SKI Report 2007:21

Research

# On tentative decommissioning cost analysis with specific authentic cost calculations with the application of the Omega code on a case linked to the Intermediate storage facility for spent fuel in Sweden

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SKI

# SKI perspective

## Background

The nuclear power utilities must under the Act on the Financing of the Management of Certain Radioactive Waste etc. (1988:1597), sometimes referred to as the "Studsvik Act", fund 0,3 öre[1] per kWh produced by utilisation of nuclear power.

The Swedish parliament has decided that all current and future expenses for the decontamination and decommissioning of older historic waste from Swedish nuclear installations shall be financed by funds generated by support of the "Studsvik Act". Thus, the task to inject capital into the Swedish Nuclear Waste Fund is crucial for the long-term sustainability of this financing system. SKI must therefore supervise that provisions to the fund reflect the actual as well as future authentic cost that are needed to decontaminate and dismantle these older nuclear facilities.

## Purpose of the project

The aim of this applied study has been to demonstrate how a cost calculation is done in a systematic way. The framework of the project has been limited to older nuclear installations in Sweden. Furthermore, it may be envisaged that the process of making regular estimates of all the parameters is crucial in preparatory phases of decommissioning and dismantling processes. A secondary aim of the presented project has been to define and present a comprehensive procedure for how to prepare an overall description of all qualified input data that ought to be used in the earlier planning phases of decommissioning projects. Such parameters as costs, exposure times, duration times, amounts of waste, manpower and manpower allocation as well as equipment needed has to be estimated.

## Results

The study illustrates that cost can be estimated, described and presented by application of a model which takes into account the different steps in the planning process. In this project the costs for an authentic nuclear installation has been calculated and scrutinised.

This report is part of an active learning process of how advanced costing methodology can be applied in a way so that the quality of cost calculations of smaller older nuclear installations are enhanced and developed.

The study not only illustrates how an efficient technical planning is obtainable, but also gives knowledge of how specific and solid estimates of the future cost may be arranged and presented with the use of sound didactic techniques. The tentative capital budgeting shows a future cost of more than 4 300 000 euros (this corresponds to around 40 million SEK at current cost level).

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[1] Approximately 0,03 European cents.

## Continued work

This study indicates that there is a need to develop a more comprehensive platform of decommissioning cost data in order to create prudent cost estimates.

A step in this line of applied research can be to find a systematic way to collect, handle and analyse cost and cost data for decontamination and decommission of a particular nuclear installation, or sets of nuclear installations, from different countries.

## Contribution to SKI work

SKI will be able to use the result from this applied study in the monitoring of yearly cost estimates that are the basis for suggestion of an appropriate level of the fee for year 2008. This estimated future costs are calculated and presented by the following companies; AB SVAFO, Vattenfall AB and Studsvik Nuclear AB. The study will therefore support the present review process regarding estimated dismantling costs of nuclear installations located at the Studsvik site.

## Project information

Staffan Lindskog has Co-ordinated this applied research project. Marek Vasko has been responsible for the steering and realisation of the project. Staffan Lindskog, Marek Vasko and Vladimir Daniska are responsible for the disposition of the report. Crucial parts of the analysis have been done by Kristina Kristofova, Peter Bezák and Frantisek Ondra. Peter Tatransky and Matej Zachar has participated in some parts of the project.

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**CONTENTS**

# ABSTRACT

The presented report is focused on tentative calculations of basic decommissioning parameters such as costs, manpower and exposure of personnel for activities of older nuclear facility decommissioning in Sweden represented by Intermediate storage facility for spent fuel in Studsvik, by means of calculation code OMEGA.

This report continuously follows up two previous projects [1], [2], which described methodology of cost estimates of decommissioning with an emphasis to derive cost functions for alpha contaminated material [1] and implementation of the advanced decommissioning costing methodology for Intermediate Storage facility for Spent Fuel in Studsvik [2].

The main purpose of the presented study is to demonstrate the trial application of the advanced costing methodology using OMEGA code for Intermediate Storage Facility for Spent Fuel in Studsvik. Basic work packages presented in report are as follows:

1. Analysis and validation input data on Intermediate Storage Facility for Spent Fuel and assemble a database suitable for standardised decommissioning cost calculations including radiological parameters,
2. Proposal of range of decommissioning calculations and define an extent of decommissioning activities,
3. Defining waste management scenarios for particular material waste streams from Intermediate Storage Facility for Spent Fuel,
4. Developing standardised cost calculation structure applied for Intermediate Storage Facility for Spent Fuel decommissioning calculation and
5. Performing tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code.

Calculated parameters of decommissioning are presented in structure according to Proposed Standardized List of Items for Costing Purposes [6]. All parameters are documented and summed up in both table and graphic forms in text and Annexes.

The presented report documents availability and applicability of methodology for evaluation of costs and other parameters of decommissioning in a form implemented within calculation code OMEGA for calculations of Intermediate Storage for Spent Fuel in Studsvik.

# ABSTRAKT

Predkladaná správa sa zaoberá predbežnými výpočtami základných parametrov vyraďovania menovite nákladmi vyraďovania, prácnosťou a ožiarením personálu počas činností vyraďovania pre staršie jadrové zariadenie reprezentované Medziskladom vyhoreného paliva v Studsviku pomocou výpočtového prostriedku OMEGA.

Správa kontinuálne nadväzuje na dva predchádzajúce projekty [1], [2], ktoré popisovali metodiku výpočtu parametrov vyraďovania pomocou výpočtového prostriedku OMEGA so zreteľom na prítomnosť alfa kontaminovaných materiálov [1], resp. implementáciu pokročilej metodiky oceňovania nákladov pre Medzisklad vyhoreného paliva v Studsviku [2].

Hlavným cieľom predkladanej správy je demonštrovať skúšobnú aplikáciu pokročilej metodiky oceňovania nákladov implementovanú v o výpočtovom prostriedku OMEGA pre Medzisklad vyhoreného paliva v Studsviku.

Základné pracovné balíky prezentované v predkladanej správe sú nasledujúce:

1. Analýza a overenie vstupných dát pre inventár Medziskladu vyhoreného paliva v Studsviku a zostavenie inventárnej a výpočtovej databázy vhodnej pre výpočty, vrátane rádiologických parametrov
2. Návrh rozsahu výpočtov vyraďovania a definovanie rozsahu činností vyraďovania
3. Definovanie spracovateľských scenárov pre jednotlivé materiálové toky RAO vzniknutých z vyraďovania Medziskladu vyhoreného paliva v Studsviku
4. Vypracovanie štandardizovanej výpočtovej štruktúry aplikovanej pre Mokrý medzisklad vyhoreného paliva v Studsviku
5. Vykonanie výpočtov parametrov vyraďovania pre Medzisklad vyhoreného paliva v Studsviku

Vypočítané parametre vyraďovania sú uvádzané v štruktúre podľa Proposed Standardized List of Items for Costing Purposes [6]. Všetky parametre sú zdokumentované a zhodnotené v tabuľkovej a grafickej podobe v texte správy ako aj v prílohovej časti.

Predkladaná správa dokumentuje použiteľnosť metodiky pre stanovanie nákladov a ďalších parametrov vyraďovania, tak ako je implementovaná vo výpočtovom prostriedku OMEGA, pre výpočty pre Medzisklad vyhoreného paliva v Studsviku.

# ABBREVIATIONS

| | |
|---|---|
| CC | contamination class |
| CS | carbon steel |
| EU | European Union |
| FRC | fibre reinforced concrete |
| FRC | fibre reinforced concrete |
| IAEA | International Atomic Energy Agency |
| LLW/ILW | Low Level Wastes/Intermediate Level Wastes |
| LRAW | Liquid RAW |
| NPP | Nuclear power plant |
| OECD | Organization for Economic Co-operation and Development |
| PP | Polypropylene |
| PSL | A Proposed Standardised List of Items for Costing Purposes |
| RA | Radioactive |
| RAW | radioactive waste |
| SS | stainless steel |
| WP | work package |

# 1. INTRODUCTION

The planning and implementation of decommissioning strategies for nuclear facilities requires a careful cost calculation analysis of the whole process. Since the number of decommissioning projects has increased an application of standardised cost structure seems to be a solution in order to achieve transparent, traceable and comparable results with various decommissioning projects in various countries.

This report is the result of successful Swedish Nuclear Power Inspectorate (SKI) cooperation with Slovak team of decommissioning experts since 2004. The study below continues on findings and suggestions that were presented in two previous research projects:

- "A model Study of Cost Estimates of Decontamination and Decommissioning with an Emphasis to Derive Cost Functions for Alpha-Contaminated Material Using OMEGA Code" – final report [1] issued in December 2004.
- "An Applied Study of Implementation of the Advanced Decommissioning Costing Methodology for Intermediate Storage Facility for Spent Fuel in Studsvik, Sweden with special emphasis to the application of the OMEGA code" - final report [2] issued in December 2005.

The later research project on Intermediate Storage Facility for Spent Fuel was concentrating mainly on an analysis of decommissioning costs for the Intermediate Storage Facility for Spent Fuel in Studsvik prepared by the SVAFO company [3] and a proposal of the advanced decommissioning costing methodology application. Based on results and recommendations of the final report [2] a new research project has been developed as a further step to implement a standardised decommissioning costing on specific older Swedish nuclear installation.

The pre-requisite for implementation of the advanced costing methodology for Intermediate Storage Facility for Spent Fuel stressed out in the project 2005 was mainly developing the inventory database and calculation databases with standardised structures to achieve transparent, traceable and directly comparable decommissioning costs and other decommissioning parameters with other decommissioning projects in other countries.

Therefore, the main purpose of the presented study is to demonstrate the trial application of the advanced costing methodology using OMEGA code for Intermediate Storage Facility for Spent Fuel in Studsvik. In order to perform tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code it has been necessary to:

1. analyse and validate input data on Intermediate Storage Facility for Spent Fuel and assemble a database suitable for standardised decommissioning cost calculations including radiological parameters,
2. propose range of decommissioning calculations and define an extent of decommissioning activities,
3. define waste management scenario for particular material waste streams from Intermediate Storage Facility for Spent Fuel,
4. develop standardised cost calculation structure applied for Intermediate Storage Facility for Spent Fuel decommissioning calculation and
5. perform test decommissioning calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code.

The above mentioned activities represent the project work packages (WP) referred in the SKI Letter of Authorisation [4], dated April 28, 2006 are specified in detail in the following chapters of this document.

OMEGA code tentative decommissioning cost calculations for Intermediate Storage Facility for Spent Fuel in Studsvik presented in the study are performed and evaluated for different radioactive waste treatment scenarios:

- Scenario S1: Wet bath post-dismantling decontamination equipment for iron/steel radwaste and melting equipment for iron/steel radwaste are available at decommissioning site.
- Scenario S2: Wet bath post-dismantling decontamination equipment for iron/steel radwaste is available at the site.

- Scenario S3: Melting equipment for iron/steel radwaste is available at the site.
- Scenario S4: Neither wet bath post-dismantling decontamination equipment for iron/steel radwaste nor melting equipment for iron/steel radwaste are available at the site.

Main decommissioning parameters such as costs, manpower, collective dose equivalent and distribution of materials arisen from decommissioning are calculated for all the above applied radioactive waste treatment scenarios in decommissioning calculations for Intermediate Storage Facility for Spent Fuel in Studsvik by OMEGA code. In addition to numerical values and their graphical expressions of these main decommissioning parameters, a time schedule of calculated decommissioning activities for Intermediate Storage Facility for Spent Fuel in MS Project is also presented.

Consequently, the results of performed tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code are analysed and discussed. Finally the summary of project results and proposals for continuation of the project are provided.

# 2. TENTATIVE DECOMMISSIONING CALCULATIONS BY OMEGA CODE FOR INTERMEDIATE STORAGE FACILITY FOR SPENT FUEL IN STUDSVIK

The aim of tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel in Studsvik is to demonstrate the trial application of the advanced costing methodology by using OMEGA code on available inventory data from older nuclear facility in Sweden represented by Intermediate Storage facility for Spent Fuel in Studsvik.

Therefore this chapter gives a short characteristics of Intermediate Storage Facility for Spent Fuel as an object of decommissioning calculations and describes main features of decommissioning calculation code OMEGA. At last a brief information developed in detail in further chapters on extent and conditions for decommissioning calculations is also provided.

## *2.1 SHORT DESCRIPTION OF INTERMEDIATE STORAGE FACILITY FOR SPENT FUEL*

Intermediate Storage Facility for Spent Fuel in Studsvik was chosen as an example of older nuclear facility for the tentative decommissioning calculations. The reason for the choice was an information on technological and building inventory taken from available documentation [3], obtained results from the previous research project for SKI carried out in 2005 [2] and information taken from technical visit of Intermediate Storage Facility for Spent Fuel in 2005.

Intermediate Storage Facility for Spent Fuel is a relatively small building located within Studsvik site, and it was used as an intermediate underwater storage facility for spent fuel from the Ågesta reactor. It was designed and built during 1962-1964 [3], [1]. As all fuel from Ågesta has been transferred to CLAB, the facility may be used for other purposes such as storage of spent fuel from other reactors, or for storage of other radioactive materials [5]. Stored fuel has originated from R1 reactor in KTH Stockholm, R2 an R2-0 reactor in Studsvik and reactor in Ågesta. Currently, the facility is being used only for the temporary storage of spent nuclear fuel from the research reactors R2 and R2-0.

As an interim spent fuel storage the Intermediate Storage Facility for Spent Fuel comprises three storage basins. In the cellar floor there are located the process equipment, tanks, ion-exchangers, heating and compressor units and technological piping. Three store basins, offices and changing rooms are located on the ground floor. The storage basins are constructed as monolith reinforced concrete unit lined with epoxy painting. Their depth is 8.2, and the diameter is 3.8 meters. Upper floor includes ventilation equipment and de-ionized water storage tank.

There are 111 fuel assemblies stored in one of storage pools, which comprises 118 kg of spent fuel [5]. This spent fuel has to be removed and transported to other storage facility before the start of decommissioning work.

Concerning the radiological situation, Co-60 is expected to be the main contaminant of Intermediate Storage Facility for Spent Fuel [2]. Radioactive contamination of process equipment is expected mainly on the internal area of pipes, tanks and other components and much less on exterior surfaces. The surface dose rates on pipework in the facility cellar vary between 0.01 and 2mSv/h [3]. These values indicate the need of decontamination for a great portion of equipment surfaces to meet the release criteria according to SSI regulation SSI FS 1996:2.

Radioactive contamination of building structures can be found in significant levels mainly in the restricted areas with components (piping, tanks) or in places with more or less radioactive material free handling. Surfaces in the hall have a yellow classification, which implies activities of between 40 and 400 kBq/m$^2$ ($\beta$,$\gamma$) and between 4 and 40 and 400 kBq/m$^2$ ($\alpha$) [3].

In the case of decontamination basin it is assumed that activity can occur behind the lining (10% of the surface to a depth of approx. 2 cm). Within the fuel storage basins the concentration of activity has been of order of MBq/m$^3$. At the same time it is assumed those internal wetted surfaces are penetrated by radioactivity (10% of the surface to a depth of approx. 5 cm). These surfaces need to be decontaminated or removed respectively.

For estimating contamination levels for components, the SVAFO study uses a method of conversion factors between surface dose rate measurements and specific activity of given component.

Available data are rather descriptive therefore the conservative approach for definition of radiological properties was applied (chapter 3.1.4).

Concerning the end point status of Intermediate Storage Facility for Spent Fuel a green field is considered with remediation and landscaping of area after final demolishing of building.

## *2.2 BRIEF DESCRIPTION OF DECOMMISSIONING COST CALCULATION CODE OMEGA*

For the performance of tentative cost calculations for Intermediate Storage Facility for Spent Fuel decommissioning planning Omega calculation code has been chosen.

The computer code OMEGA, developed at DECOM Slovakia, is an option oriented calculation and optimization code for applications in decommissioning decision making processes for nuclear facilities of various types and radiological properties with following purposes:

1. Definition of the set of decommissioning calculation options according to the standardised structure for facilities with various building and technology inventory structure and with various radiological parameters.
2. Calculation of costs and other decommissioning parameters (such as manpower needs, collective dose equivalent, waste distribution from decommissioning process etc.) for individual calculation options, for calculated data processing and evaluation.
3. Optimisation of individual calculation options and waste management within the individual options.
4. Comparison of options and selection of the most suitable one based on multi attribute analysis.

Basic properties of the calculation code OMEGA for applications on the level of the calculation options [2]:

- Activity based costing was implemented based on the Proposed Standardised List of Costs Items (PSL) [6] issued commonly by OECD, IAEA and EC which enables to use the code for various types of nuclear facilities.
- Automatic generation of the standardised calculation structure based on template calculation structures, conditions defined by the user and based on inventory data. Structures with approx. 60 000 items were generated and used. This automatic generation of the calculation options facilitates significantly the multi option work.
- The code was originally developed for Jaslovske Bohunice A-1 NPP costing with complicated radiological situation. A new concept of calculation modelling of material and radioactivity flow control was implemented in order to increase the accuracy of calculation and for optimisation of radioactive waste management. The code can be used for facilities with various radiological states. The accuracy of calculation of decommissioning parameters is significantly higher then using the traditional costing methodologies where the amounts of waste are estimated.
- The calculation process is nuclide-resolved. This enables to use limits on the nuclide level for treatment / conditioning / disposal / release (unconditional and conditional) of materials as well as calculation of the radioactivity decay to study the effect of deferred activities.
- On-line optimisation of decommissioning options in standard Microsoft Project software using the work breakdown structure, constructed as the upper layer over the standardised structure.

The pre-requisite for efficient work with the OMEGA code is the inventory database of the facility with relevant systems, buildings and radiological data and the calculation database with relevant data for processes, profession / work time data, material / nuclide data and other data.

Main calculated parameters are costs in standardised structure, manpower and exposure items (total values and profession resolved items), material items and nuclide resolved radioactivity items linked to these material items (so called waste distribution), time parameters such as starts and duration of elementary activities and of phases of the process and equipment planning items.

Based on described features of OMEGA code decommissioning calculation a simplified scheme of OMEGA data processing can be created:

Fig. 2-1 Simplified scheme of OMEGA data processing

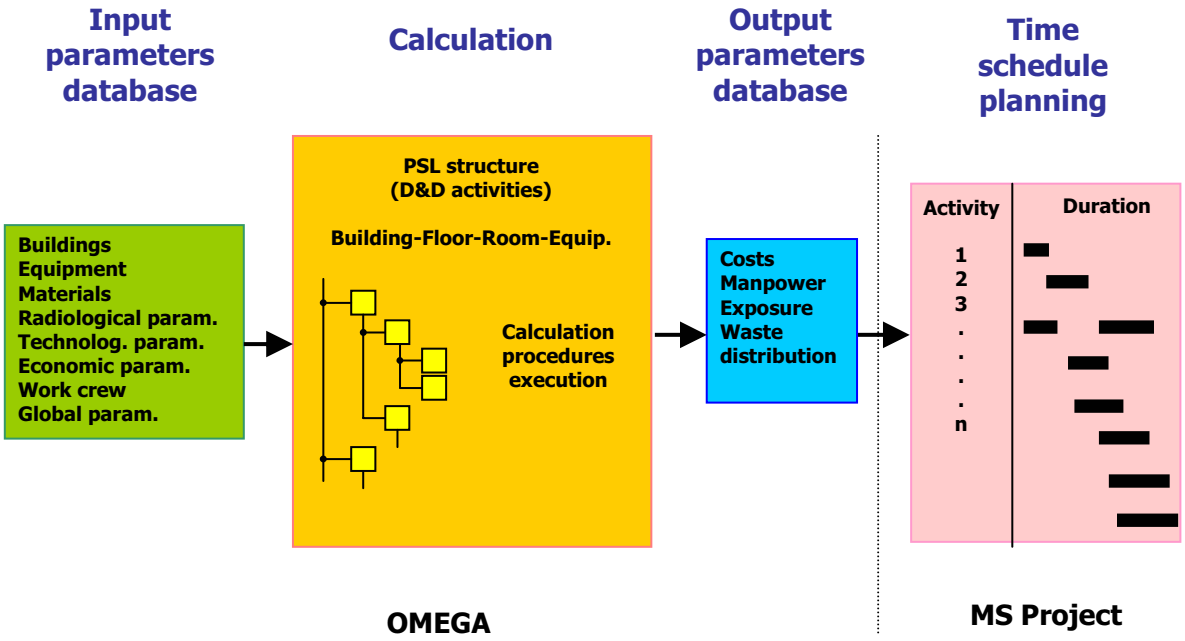
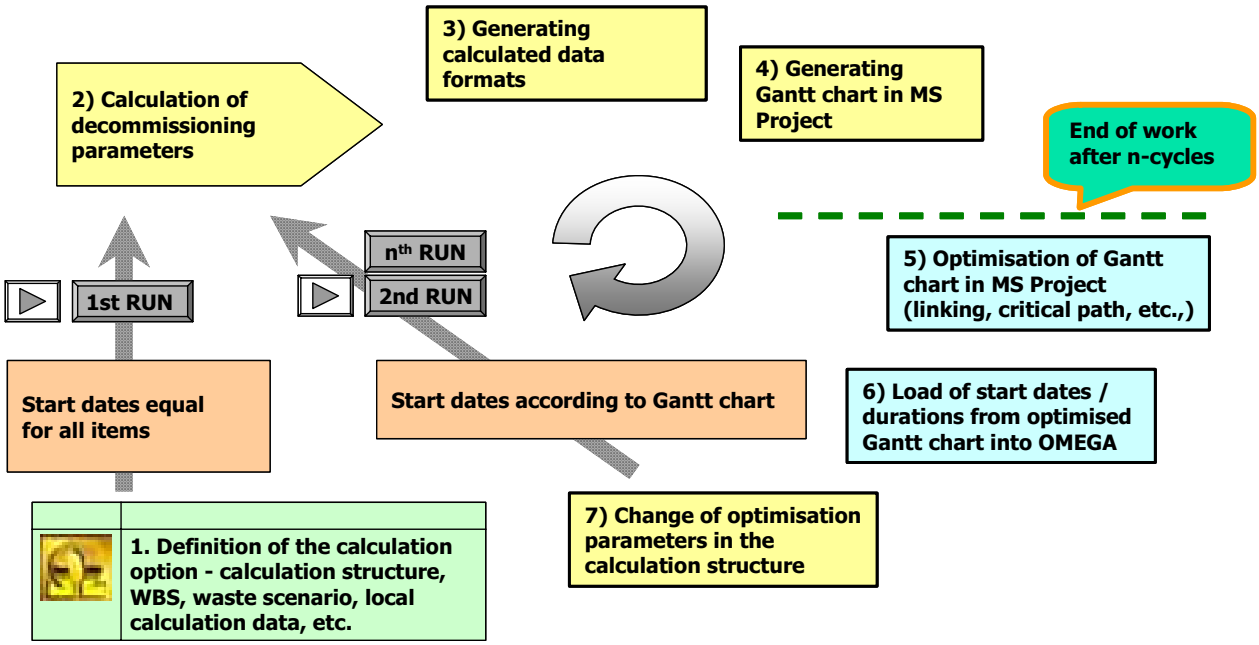



Fig. 2-1 identifies input/output data, decommissioning process calculation and its time schedule planning possibilities. Displayed OMEGA input database applied in tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel are characterised in detail within chapter 3.

The work with OMEGA for management of the decommissioning calculation option has an iterative character with following main steps displayed on Fig. 2-2:

1. Definition of the calculation option - calculation structure, WBS, waste scenario, local calculation data, extent of calculation, etc.
2. Calculation of parameters in the first calculation run with equal start dates.
3. Generating calculated data formats.
4. Generating Gantt chart in MS Project.
5. Optimisation of Gantt chart in MS Project (linking, critical path, etc.,).
6. Load of start dates / durations from optimised Gantt chart into OMEGA, change of optimisation parameters in the calculation structure.
7. Calculation of decommissioning parameters with start dates derived from the Gantt chart, calculation of so called “optimised” decommissioning option. Repeated calculations with start dates derived from Gantt chart up to achieving the finally optimised decommissioning option ready for multi-attribute analysis of individually calculated / optimised / evaluated projects.

Fig. 2-2 Graphical interpretation of main steps of the iterative work with Omega




Principles of algoritmisation of costs calculation in Omega can be summarised as follows:

1) What to do - management of the standardised calculation structure. Definition of decommissioning activities and extent of calculation
2) How to do - management of calculation conditions. Definition of calculation procedures, definition of local calculation input data and correction factors
3) In what sequence - management of material / radioactivity flow in decommissioning by definition of calculation sequence and by data linking of calculation procedures (calculation modelling of decommissioning process)
4) At what time - management of time in decommissioning by on-line optimisation of decommissioning time schedule with feed-back to the calculation structure supported by dynamical recovery of radiological parameters.

## *2.3 CONDITIONS FOR TENTATIVE DECOMMISSIONING CALCULATIONS*

Tentative decommissioning calculations using OMEGA code are performed for Interim Storage for Spent Fuel in Studsvik. For these calculations, an inventory database of Intermediate Storage Facility for Spent Fuel comprised in the SVAFO decommissioning study [3] is used as the primary source of input data. However the results from analyses of the SVAFO study for Intermediate Storage Facility for Spent Fuel documented in the previous Slovak-Swedish research project [2] were also taken into account as the source of information, especially the part devoted to the “Discussion on input data”.

Since big efforts and works have been done in the field of preparation of input data for Intermediate Storage Facility for Spent Fuel tentative decommissioning calculations, separate chapter 3 describes development of input datasheets for Intermediate Storage Facility for Spent Fuel in Studsvik. It must be stressed out that except of Intermediate Storage Facility for Spent Fuel inventory database all necessary calculation data are based on international and Slovak input parameters characterizing the decommissioning process and its individual activities from preparatory activities through dismantling up to waste treatment and disposal of radioactive waste. Moreover, Slovak waste management scenarios as well as end points - repositories or release into environment together with their radiological limits are applied.

This approach of combination of Intermediate Storage Facility for Spent Fuel inventory database and a database of Slovak calculation parameters was applied to make first tentative calculations for demonstration of using advanced decommissioning costing calculations for Swedish older facility.

Decommissioning activities included in the presented calculations for Intermediate Storage Facility for Spent Fuel are divided into following categories:

- Preparatory activities
- Dismantling activities
- Decontamination of building surfaces
- Final building radiation survey
- Post-dismantling decontamination of technological equipment
- Waste management activities: Sorting of dismantled material, treatment and conditioning activities of dismantled material, packaging, transportation and disposal activities.
- Demolition, site restoration and release of the site
- Management and support decommissioning activities.

Main features of individual decommissioning activities included in tentative calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code are described in more detail in chapters 4 and 5.

Within tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel by OMEGA code there were several radioactive waste treatment scenarios evaluated:

- Scenario S1: Wet bath post-dismantling decontamination equipment for iron/steel radwaste and melting equipment for iron/steel radwaste are available at decommissioning site.
- Scenario S2: Wet bath post-dismantling decontamination equipment for iron/steel radwaste is available at the site.
- Scenario S3: Melting equipment for iron/steel radwaste is available at the site.
- Scenario S4: Neither wet bath post-dismantling decontamination equipment for iron/steel radwaste nor melting equipment for iron/steel radwaste are available at the site.

For all performed decommissioning calculations the set of the following output parameters divided into two groups were evaluated and discussed:

1. **Main general decommissioning parameters** - these parameters characterize decommissioning option from the overall manager point of view. Costs, manpower and collective dose equivalent are included in this category.
   - Costs - integral parameter, sensitive to any change of input decommissioning parameters. Summarize subtotal costs items connected with decommissioning activities - labour costs, investment costs, expenses and contingency.
   - Manpower – represents the sum of overall work carried out during the decommissioning process and is influenced mainly by radiation situation and working conditions.
   - Collective dose equivalent - represents the sum of all individual dose equivalents for all decommissioning personnel. Depends on individual dose rates at workplaces during work execution and manpower needs of individual work processes.

2. **Distribution of materials arisen from decommissioning** - these parameters characterize decommissioning option from the dismantled material distribution point of view. This category contains mass distribution of given materials either destined to repositories or released into environment respectively:
   - Material released to environment after dismantling – directly released material without application of post-dismantling decontamination.
   - Material released to environment after decontamination – dismantled material released after post-dismantling decontamination without melting.

- Material released to environment after melting - dismantled material released after post-dismantling decontamination and consequent melting or direct melting.
- Material destined to near-surface repository – non-releasable material placed in fibre reinforced concrete (FRC) containers for near-surface repository disposal.
- Material destined to deep geological repository - non-releasable material placed in containers for deep geological repository disposal.

Given calculated parameters are evaluated and compared numerically and graphically for the above mentioned 4 radioactive waste treatment scenarios.

# 3. DEVELOPMENT OF DATASHEETS FOR THE INPUT DATA APPLIED IN CALCULATIONS

Input database needed for calculations in OMEGA code is in principle created by two main types of input data:

- Inventory data – parameters characterizing decommissioned facility
- Calculation data – parameters characterizing decommissioning process.

Extent of both types of data is large. In the case of inventory data it means to create a database of facility in buildings – floors – rooms – equipment structure with their tables. This database includes hundreds of parameters describing physical and radiological parameters of facility e.g. dimensions, area of surfaces, weight, inner volume of equipment, contaminations, dose rates, nuclide vectors, categories of equipment etc.

Calculation database is even larger and consists of huge amount of tables with parameters characterizing decommissioning process with its individual activities. These parameters are heterogeneous; they include e.g. cost unit factors, consumption unit factors, parameters of working groups, time duration parameters, and a lot of other parameters needed for mathematical description of decommissioning process.

In this chapter only most significant and relevant parameters which are used for purposes of Intermediate Storage Facility for Spent Fuel calculations are mentioned. Developed datasheets with inventory database data and selected calculation data are included as separate Annexes due to their large extent.

## *3.1 FACILITY INVENTORY DATA*

For the purpose of decommissioning cost calculations using OMEGA code, an input database of Intermediate Storage Facility for Spent Fuel at Studsvik has been created. Creation of inventory database is one of the main and thee most time-consuming preparatory activities for decommissioning calculations.

The inventory database encompasses all essential data which characterize Intermediate Storage Facility for Spent Fuel. This database is a baseline for performing any decommissioning calculation of the facility. It includes characterization of physical, material and radiological properties of individual equipment, building structures and rooms within facility. Whole inventory database is structured in logical hierarchical structure building – floors – rooms – equipment. It means that all equipment is assigned to given room, floor and building and is fully traceable within this inventory database structure.

For the purposes of inventory database creation, the SVAFO study [3] was used as the only available source of information. Data which were missing and were necessary for purposes of OMEGA calculations where evaluated by calculations (Microshield, Excel) from available indicia in the SVAFO study or expert judgement. Especially radiological data and some building structure data listed in the previous research project from 2005 within “The SVAFO study input data validation” [2].

As it was previously mentioned database structure consists of database tables of buildings, floors, rooms and equipment. Individual database tables with their content are described in the text below. Complete database is attached in Annexes 1.1 – 1.3.

### 3.1.1 Database of buildings

Only one building is used for purposes of Intermediate Storage Facility for Spent Fuel –storage building. This building contains all equipment (technological equipment and building structures) which is being a subject of decommissioning.

### 3.1.2 Database of floors

Intermediate Storage Facility for Spent Fuel is formed by main building with three floors: cellar, ground floor and first floor.

Floors have no significant description in inventory database. They are used only for accurate localization of rooms within calculation structure.

### 3.1.3 Database of rooms

In this table, all rooms within Intermediate Storage Facility for Spent Fuel are listed. Each room is characterized by several parameters, such as:

- Identification number of the room,
- Reference to the floor and building,
- Number of the room,
- Name of the room,
- Dimensions of the room,
- Average dose rate inside the room,
- Nuclide vector of dose rate,
- Reference date for dose rate [DD.MM.YYYY].

All of these parameters are required by OMEGA code during development of decommissioning calculation structure and calculation itself.

Rooms are assigned to individual floors:

The cellar floor contains sixteen rooms (room numbers 0.01 – 0.16) comprising active as well as inactive process equipment such as heating and compressor units, electricity and communication facilities, tanks and ion-exchangers.

The ground floor contains seventeen rooms (room numbers 1.01 – 1.18 ) which are occupied mainly by storage basins, offices and changing rooms. Part of comprised technological equipment in storage hall is active but most of other rooms comprise inactive equipment.

For purposes of calculation, there was also created an extra item for so-called “virtual room” (room number 1.18) in the room database. This room was created for purposes of placement of building structures and building surfaces added to the equipment database – see end of chapter 3.1.4.

The upper floor contains five rooms (room numbers 2.01 – 2.05) containing ventilation equipment, together with a deionised water storage tank. Active equipment are placed only in the room 2.02, other rooms contain inactive equipment.

There was a lot of missing data concerning room dimensions, average dose rates, dose rate nuclide vector and reference date of nuclide vector evaluation. These data have been completed:

**Room dimensions** were completed on the basis of site visit (2005) and evaluation based on purpose of the room. Dimensions of storage basins (height and diameter) were transformed to cubic dimensions (width, length, height) whereas the areas of storage basins walls remained unchanged.

**Average dose rate** in rooms was approximately evaluated from the occurrence of active and inactive equipment in room.

**Dose rate nuclide vector** is 100% Co-60 and was evaluated on the basis of the SVAFO study, which mentioned only Co-60 as a dominant nuclide for dose rates within Intermediate Storage Facility for Spent Fuel.

**Reference date for dose rate** was not known from the SVAFO study. It was decided to use year 2001 as a date of dose rate evaluation which also is the year when the SVAFO study was issued. This date is used for calculation of dose rate decrease with time.

All rooms are assigned to controlled are since there is no relevant available data on controlled area borders within Intermediate Storage Facility for Spent Fuel.

Completed database implemented into OMEGA code is listed in Annex 1.2.

### 3.1.4 Database of equipment

The main portion of input inventory database is created by database of equipment. It means technological equipment e.g. pipes, valves, tanks, ventilation, motors etc. and also building structure equipment such as walls and building materials. Both of these types of equipment should be taken into inventory database for calculation of decommissioning parameters. In most cases, individual technological equipment located in the room corresponds to particular database items. Each database item within Intermediate Storage Facility for Spent Fuel in Studsvik is characterized by relevant parameters as follows:

- Identification number of technological or building equipment – identification of database item within the database
- Name of technological or building equipment
- Number of room to which technological or building equipment is assigned
- Weight of technological or building equipment [kg]
- Inner surface of technological equipment [$m^2$]
- Outer surface of technological or building equipment [$m^2$]
- Inner surface contamination of technological equipment [$Bq/m^2$]
- Outer surface contamination of technological or building equipment [$Bq/m^2$]
- Nuclide vector of inner surface contamination – represents an average isotopic composition of inner surface contamination source [%]
- Reference date for inner contamination and nuclide vector of inner surface contamination [DD.MM.YYYY]
- Nuclide vector of outer surface contamination – represents an average isotopic composition of outer surface contamination source [%]
- Reference date for outer contamination and nuclide vector of outer surface contamination [DD.MM.YYYY]
- Dose rate nearby technological or building equipment – dose rate 0.5 m from the surface of the technological or building equipment [μGy/h]
- Nuclide vector of dose rate – represent an average isotopic composition of dose rate source [%]
- Reference date for dose rate and nuclide vector of dose rate [DD.MM.YYYY]
- Inner volume of technological equipment – parameter used only for pre-dismantling decontamination by autonomous circuits (not necessary for all equipment)
- Category of technological or building equipment – characterizes type, shape, dimensions and material composition of technological or building equipment. This parameter is used for assignment of default dismantling and demolition procedures.

The data for characterization of individual equipment are based on the SVAFO study information where individual technological equipment is characterized by the following parameters: quantity, category of equipment, mass, sort of material, typical dimensions of given equipment, volume and mass of particular equipment components. Listed technological equipment in the SVAFO study are divided into two groups – active and inactive.

Missing and insufficient data, needed for completion of inventory database for OMEGA code purposes, were obtained by modelling calculations or by evaluation or judgement based on experience. The missing or insufficient data were evaluated for these input parameters:

**Inner and outer surface of equipment** were completed for each of technological or building (only outer surface area) equipment items. Values of areas were calculated on the basis of dimensions published in the SVAFO study and on the basis of building structure weight (for building equipment surfaces) and also they were based on expert judgement.

**Nuclide vector of inner and outer surface contamination.** The SVAFO study database does not include any detail information on nuclide composition of contamination of technological or building equipment. Co-60 is the only mentioned nuclide. However regarding to the history and purpose of facility as an interim storage for spent fuel from older rectors, also Cs-137, Sr-90 and some alpha contaminants can be expected to occur in contamination. It is documented that during the storing of the spent fuel also some fuel assemblies were stored with occurrences of leakages [12]. Therefore, based on the experience from older facilities, and applying the conservative approach (chapter 2.1) we proposed to use a tentative nuclide vector which simulates abundance of the above mentioned nuclides in contamination of surfaces. Abundance of Cs-137 is proposed to be around 1/10 of Co-60. Activity of Sr-90 is simulated to be around 1/10 of Cs-137 and activity of alpha contaminants is proposed to be 1/10 of Sr-90. Am-241 and Pu -241 are proposed as typical representatives of alpha contaminants. Nuclide composition and abundance of nuclides on contamination is then as follows:

- Co-60 90,0% half life – 5,27 y
- Cs-137 8,9% half life – 30,00 y
- Sr-90 1,0% half life – 28,78 y
- Am-241 0,05% half life – 432,20 y
- Pu-239 0,05% half life – 24 110,00 y

Proposed nuclide vector is used both for inner and outer surfaces.

**Nuclide vector of dose rate** was chosen the same as for average dose rate in rooms – 100 % Co-60.

**Contamination of inner surface**. As contaminated equipment we regarded only active equipment mentioned in the SVAFO study. There are no data on inner surface contamination for any active equipment within study. The only relevant data which could be used are based on indicia which tell that "…radioactive contamination of process equipment is expected mainly on the internal area of pipes, tanks and other components and much less on exterior surfaces…" [3]. There is only the remark in the SVAFO study that: "The surface dose rates on pipework in the facility cellar vary between 0.01 and 2mSv/h" [3]. For estimating contamination levels for components, the SVAFO study uses a method of conversion factors between surface dose rate measurements and specific activity of given component.

Radioactive contamination of building structures can be found in significant levels mainly in the restricted areas with components (piping, tanks) or in places with more or less radioactive material free handling.

For calculation purposes, OMEGA code needs values of contamination for individual active equipment. The only way how to obtain these values without any radiological measurements is to make some approximate simulation of contamination distribution within active components.

Based on this information and requirements, we decided to simulate distribution of contamination levels for active equipment based on methodology of contamination classes. This simulation is relatively extensive and time-consuming.

Simulation based on this methodology is only provisional and approximate and is used when no relevant data for better characterization of contamination are available. This approach of contamination classes within active equipment consists of several steps:

1. identification of range ($Bq/m^2$) in which contamination can vary
2. dividing of this range into several intervals (e.g. four) of contamination level – contamination classes
3. evaluation of percentage for partitioning of active equipment among this classes. This partitioning should be based on analogy with known contamination distribution from types of systems or equipment with similar contamination composition
4. inserting of new database items for parts of active equipment based on number of contamination classes and dividing of weight, areas and volumes of original equipment among this new items. Dividing of weight, areas and volumes is based on percentage for partitioning.

### *1. Identification of contamination range for active equipment of Intermediate Storage Facility for Spent Fuel*

For stipulation of boundary values of inner surface contamination we have used two available information from the SVAFO study:

- dose rates on pipework in the facility cellar vary between 0.01 and 2mSv/h
- estimated conversion factors between dose rates (μSv/h) and specific activity (Bq/kg) for piping (diameters of 50-150 mm) are 3-10 kBq/kg per μSv/h for steel pipework and 20-100 kBq/kg per μSv/h for plastic pipework.

Based on these information, some other approximations and calculations for transforming Bq/kg to Bq/m$^2$ values for pipeworks was evaluated leading to setting of approximate margins for contamination that can vary from 5.10$^6$ Bq/m$^2$ to 1.10$^9$ Bq/m$^2$. We have used these margins for inner contamination range of all active components.

### *2. Dividing of contamination range into intervals of contamination level*

Further step was to determine some intervals for contamination levels within calculated margins. Due to simplicity and tentative character of decommissioning calculations we have decided to create only four contamination classes for simulation of contamination distribution within active equipment. Proposed values of contaminations within individual contamination classes are shown in the next table together with dose rates matching to individual contamination classes.

Tab. 3.1 Contamination classes

| Contamination class | Contamination [Bq/m2] | Dose rate [μGy/h] |
|---|---|---|
| CC 1 | 5.00E+6 | 10 |
| CC 2 | 5.00E+7 | 100 |
| CC 3 | 5.00E+8 | 1000 |
| CC 4 | 1.00E+9 | 2000 |

Contamination of classes increases by a factor of 10 except of last contamination class CC4 which is only 5 times higher then CC3 to fit into upper margin of contamination range (1.10$^9$ Bq/m$^2$).

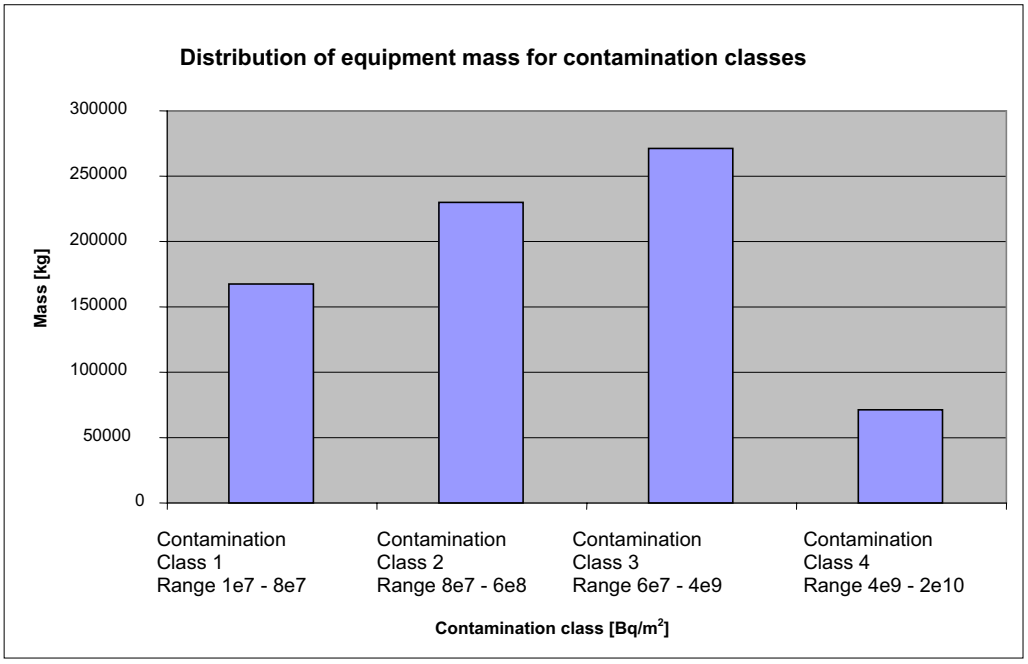
### *3. Evaluation of percentage for partitioning of active equipment among contamination classes*

Mass distribution of primary circuit pipes in NPP A-1, Jaslovske Bohunice, Slovakia, was used for this percentage evaluation. There are two reasons for using A-1 primary circuit piping data:

1. Nuclide composition of A-1 NPP contamination (inner surfaces of primary piping) is similar to the nuclide composition proposed for Intermediate Storage Facility for Spent Fuel (abundance of Co-60, Cs-137, Sr-90, alpha )
2. Good availability of contamination and weight data based on real measurements from A-1 NPP primary circuit piping characterization

Contamination range of A-1 NPP primary circuit pipes was divided among four contamination classes in analogy with contamination classes system used in Intermediate Storage Facility for Spent Fuel (see CC1 thru CC4 in Tab. 3.1). Mass of all equipment of primary circuit was then distributed among these classes according to intervals of contamination. The result of this distribution for four contamination classes is shown on the following figure:

Fig. 3-1 Distribution of mass of A-1 NPP primary circuit pipes among four contamination classes




The ratio of equipment mass in individual contamination classes displayed on Fig. 3-1 to total mass of primary circuit piping was calculated. Resultant percentage was as follows:

- 23 % of original equipment mass for contamination class 1
- 31 % of original equipment mass for contamination class 2
- 37 % of original equipment mass for contamination class 3
- 9 % of original equipment mass for contamination class 4

***4. Creating new database items according to contamination classes for active equipment***

Every active equipment from Intermediate Storage Facility for Spent Fuel was partitioned into four parts (according to amount of contamination classes CC1 thru CC4 from Tab. 3.1). The mass and area of inner/outer surfaces of original equipment was divided among these parts by percentage stipulated above. Each part of equipment has assigned appropriate contamination level of inner surface ($Bq/m^2$) base of its contamination class.

That means every original active equipment was partitioned into four new parts each with its own mass, surfaces, and inner contamination level based on contamination class. These parts were inserted into inventory database of equipment and original equipment was removed from the database. Therefore the number of database items of technological and buildings equipment is higher in comparison to the list of equipment in the SVAFO study.

**Contamination of outer surface** for active components was evaluated based on the SVAFO study, which mentioned that surfaces in the hall had a yellow classification, which implied activities of between 40 and 400 $kBq/m^2$ ($\beta,\gamma$) and between 4 and 40 and 400 $kBq/m^2$ ($\alpha$).

Based on this information we conservatively used $4.10^5$ $Bq/m^2$ as a value for outer surface contamination for all active technological equipment and contamination of building equipment (surfaces) in the database.

**Reference dates for inner, outer contamination and dose rate.** We used the same date as in the case of room dose rate, 2001.

**Categories of equipment.** The categorization of equipment implemented in OMEGA code in compliance with information about categories used in the SVAFO study was used. Based on this approach, 34 categories for technological equipment and 9 categories for building equipment were used. The list of used equipment categories is shown in the next tables:

Tab. 3.2 Table of technological equipment categories used for equipment in the inventory database

| | Technological equipment | |
|---|---|---|
| | **Category of equipment** | **Number of database items** |
| Pipes | Piping (PE, PP ..), D25 < diameter <= D100 mm | 60 |
| | Piping (SS), D25 < diameter <= D100 mm | 78 |
| | Piping (CS), diameter =< D25 mm | 32 |
| | Piping (CS), D25 < diameter <= D100 mm | 47 |
| | Colour metals pipes | 43 |
| Valves | Valves (CS), mass <= 50 kg | 19 |
| Pumps | Pumps (CS), mass <= 50 kg | 20 |
| | Pumps (CS), mass > 50 kg, at least one dimension > 1m | 1 |
| Motors | Electric motors, mass <= 50 kg | 4 |
| Tanks and containers | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 26 |
| | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 14 |
| | Sampling boxes (CS) | 2 |
| Heat exchangers | Heat exchangers (CS), diameter <= 1m, typical wall thickness 20 mm | 7 |
| Air condition equipments | Air conditioning components - piping (CS), cross section < 0,16 $m^2$ | 40 |
| | Air conditioning systems, filter casings (CS), dimension <= 1m | 4 |
| Ventilators | Ventilators (CS), mass <= 50 kg | 1 |
| | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 8 |
| Hoisting equipments | Hoisting equipment (CS), electrical tackles | 1 |
| | Hoisting equipment (CS), cranes | 4 |
| Electric and control equipments | General electric equipment, (CS) mass <= 50 kg | 9 |
| | General electric equipment, (CS) mass > 50 kg | 8 |
| | Non-portable small equipment & instruments (CS), mass <= 50kg | 2 |
| | Non-portable small equipment & instruments (CS), mass > 50kg | 1 |
| Electric cables | Electrical cables & conductors; (Cu), 1 kV power cables | 11 |
| | Control & low-voltage cables (Cu) | 2 |
| Thermal insulation | Thermal insulations, non-metal covering | 56 |
| Casing and linings | Casing of technological equipment (CS), thickness < 100 mm | 2 |
| | Stainless steel linings, (SS) | 1 |
| Technological steel constructions | Steel constructions, (CS), hangings of piping, general hangings | 5 |
| | Steel constructions, (CS), platforms and stages | 1 |
| | Steel constructions, (CS), stairs, ladders, railings | 1 |
| | Steel constructions, (CS), dismantling appliances | 1 |
| Others equipments | Piece components (CS), mass <= 200 kg | 19 |
| | Other general equipment | 3 |
| | Gulleys, (SS) | 6 |
| **Total** | | **539** |

Tab. 3.3 Table of building equipment categories used for equipment in the inventory database

| | Technological equipment | |
|---|---|---|
| | **Category of equipment** | **Number of database items** |
| Buildings materials | Masonry | 1 |
| | Contaminated concrete | 1 |
| | Steel skeletons, (CS) | 2 |
| | Other building construction | 1 |
| | Reinforced concrete, thickness <= 400 mm | 2 |
| | Building structure - carbon steel | 1 |
| Building surface for decontamination | Building surface (cement screeding, epoxid paint) | 1 |
| | Building surface ( epoxid system) | 1 |
| | Building surface (building surfaces with low adhesion) | 1 |
| **Total** | | **11** |

There were also added some building equipment for purposes of calculation of demolition and decontamination of building surfaces in OMEGA code. They were:

- Items characterizing weight of building materials for demolition of building structures
- Weights of items needed for demolition of building structures (masonry, contaminated concrete, steel skeletons…) were adopted from the SVAFO study (Appendix 6, 8 a 9 in [3]) or were calculated on the basis of known volumes and specific weight materials also given in the SVAFO study.
- Items characterizing surfaces of building materials for decontamination of building surfaces
  * Surfaces of storage basins – area of surfaces was calculated on the basis of their dimensions (expected mechanical decontamination)
  * Surfaces of floors in active rooms – area of surfaces was calculated by summation of floor areas of rooms with active components (expected mechanical decontamination)
  * Surfaces of walls (1 m height) in active rooms - area of surfaces was calculated from dimensions of rooms with active equipment conservatively to height of 1m (expected chemical decontamination).

This building equipment was assigned to virtual room, created in database of rooms for this purpose – see chapter 3.1.3.

The complete inventory database used for calculation including all databases (floors, rooms, equipment) and items within these databases is listed in Annexes1.1 – 1.3.

## *3.2 CALCULATION DATA*

One part of input data is represented by inventory database mentioned in previous text. The second part of input data are calculation data. These data describe activities which are carried out during decommissioning process.

In OMEGA code, individual decommissioning activities are described by mathematical models. These models are represented by calculation procedures. Calculation procedures need for their run a set of calculation parameters which characterise and quantify input parameters of procedure. That includes a broad spectrum of parameters: Parameters describing features of activity such as capacity of decommissioning technology or technique, consumption of various media and materials used, working group composition (amount of workers and their professions), costs parameters (wages of workers, costs unit factors of consumed media and materials), and other parameters.

For purposes of tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel, parameters already implemented in OMEGA code are used. Values of these parameters come out from international available data (capacities, consumptions) or from Slovak data which were available (wages, cost unit factors).

Main calculation parameters used within OMEGA code are described in this chapter. For better orientation, data are divided into three groups according to their character.

1. General calculation data - data concerning cost unit factors and other overall data.
2. Calculation data for technological procedures – these data include technological parameters of decommissioning procedures and parameters of working groups used for these procedures.
3. Specific calculation data – these data include parameters of preparatory, support and management activities which have time dependent character (duration of procedure, working group for procedure)

Due to large extent of input calculation parameters all data sheets containing individual data tables are attached in Annex 2.

### 3.2.1 General calculation data

This group of calculation data encompasses mainly cost unit factors. Based on tentative character of decommissioning calculations, Slovak data are used for individual cost unit factor values. Values for individual costs items are recalculated from SKK to EUR. Database parameters are listed in Annex 2-1.

First portion of cost unit factors encompasses salaries of individual professions used in working groups within calculation. Database table contains salary paid by company to its employee. For purposes of calculation, values of salaries are expressed in EUR per manhour. Total sum of social security contributions, insurance, social charges and other charges paid by the company is present in last row of the table. It is expressed by percents which are added to salaries and are also paid by company.

Second portion of cost unit factors represents selected cost unit factors for media, substances and materials used by technological procedures within calculation. These cost unit factors are collected from parameters of individual procedures to one common table. Values are expressed in EUR per unit of consummated material.

Other general parameters used in calculation are shown in third table of Annex 2-1. This table includes common used parameters such as work days per year, work hours per shift, dose rate of background in facility and some others.

### 3.2.2 Calculation data for technological procedures

These input data represent a major portion of all calculation data, characterise and quantitatively describe individual technological decommissioning activities from pre-dismantling decontamination through dismantling, waste management up to disposal of waste packages. Extend of technological procedures included in decommissioning calculation for Intermediate Storage Facility for Spent Fuel is based on chapter 4 were individual activities are listed.

Calculation parameters of individual decommissioning procedures are used in combination with parameters from inventory database for calculation of output parameters. Calculation data for technological procedures include technical/economical parameters and working group parameters.

Technical and economical parameters characterise technological features of procedure. The main used parameters are:

- manpower unit factors (for hands on activities and techniques),
- capacities of equipment (for machines and technological lines),
- consumption unit factors – consumption of electricity, steam, fuel oil, air, chemical substances, working tools and equipment etc.
- cost unit factors – prices for electricity, steam, fuel oil, air, chemical substances, working tools and equipment etc. – main cost unit factors are selected in general calculation data mentioned above

Working group parameters includes assignment of working group to individual activities. Working groups consist of individual universal professions. Each profession in working group has assigned number of workers. There are seven universal profession used for characterization of working groups:

- manager (average personnel on the management level)
- senior engineer (experienced graduated engineer, more then 10 years of experience in the field)
- engineer (standard graduated engineer)
- operator (qualified operator in relevant branch with secondary school education)
- administrative worker
- skilled worker (qualified craftsman)
- auxiliary worker (semi skilled).

Individual working groups have also assigned a structure of non-effective working time fractions during carrying out work within individual working group. These non-effective working time fractions are by-products of effective time needed for decommissioning activity and these are time consuming, e.g.: entrance of workers to controlled area, breaks in work , moving of personnel during working time within controlled area, exit from controlled area, etc. In OMEGA code we used default values for non-productive time fractions for all workgroups.

Values of used parameters within this database were obtained from various sources. They were obtained from price catalogues for evaluation of costs in industrial sectors in Slovakia, from work methodic from operation of technological lines at A-1 NPP and maintenance of V-1 and V-2 NPP, international catalogues and prospects of producers of dismantling and demolition equipment. In addition, a lot of useful parameters were evaluated within cooperation with Japan specialists in the frame of cooperation on A-1 NPP decommissioning.

Data sheets of calculation data for technological procedures are divided into several parts according to the type of calculation technological procedures. In the beginning of each part there is a list of included procedures and also table of non-productive working time fractions for working groups. There is a table of

parameters with values listed for each calculation technological procedure together with table for assigned work group.

Individual datasheets of calculation data for technological procedures with parameters are attached in Annex 2-2. Amount of parameters used for individual procedures is very extensive, owing to simplify parameters review only main and most important parameters are listed in datasheets. Data listed in datasheets are mentioned within colour legend. Legend distinguishes most important or specialized parameters by individual colours.

### 3.2.3 Specific calculation data

These data are used for activities which have time dependent character. These activities have no technological character but they are a part of decommissioning process. They are connected with preparatory activities e.g. decommissioning planning, preparation of documentation, etc. Management and decommissioning support activities such as management unit, security and safety during decommissioning, etc. is also included.

Main parameter for this type of procedures is time of duration, which determines how long is certain activity carried out during decommissioning process. Then a composition of working group is necessary – professions and numbers of workers in professions, which are involved in certain time dependent activity. Based on this data and parameters of professions wages data (included in general data), cost for workforce can be calculated.

Fixed costs are another type of parameter which can be used as specific data within the time dependent procedures. Fixed costs represent investment costs, for example in the case of procurement of some equipment or mechanisms etc.

Table with specific calculation data for individual selected time dependent procedures is attached in Annex 2-3.

# 4. DEFINITION OF DECOMMISSIONING ACTIVITIES

This chapter contains review of procedures representing individual decommissioning activities which are implemented within OMEGA code. Some of these procedures are not used within Intermediate Storage Facility for Spent Fuel calculation, (they can be used for other facilities with more various radiological and technological inventory), but they are mentioned owing to complexity of implemented procedures in OMEGA code.

## *4.1 METHODS FOR DEFINITON OF DECOMMISSIONING ACTIVITIES*

One of the main features of the OMEGA code is the implementation of the standardised list of decommissioning activities [6]. The standardised list includes all activities that could be identified in any decommissioning project. From this point of view, the definition of extent of decommissioning activities involved in the given decommissioning project, means the methods for selecting of decommissioning activities, relevant for the given project. The OMEGA code involves a set of standardised templates of decommissioning activities, which include segments for basic types decommissioning activities:

- Inventory-dependent activities, related to the extent of "hands-on" work like dismantling, decontamination , etc.
- Period-dependent activities, proportional to duration of individual decommissioning activities/phases
- Definition of fixed costs (costs special items which can neither be assigned to inventory-dependent activities nor to period-dependent activities

For the first type of decommissioning activities, the segments in the template are available which corresponds to facility structure of buildings – floors – rooms/cells - inventory items in rooms/cells. For the second and the third type of decommissioning activity, the universal segments were developed, which can be applied in the given decommissioning project by implementing the procedure described below.

The user can configure the executive standardised calculation structure in three steps using the templates which facilitates significantly the work of the user. The base for this work is the general standardised template which covers the decommissioning activities as defined in [6]. In the first step the user can develop the master template which is specific for a type of a nuclear facility. In the second step the user can adapt the selected master template to the standardised structure specific to the decommissioning option to be calculated. In this step the user can define as much calculation options as required for the evaluation within the decommissioning project. The option specific standardised structure of decommissioning activities involves also the prescriptions for generation of lower levels of calculation items, for allocating the calculation procedures and definition of calculation sequence.

The third step is the automatic generation of the executive standardised calculation structure. The typical feature of this structure is that it has the hierarchical structure of the buildings – floors – rooms/cells – inventory items in the room/cell in selected sections of the standardised structure, as required in basic definition of decommissioning activities in [1]. The generated structure contains also input calculation data with default values. After the generation, the user can review/edit the generated calculated structure and the generated default values of the calculation data.

The generated calculation structure involves all decommissioning activities as defined in [6] and the definition of the extent of calculation is defined by the user by clicking in the individual calculation items. The procedure of generating the standardised calculation structure is presented in chapter 6.

The decommissioning activities presented in chapters 4.2 to 4.4 are the activities of the "inventory dependent type" and for these activities the relevant segments in executive calculation structure were generated based on the Intermediate Storage Facility for Spent Fuel inventory database and on the standardised template developed specially for the Intermediate Storage Facility for Spent Fuel, The procedure is described in the chapter 6. These decommissioning activities are specific for the Intermediate Storage Facility for Spent Fuel.

The decommissioning activities presented in the chapter 4.5 are activities planning activities for preparing the decommissioning project and general management and supporting activities during the execution of the

project. These are activities of the "period dependent type" and "fixed cost". For calculation of parameters for these activities, the "static" segments of the executive calculation structure are used.

The full extent of calculated decommissioning activities for the Intermediate Storage Facility for Spent Fuel is identified in the chapter 7, in the format "PSL".

## *4.2 DISMANTLING ACTIVITIES*

According to PSL numbering, dismantling activities cover pre-dismantling decontamination of technological equipment, dismantling technology itself including preparatory and finishing activities, decontamination of building surfaces, final building radiation survey and post- dismantling decontamination of technological equipment.

The following sections are involved to describe a set of decommissioning activities generated for usual decommissioning calculation run by OMEGA code. Majority of them are also used for Intermediate Storage Facility for Spent Fuel tentative calculations.

### 4.2.1 Pre-dismantling decontamination

Pre-dismantling decontamination is considered in calculation due to decrease of dose rates from dismantled equipment or decrease of potential creation of aerosols during dismantling operations. Based on the SVAFO study information there is an assumption of internal contamination of piping and other equipment, therefore a pre-dismantling decontamination by autonomous circuits for inner surfaces of equipment was applied in calculations.

Procedure includes creation of autonomous circuit from existing piping and other equipment, connection of mobile tank with circulation pump for decontamination medium, filling the circuit with decontamination media and decontamination of inner surfaces by flowing of media through created circuit. The circuit if then flushed by water and decontamination ends with disconnecting of tank and pump from autonomous circuit.

For Intermediate Storage Facility for Spent Fuel decommissioning calculations is pre-dismantling decontamination not considered. Deeper analysis of technological systems should be carried out to identify reference of individual equipment (pipes, tanks, pumps, valves) to individual technological systems, to be able to arrange equipment into potential decontamination loops in proper manner.

### 4.2.2 Dismantling procedures

Dismantling procedures involves the biggest portion of calculation. These procedures describe activities of dismantling (removal) of technological equipment from rooms within facility. Dismantling is carried out in controlled area (active rooms) or outside the controlled area (inactive rooms). Dismantling in controlled area, in common, demands higher manpower than outside the controlled area.

There are three types of procedures during dismantling used in calculation:

- preparatory procedures prior to dismantling
- dismantling procedures
- finishing procedures after dismantling.

***Preparatory procedures prior to dismantling***

These procedures describe and calculate a set of activities carried out prior to dismantling itself and they are carried out within individual rooms (room oriented). Insertion of individual preparatory procedures within particular room is optional.

- **Survey of radiological situation** – mapping of radiological situation in room directly prior to dismantling
- **Covering of floor by protective foil** – covering of contamination protective foil on the floor of the room

- **Installation of scaffolding** – assembly of scaffolding needed for dismantling of equipment placed in heights
- **Installation of temporary air-conditioning** – installation and testing of local mobile air-conditioning with filters in the room which will be used during dismantling
- **Installation of temporary electric and other media connections** –installation and testing of connections for electricity and other media (air, water, etc.) supply in the room
- **Disconnection and revision of dismantled technological equipment** – securing of removal and closing of any connections of dismantled equipment to other systems (media, electricity) prior to dismantling in room
- **Marking of cuts and areas** – drawing of lines for cuts which determines segmented parts of equipment and guide personnel during dismantling
- **Delivery of working tools and equipment** – transport of working tools and equipment into room prior to dismantling
- **Preparation of working tools and equipment** – activities connected with preparation, setting and adjusting of dismantling tools and equipment in room
- **Preparation of transport containers** - delivery and placement of transport containers for dismantled material in room
- **Installation of protective tent** – assembly of foil protective tent against spreading of potential aerosols during dismantling
- **Working group instructions** – preparation and instruction of activities, cooperation and safety for working group personnel prior to dismantling in room

These preparation activities are carried out prior to dismantling in active rooms (inside the controlled area). The set of preparation activities prior to dismantling outside the controlled area (normal inactive rooms) is similar but activities relevant only for controlled area are missing (survey of radiological situation, covering of floor by protective foil, installation of temporary air-conditioning, installation of protective tent).

For the purpose of tentative decommissioning calculations by OMEGA code for Intermediate Storage Facility for Spent Fuel we assume using all set of preparatory procedures for active rooms as well as for inactive rooms.

***Dismantling procedures***

These procedures represent dismantling itself. Dismantling procedures can be used both for active (inside the controlled area) or non-active equipment (outside the controlled are). Following techniques have been selected for the purpose of dismantling calculation [13], [14]:

- Dismantling by hydraulic shears
- Dismantling by oxygen-acetylene set
- Dismantling by plasma set
- Dismantling by circular saw
- Dismantling by hand tools (wrenches, etc.)

**Dismantling by hydraulic shears** is used especially for cutting of low diameter metal elements (pipelines, plates, air conditioning pipes, instrument panels, electric network installations, cables), which are made of steel, colour metals, (copper and its alloys, aluminium), plastics (PE pipes) and other materials.

**Dismantling by oxygen-acetylene set** is frequently used for cutting of non-active steel materials. This technique is applicable for cutting of steel tanks, structural and bearing parts of equipment, air-conditioning parts, cranes and other components, depending on the shape and thickness. Considerable amount of aerosols are produced during application of this technique and introduced into the air. That is why it is proposed just for non-active part of the equipment.

**Dismantling by plasma set** is applicable for cutting of any metallic materials using plasma burner. This technique is used especially for dismantling of various stainless steel equipment inside the controlled area. Aerosol is produced in time of cutting, which has to be removed by air-conditioning. Dismantling by plasma set is used mainly for dismantling of heat exchangers, tanks, air conditioning pipes, ventilators, valves, steel linings and others.

**Dismantling by circular saw** is a cutting technique frequently used for dismantling of technology equipment of longitudinal shape, such as pipelines, rods, bearers and other parts made of steel, color metals, plastics. It is applicable especially for dismantling inside the controlled area due to low production of aerosols.

**Dismantling by hand tools** is a technique used for dismantling of technology equipment by means of hand instruments (screwdrivers, wrenches, various types of jigs). This manual method is the most frequently used especially in case of assumed re-using of dismantled components (electric motors, compressors, pumps, valves, electric equipment, diagnostic devices.

A number of technology categories were assigned to each of mentioned dismantling techniques. The combinations of material categories with dismantling techniques were elaborated for the purpose of Intermediate Storage Facility for Spent Fuel calculation, as shown in the Table 4-1. Particular combinations used within the calculation procedure are marked by blue point. This combinations are based on choosing of most suitable and applicable dismantling techniques for given categories of equipment regarding to radioactive conditions. For completeness, other alternative combinations possible in OMEGA are added marked by black circle. Complete list of the selected material categories is given in the chapter 3 of this report. A list of material categories given in the following table is reduced due to comprehensibility. Combinations mentioned below are valid for dismantling in the controlled area as well as for the non-controlled area.

Table 4-1 Table of combination of used technological equipment categories and available dismantling procedures.

| | | Dismantling (manual) by hydraulic shears in CA | Dismantling (manual) by oxygen-acetylene set in CA | Dismantling (manual) by plasma set in CA | Dismantling (manual) by circular saw in CA | Dismantling (manual) by hand tools (wrenches, etc.) in CA |
|---|---|---|---|---|---|---|
| 1 | Piping (CS), various diameters | ● | ● | ● | ● | |
| 2 | Piping (SS), various diameters | ○ | | ● | ● | |
| 3 | Piping (PE, PP ..), various diameter | ● | | | ○ | |
| 4 | Air conditioning components - piping (CS), various cross sections [$m^2$] | ● | ● | ● | | ● |
| 5 | Electrical cables & conductors; (Cu, Al) | ● | | | | ● |
| 6 | General electric equipment, various mass | | ● | ○ | | ● |
| 7 | Heat exchangers (CS) , various dimensions [m] | | ● | ○ | | |
| 8 | Pumps (CS), various mass [kg] | | ● | ○ | | ● |
| 9 | Piece components (CS), various mass [kg] | | ● | ● | ● | ● |
| 10 | Non-portable small equipment & instruments (CS), various mass [kg] | ○ | ● | ○ | | ● |
| 11 | Valves (CS), various mass [kg] | | ● | ○ | | ● |
| 12 | Ventilators (CS), various mass [kg] | | ● | | | ○ |
| 13 | Thermal insulations | ● | | | | ● |
| 14 | Sampling boxes (CS) | | ● | | | ● |
| 15 | Steel constructions, (CS) | | ● | ● | ● | ● |
| 16 | Tanks and containers (CS), various diameters [m], various thickness of wall [mm] | | ● | ● | | |
| 17 | Casing of technological euipment (CS), various thickness [mm] | | ○ | ● | ○ | ○ |
| 18 | Hoisting equipment (CS) | | ● | ● | | ● |
| 19 | Stainless steel linings (SS) | ○ | | ● | | |
| 20 | Electric motors, various mass [kg] | | ○ | | | ● |
| 21 | Ventilators (CS), various mass [kg] | | ● | | | ● |

***Finishing procedures after dismantling***

Similarly to preparation activities prior to dismantling, there is a set of finishing activities, represented by calculation procedures, used after dismantling of equipment in room. Insertion of individual finishing procedures within particular room is optional.

- **Removal of scaffolding** – de-installing and removal of scaffolding after dismantling
- **Removal of protective foil** – rolling and packing of protective foil from floor of the room
- **Removal of temporary air-conditioning** – de-installation and removal of temporary mobile air-conditioning from room
- **Removal of temporary electric and other media connections** – de-installation and removal of connections for electricity and other media (air, water, etc.) supply in the room
- **Removal of working tools and equipment** - transport of working tools and equipment out of room prior to dismantling to designated place
- **Removal of protective tent** – de-installation of foil protective tent after dismantling
- **Removal of transport containers** - transport of containers with dismantled material out of the room to designated place
- **Cleaning of room** – final cleaning and removal of any remains after dismantling of equipment in the room.

These finishing activities are carried out after dismantling in active rooms (inside the controlled area). The set of finishing activities after dismantling outside the controlled area (normal inactive rooms) is similar but activities relevant only for controlled area are missing (removal of protective foil, removal of temporary air-conditioning, removal of protective tent).

Individual preparation and finishing activities were selected room by room with regards to radiological and technological properties of individual room and its equipment. Table of selected preparatory and finishing activities by rooms is showed in Annex 2-4. Criterions for using of given preparatory and finishing activity for individual room are as follows:

- Radiological survey prior to dismantling

  Radiological survey has been used for all rooms. This is conservative approach by reason of old technological facility where possible unknown sources of contamination/dose rate can occur within rooms.

- Covering of floor by plastic foil
- Installation of temporary air-conditioning
- Installation of protective tent

  These preparation activities prior to dismantling were used in the case when room contains at least 10 contaminated equipment.

- Installation of scaffolding

  This preparation activity prior to dismantling was used if there are supposed some equipment which is inaccessible from the floor level.

- Installation of temporary electric connection
- Marking of cuts and surfaces
- Delivery of working tools and equipments
- Disconnection and revision of decommissioned technological equipment
- Preparation of working tools and equipments
- Working group instructions

  Activities have been used for all rooms with number of dismantled equipment $\geq$ 10 pcs.

- Preparation of transport containers

Activity has been used for all rooms with number of dismantled equipment ≥ 5 pcs.

- Finishing of dismantling
- Removal of temporary air-conditioning
- Dismantling and removal of scaffolding
- Removal of temporary electric connection
- Removal of protective tent
- Removal of working tools and equipments
- Removal of transport containers
  Activities have been used if corresponding preparation activities had been realized.

- Cleaning of room
  Activity has been used for all rooms with number of dismantled equipment ≥ 5 pcs.

### 4.2.3 Decontamination of building surfaces procedures

Decontamination of building surfaces is also taken into account in calculations for Intermediate Storage Facility for Spent Fuel. There are used decontamination procedures representing mechanical and chemical decontamination of building surfaces [13], [14]. Decontamination is supposed for rooms with presence of active components. Conservatively, there is calculated mechanical decontamination for whole floors and chemical decontamination of walls up to height of 1m in these rooms and also mechanical decontamination of whole surface of storage basins.

There are three types of procedures during decontamination of building surfaces used in calculation:

- preparatory procedures prior to decontamination of building surfaces
- decontamination of building surfaces procedures
- finishing procedures after decontamination of building surfaces.

***Preparatory procedures prior to decontamination of building surfaces***

System of procedures is the same as in the case of preparatory activities prior to dismantling and includes the following procedures:

- Survey of radiological situation
- Covering of floor by protective foil
- Installation of scaffolding
- Installation of temporary air-conditioning
- Installation of temporary electric and other media connections room
- Marking of decontaminated areas
- Delivery of working tools and equipment
- Preparation of working tools and equipment
- Preparation of transport containers
- Installation of protective tent
- Working group instructions.

***Decontamination of building surfaces procedures***

**Chemical decontamination by foam application, vacuum cleaning and washing** includes application of decontamination foam or reagent on decontaminated surfaces by application machine, action of applied foam on surface, vacuum cleaning of applied foam and final washing by water. This procedure is used in calculation for decontamination of walls (1 m height) in rooms with active components.

**Mechanical decontamination by shaving** represents decontamination by machine or hand tool equipped with grinding disk – shaver, which mechanically removes surface layer of building surfaces. Technique is

suitable for building surfaces with suspicion of contamination penetrated into deeper layers of building material.

This procedure is in calculation used for decontamination of storage basins surfaces and decontamination of floors in rooms with active equipment.

***Finishing procedures after decontamination of building surfaces***

Set of these procedures is very similar as for the finishing of dismantling procedures. It includes procedures as follows:

- Removal of working tools and equipments
- Removal of scaffolding
- Removal of protective foil
- Removal of temporary air-conditioning
- Removal of temporary electric and other media
- Removal of protective tent
- Removal of transport containers.

Preparation and finishing activities for building surfaces decontamination have been used for all rooms with contaminated equipment on floors and walls to high 1 m from floor.

### 4.2.4 Final building RA-survey procedures

The level of residual contamination will be monitored after completion of building surfaces decontamination and prior to release of building object from control [13], [14].

Final building surfaces RA-survey consists of three partial activities:

- Preparation activities for radiation monitoring of building surfaces,
- Radiation monitoring of building surfaces
- Finishing activities after decontamination of building surfaces.

***Set of preparation activities comprises following procedures in calculation:***

- Installation of scaffolding
- Marking of surfaces
- Preparation of working tools and equipments
- Preparation of RA-survey, calibration

***Radiation monitoring of building surfaces***

This procedure represents radiation monitoring of building surfaces (walls, floors) prior to releasing of building from regulatory control. Radiation monitoring is carried out by workers equipped with handheld monitors in rooms where active equipment are situated and contamination of surfaces is supposed to be. Monitoring is made for both wall and floor surfaces. Assumed capacity of monitoring capacity is 2 $m^2$/h per one worker (monitor).

***Set of finishing activities after decontamination of building surfaces includes next procedures:***

- Removal of scaffolding
- Removal of equipment
- Release of the room

Preparation and finishing activities of radiological survey have been used for all rooms in Intermediate Storage Facility for Spent Fuel.

### 4.2.5 Post-dismantling decontamination of technological equipment

Post-dismantling decontamination is used to obtain larger amount of material for unconditional or conditional release or decreasing of material amount destined to deep geological repository disposal.
The chemical post-dismantling decontamination by means of ultrasound is considered in calculations. Dismantled material is immersed into the tank filled with chemical decontamination solution and its contaminated surface layer is removed by means of ultrasound action. Afterwards, material is transferred into rinsing tank where it is rinsed by detergent and dematerialized water. Assumed capacity of such post-dismantling decontamination is around 3 $m^2$/h.

For Intermediate Storage Facility for Spent Fuel decommissioning calculations, wet bath post-dismantling decontamination equipment for iron/steel radwaste is considered in radioactive waste treatment scenarios S1 and S2 as stated in chapter 2.3.

## *4.3 WASTE MANAGEMENT*

For the purpose of tentative decommissioning calculations for Intermediate Storage Facility for Spent Fuel in Studsvik a set of radioactive and non-radioactive waste management technologies were considered. A short characteristics of each waste management technology used in OMEGA decommissioning calculations are given below. Described technologies are either commonly used in Slovakia or considered to used in future. For further decommissioning calculations for Intermediate Storage Facility for Spent Fuel it would be necessary to take into account waste management technologies available at Studsvik site together with their parameters as well as the final waste package forms and their disposal routes.

### 4.3.1 Radioactive waste management

Treatment and conditioning of radioactive waste (RAW) consists of a lot of technological procedures. The objective of these procedures is to reduce the volume of RAW, decrease the mobility of radionuclides and create a material matrix suitable to dispose of the waste in repository.

There is a variety of RAW generated during activities of dismantling and decontaminations. We considered the following technologies for material treatment and conditioning in OMEGA code calculations:

**A) Technological methods for treatment of solid RAW:**

- fragmentation of metals and cables
- compaction (low and high pressure) of incombustible waste
- incineration of combustible waste
- melting of metals
- cementation of fragmented RAW into drums.

**B) Technological methods for treatment of liquid RAW:**

- evaporation
- bituminization
- cementation
- vitrification.

**C) Consideration of final products from treatment before disposal to the repository**

Final consideration of products from treatment into the FRC containers. Products from treatment are grouted by cement mixture in FRC containers.

Following chapters (4.4.1.1, 4.4.1.2, 4.4.1.3) contain a short description of treatment activities using by OMEGA code for creation of waste management scenarios. However whole waste management scenarios for metal, non-metal and liquid RAW as well as RAW production in decommissioning process are described in chapter 5.

### 4.3.1.1 Basic technological methods for treatment of solid radwaste

***Fragmentation of metals with radioactivity up to 3kBq/cm$^2$***
This workplace includes fragmentation by air plasma cutting, hydraulic shears and circular saws. Dismantled material is transported to the fragmentation workplace in standardized ISO containers (1,6 x 1,2 x 1,4 m) with weight capacity 1,5 t. Material is fragmented to pieces with maximal dimensions up to 200 mm and filled into 200 l drums. Maximal allowed dose rate is 2 mGy/h at the surface of a drum. Capacity of fragmentation is considered about 2000 kg/shift.

***Fragmentation of metals with radioactivity over 3kBq/cm$^2$***
This fragmentation workplace is remotely controlled due to higher radioactivity of dismantled material. The dismantled material is cut by hydraulic shears. Material is fragmented into 200 l drums. Capacity of fragmentation is considered about 200 kg/shift.

***Low-pressure compaction***
Low pressure compactor is hydraulic equipment designed for incombustible solid material compaction (PVC, glass, isolation glass wool, brash metal material). The RAW is compacted directly in 200 l drum. Drums with compacted RAW are intended for high-pressure compaction. Considered capacity of low-pressure compaction is 1,6 m$^3$/h.

***High-pressure compaction***
High-pressure compactor is designed for drums with low-pressure compacted materials, drums with small pieces of fragmented metals or debris. In this process the whole drum is compacted. Dimensions of output product depend on compressibility of compacted waste. That can be pellets or only partially compressed drums. These products are destined to final cementation into FRC containers for near surface repository. Capacity of low-pressure compaction is 3 drums/h with average weight of drum 330 kg.

***Incineration***
Combustible solid wastes packed in bags (3-10 kg) and transported in 200 l drums, processed in the incinerator. Incineration of a burnable liquid waste (oils, lubricant and grease) is also possible. Washing liquids for exhaust gases cleaning are generated as a secondary RAW. These can be used as an active cement filler in cementation process. The same is usage of generated ash, it is mixed with cement filler. We suppose capacity 50 kg/h of input RAW with volume reduction factor around 15 and generation of 200 l of washing liquid per 1t of RAW.

***Melting of metal RAW***
Melting is used for, in combination with post-dismantling decontamination, increasing of amount of material for conditional and unconditional release. It means that melting is not intended for volume reduction for non releasable materials.

Individual radionuclides can have different behavior in the process of melting. Some migrate from metal (or its surface) to exhaust gases or slag, some migrate only a little and mostly stay in metal volume. For example Cs-137: around 96 % evaporates and is caught by filters and remain (4 %) migrates to slag. On the other side major part of Co-60 remains in metal (90,5 %), 7,2 % is migrating to sludge and 2,3 % to exhaust gases as a dust. This behavior of radionuclides is also taken into account in calculation. Supposed capacity of melting furnace is 125 kg/h.

Melting procedure for Intermediate Storage Facility for Spent Fuel decommissioning calculations is considered only for waste treatment scenarios S1 and S3.

***Cementation of solid RAW into drums***
This cementation line is designed for remotely fragmented solid materials which radioactivity level doesn't allow high-pressure compaction. Fragmented material is grouted with cement mixture directly in drum. Capacity of drum cementation is 0,56 m$^3$/h.

### 4.3.1.2 Basic technological methods for treatment of liquid waste

***Evaporation and bituminization***

Bituminization line is intended for processing and fixation of liquid concentrates, sludge or used ion exchangers. Firstly, waste waters are concentrated by evaporator with natural circulation. Thicken liquid is

consequently fixed into bitumen by rotary evaporator and filled into 200 l drums. Spent ion exchangers and condensate are generated as a secondary waste during the process of bituminization. Limit salinity of evaporated concentrates is intended to be about 180 kg/$m^3$. Capacity of bituminization line is 1drum of bitumen product per hour.

Secondary liquid RAW generated from decontamination activities in Intermediate Storage Facility for Spent Fuel is in calculations assumed either to be bituminised or used as for preparing an active cement grout in cementation process of final waste packages – FRC containers.

***Vitrification***

Liquid RAW with high level of overall radioactivity and especially with significant alpha radioactivity are treated by vitrification. Liquid RAW is concentrated in evaporator and generated concentrate is mixed with glass frit, dried and incorporated into glass matrix during melting of glass frit. Glass product is filled into metal shells with 7 liters volume and they are destined for cementing into containers for deep geological disposal. Assumed capacity of vitrification line is 0,002$m^3$/h.

Vitrification is the very special procedure belonging to treatment of highly contaminated liquids however in case of Intermediate Storage Facility for Spent Fuel it is not used for treatment of generated secondary radioactive liquids from decontamination activities.

### *4.3.1.3 Basic technological method for conditioning of RAW to the repository*

***Final cementation into FRC containers destined to near surface repository***

Cementation into FRC containers is used for final disposal of RAW that can't be released and its radioactivity enables disposal at surface repository.

The FRC (fibre reinforced concrete) container is a cubic container designed for disposal of RAW at near surface repository. It is made of concrete reinforced by metal fibres (mixed together with concrete). Its inner volume is 3 $m^3$ and payload 10 t.

There are solid radioactive wastes placed into FRC containers such as high-pressure compaction products, drums filled with bitumen, cement product or pressured RAW, stand alone RAW (e.g. debris). These solid wastes are consequently fixed in the FRC container by cementation mixture grouting.

Capacity of cementation is 1 FRC container per day.

***Final cementation into FRC containers destined to deep geological repository***

Radioactive waste which can't be disposed at near surface repository has to be cemented into containers and destined to future deep geological repository. Disposal at deep geological repository is needed mainly for high alpha level contaminated materials or for high level activated reactor core materials.

Pieces of a high level irradiated or contaminated material and products of vitrification are put into containers and consequently grouted by cement mixture.

Payload of container is 4,5t and capacity of cementation is 1 container per day.

### 4.3.2 Non-radioactive waste management

There is significant production of non-radioactive waste in process of decommissioning. These wastes are represented by two groups of materials:

1. Materials from decommissioning in controlled area of the Intermediate Storage Facility for Spent Fuel building that are after sorting, decontamination (if it is needed) and radioactivity measurement classified as materials releasable into environment:
   - some metal or non-ferrous materials from dismantling or after subsequent decontamination process if necessary
   - building materials from demolition of buildings and
   - ingots after melting process (if their radioactivity after melting is lower than the level of radioactive limits for release into environment)

2. Materials from decommissioning outside the controlled area of the Intermediate Storage Facility for Spent Fuel. These materials had no contact with radioactive materials and are classified in advance as materials releasable into environment.

In order to obtain as much materials releasable into environment as possible, all the efforts are taken to decontaminate, sort as well melt contaminated materials. Part of these waste after treatment and recycling can be released into environment for unconditional usage as secondary raw materials (metals, ingots after melting and various building materials – concrete, waste on ceramic and mortar basis). Another part of the waste – scrap from demolition works or recycling activities can be used mainly for backfilling of underground volume after demolition of buildings. The rest of releasable materials not suitable for recycling and for unconditional usage are transported to waste dump (e.g.: floor coverings, thermal insulation, waterproof isolations, glass…) or specialised waste dump for hazardous materials (in case of e.g. asbestos materials)

Technological procedures used for non-radioactive waste material treatment in Intermediate Storage Facility for Spent Fuel decommissioning calculations:

1. Recycling of metals – collection of metals, sorting into containers and transport to the scrap yard (recyclation facility).
2. Recycling of building materials - collection of materials, sorting and either using them for backfilling of underground volume after demolition of buildings or reuse of the building materials.
3. Treatment of non-recyclable materials - collection of materials and their transport to the conventional waste dump or specialised waste dumps for hazardous materials.

## *4.4 DEMOLITION, SITE RESTORATION AND RELEASE OF SITE*

### 4.4.1 Demolition

Demolition of building structures includes preparation of equipment for demolition, breaking of building structures, sorting of materials, loading of debris and transport of debris within the site. These activities are included in parameters of demolition procedures.

Calculation procedures of demolition are assigned to appropriate categories of building equipment. Building equipment includes types of building materials which are supposed to occur within demolition of Intermediate Storage Facility for Spent Fuel – see. Tab. 3.3 in chapter 3.1.4.

Particular building equipment category can be combined with one or more demolition procedures, according to availability of demolition technique for category.

Combinations of building categories used within Intermediate Storage Facility for Spent Fuel calculations and dismantling procedures are shown in the next table. Chosen default procedures for individual category are marked by blue color dot.

Table 4-2 Table of combination of used building equipment categories and available demolition procedures

| | Demolition by excavator | Demolition with explosive | Demolition by hand tools | Demolition by demolition shears | Demolition by wiring saw and excavator | Demolition by oxygen-acetylene cutting set and crane | Demolition by hand tools and crane |
|---|---|---|---|---|---|---|---|
| **Building categories** | | | | | | | |
| Masonry | ● | ○ | | ○ | | | |
| Concrete | | ○ | | ● | | | |
| reinforced-concrete (to 400 mm) | | ○ | | ● | ○ | | |
| steel skeletons | | | | | | ● | ○ |
| roof skeletons | | | | | | ● | ○ |
| other building materials | ● | | ○ | | | | |

● default combination
○ possible combination

Short description of selected procedures is presented in the text below.

***Demolition by excavator***

This demolition procedure is used for demolition of the following building equipment categories:

- masonry (walls from bricks or blocks with mortar),
- other building material (wood, plastics, glass, ceramics).

Demolition is carried out by mechanism (excavator equipped with shovel). Demolished material is loaded on lorry. Preparatory (transport of equipment to workplace) and finishing activities (terrain arrangements, transport of debris to local stock pile) are included to manpower unit factor (see Annex 2). Activity ends with rough arranged terrain.

***Demolition by demolition shears***

This demolition procedure is used for demolition of concrete or reinforced concrete up to thickness of 400 mm. Demolition is carried out by mechanism equipped with demolition shears. Demolished material is loaded on lorry. Preparatory (transport of equipment to workplace) and finishing activities (terrain

arrangements, transport of debris to local stock pile) are included to manpower unit factor (see Annex 2). Activity ends with rough arranged terrain. Demolition of each building equipment category has assigned its own manpower unit factor.

***Demolition of steel skeletons and roof skeletons by oxygen-acetylene cutting set and crane***

Demolition procedure represents demolition of steel building constructions of various shapes and dimensions and demolition of steel roof constructions. Oxygen-acetylene set, electric grinder and mobile crane are used as demolition equipment. Demolished material is loaded on lorry. Preparatory (transport of equipment to workplace) and finishing activities (terrain arrangements, transport of steel scraps to local stock pile) are included to manpower unit factor (see Annex 2). Demolition of each building equipment category has assigned its own manpower unit factor.

### 4.4.2 Site restoration

***Backfill of underground rooms***

After demolition of above Intermediate Storage Facility for Spent Fuel ground floors and ground floor to the level -1m all underground rooms will be backfilled by debris. The aim is to fill all underground free spaces so that slumping could not happen. Within the OMEGA software backfilling is divided into activities as follows:

- preparation of rooms for backfilling
- transport of backfill material
- backfilling of rooms by debris

Preparation of rooms for backfilling consists of holes drilling through room ceiling. Jack hammers, drilling machines and other demolition tools will be used for the purpose of demolition.

Transportation of building waste procedure consists of lorry loading by jib-type loader or excavator, carriage and unloading of the waste at destined place.

Backfilling of rooms by debris comprises preparation and installation of backfilling equipment, implementation of backfilling and compaction of debris using building machinery. Unit parameters are given in the Annex. 2.

***Final arrangement of landscape***

After backfilling of underground rooms it is necessary to cover up the area by soil layer of 0.8 m and plough layer of 0.2 m thickness. Within the OMEGA software this procedure is considered to be time dependent. Labour content and costs are calculated on the basis of input parameters considering the area and volume of the soil. It is assumed to use lorries and building machinery (dozer, excavator, jib-type loader).

## *4.5 MANAGENENT AND SUPPORT ACTIVITIES*

In order to prepare the decommissioning project, a set of preparatory activities are needed and for management of the decommissioning project and for supporting of the main decommissioning activities, as described in chapter 4.2 to 4.4, a set of management and supporting activities are needed. The standardised list of cost items defines the full list of decommissioning activities, for which the costs are to be calculated. The basic description of individual decommissioning activities is presented in the document [6]. For the given decommissioning project, the activities of this type are defined as selection from the full list of activities, presented in [6].

For the case of the Intermediate Storage Facility for Spent Fuel, following period dependent activities and fixed cost items were preliminary selected for the preparation of the decommissioning project, for

management of the project and for supporting of the inventory dependent activities presented in chapters 4.2 to 4.4:

01.0103 Preparation of final decommissioning plan
01.0104 Safety and environmental studies, nuclear safety analysis, involving
01.0201 License applications and license approvals
01.0202 Public consultation and public inquiry
01.0301 Radiological surveys for planning and licensing
01.0401 Hazardous material surveys and analyses
01.0501 Prime contracting selection
02.0301 Drainage and drying or blow down of all systems not in operation
02.0401 Sampling for radiological inventory characterisation of equipment
02.0402 Sub grade soil sampling and monitoring wells to map contamination
02.0501 Removal of system fluids (water, oils, etc.)
02.1201 Isolation of power equipment
02.1201 Disconnecting power equipment from the grid
03.0101 Investment and maintenance for general site-dismantling equipment
03.0201 Investment and maintenance for personnel and tooling decontamination
03.0301 General radiation protection equipment such as portal monitoring system
03.0401 Equipment required for the surveillance of facilities
04.1102 Design, procurement and testing of special tooling
04.2101 Characterization of radioactive materials for recycling and reuse
04.2301 Personnel training, training of new personnel
05.0101 Hazards analyses and risk analyses for handling, packing, storing
05.0201 Hazards analyses and risk analyses for waste transports
05.0301 Special permits, packing and transport requirements
06.0101 Site security operation and surveillance
06.0201 Inspection and maintenance of buildings and systems in operation
06.0301 Site keeping
06.0401 Energy and water
07.0201 Final cleanup and landscaping
07.0301 Independent compliance verification with cleanup
08.0101 Mobilization of construction equipment and facilities
08.0102 Mobilisation of personnel
08.0103 Set-up construct temporary facilities
08.0104 Construct temporary utilities
08.0201 Project manager and staff
08.0301 Public relations
08.0403 Decommissioning support including chemistry, decontamination
08.0501 Health physics
08.0601 Removal of temporary facilities
11.0101 Implementation of transition plan

The parameters for these period dependent activities and for fixed cost items are presented in Annex 2-3.

The set of managing and supporting activities is tentative in order to document the method of managing of these activities in the calculation case. More accurate adjustment of these types of activities requires study of site specific features, like site management, site services, support activities, etc. applicable for the project decommissioning.

# 5. DEFINITION OF WASTE MANAGEMENT SCENARIOS FOR INTERMEDIATE STORAGE FACILITY FOR SPENT FUEL

## *5.1 WASTE MANAGEMENT SCENARIOS – GENERAL APPROACH*

Initial state for characterisation of waste arisen from decommissioning process in Intermediate Storage Facility for Spent Fuel is the state when all spent nuclear fuel in basins has already been transported to another spent fuel facility and all the liquid and solid operational waste are treated. That means neither stored spent fuel nor water in storage basins is an object of decommissioning process and therefore these wastes are not considered in our decommissioning calculations.

Regarding waste production, decommissioning of nuclear facility such as Intermediate Storage Facility for Spent Fuel consists of the following activities:

- Activities on radioactive equipment before their dismantling such as pre-dismantling decontamination, partial dismantling, storage and transport of materials. These activities produce liquid and solid radioactive waste (RAW) from pre-dismantling decontamination, waste from partial dismantling and construction works majority of which is non-contaminated waste however after sorting procedure.
- Dismantling of technological equipment in controlled area produces substantial part of decommissioning waste. All produced waste is treated as RAW, non-contaminated waste arise after sorting procedures.
- Decontamination of building surfaces generates mainly RAW (contaminated building parts)
- Dismantling of non-active technological equipment out of controlled area. All the waste is classified as non-radioactive as it did not come into contact with radioactivity.
- Demolition of building after final radiological measurement guarantying that all radioactivity inside is below the limits for release into environment. Therefore all waste is classified as non-radioactive.
- Final fieldworks of the area, e.g. backfilling of underground floors with releasable building material from demolition works, which does not produce additional waste.

Decommissioning process generates radioactive waste which is necessary to treat, condition and transport either to repository or is destined into environment if it meets all the limits and conditions for release of the materials. Following chapters are describing waste scenarios for solid and liquid RAW accordingly. These scenarios are general schemes of RAW management applied in Slovakia and fully cover produced decommissioning wastes from Intermediate Storage Facility for Spent Fuel.

The system for management of material and radioactivity flow, as developed in the computer code OMEGA, implements the nuclear resolved limits for material release from decommissioning activities and also the nuclide resolved limits for final disposal at the LLW/ILW Mochovce repository (Slovak Republic), according the actual legislative in Slovak Republic. The values of these limits are presented in the Annex 3.

## *5.2 WASTE SCENARIOS FOR SOLID RADWASTE*

Solid RAW are represented mainly by primary waste from decommissioning such as materials from dismantled technological equipment (pipes, valves, pumps, motors, thermal isolation, cables etc.) as well as building equipment (concrete, masonry, steel skeletons etc.). In addition, solid RAW as secondary waste are produced during the whole decommissioning process (protective clothing, respirators, preservatives, protective coverings, various textiles, filters, used dismantling tools etc.). Solid RAW can be in general divided into the following categories:

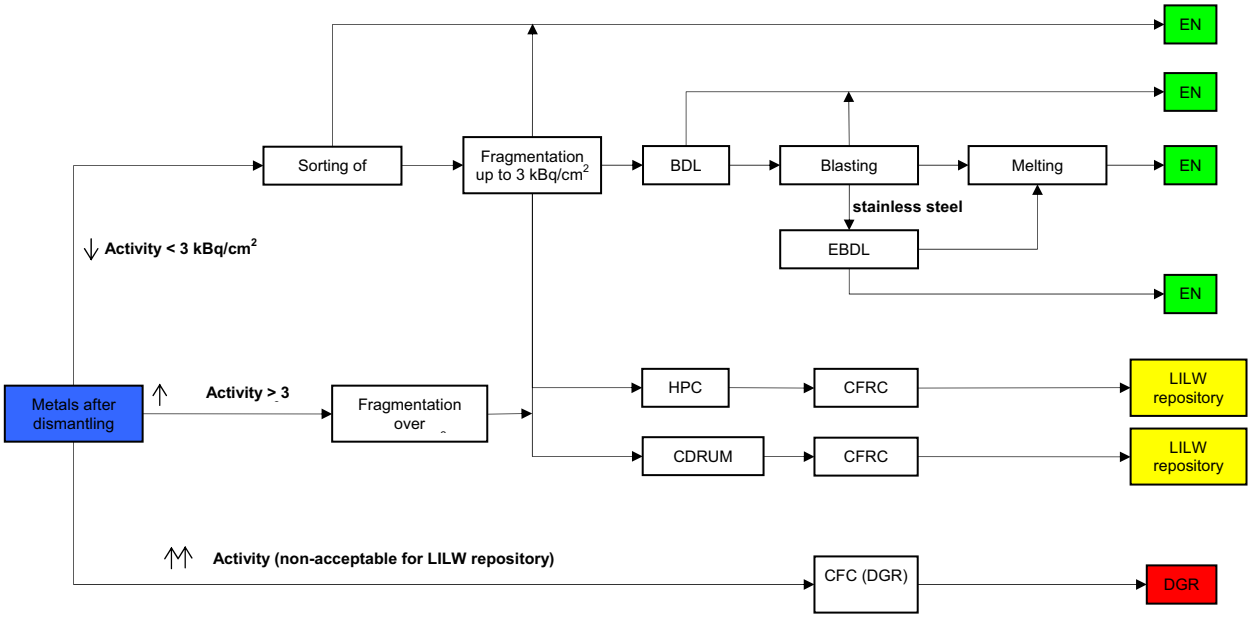
1. metal RAW:
    - carbon steel
    - stainless steel
    - coloured metals (copper, aluminium)
2. non-metal RAW:
    - combustible: textiles
    - compressible: cable isolations, plastics, small building debris

- non-compressible: suitable only for cementation to drums and subsequently to FRC containers.

### 5.2.1 Waste scenario for metal RAW

Waste management scenario for metal RAW arisen from decommissioning applied in tentative calculations for Intermediate Storage Facility for Spent Fuel has three basic endpoints classified according to radioactivity of dismantled metals. Individual waste routes are displayed on Fig. 5-1.

Fig. 5-1: Waste management scenario for metal RAW




where:

BDL - wet bath post-dismantling decontamination

Blasting - dry post-dismantling decontamination by metal abrasives

EBDL - electrochemical bath post-dismantling decontamination of stainless steels

HPC - high-pressure compaction

CFRC- cementation into FRC containers

CDRUM - cementation of metal RAW into drums

ENV - environment

LILW - near surface LILW repository in Mochovce

DGR - deep geological repository

Based on radioactivity criterion it is possible to divide dismantled metal RAW from Fig. 5-1 into groups:

1. Dismantled metal RAW with surface contamination below 3 kBq/cm$^2$ are sorted later on segmented into pieces and decontaminated if necessary. Depending on the level of contamination segmented and decontaminated metal RAW can be either released into environment or are destined to melting process and subsequently released into environment. In case of higher contamination of segmented metal RAW (when meeting limits for the release of materials neither by decontamination nor melting is possible) such materials are compressed or cemented into drums, placed into FRC containers and disposed of in the near surface repository in Mochovce.
2. Dismantled metal RAW with surface contamination above 3 kBq/cm$^2$ are segmented on special remote controlled segmentation facility. These segments are either treated by high-pressure compaction or in case of higher radioactivity above technological limits for the compactor are such metals cemented into drums subsequently into FRC containers and disposed of in the near surface repository in Mochovce.
3. In case of very high contamination or activation of metal RAW when acceptance limits for the near surface repository in Mochovce cannot be met. Such dismantled metal RAW are directly conditioned (e.g. by cementation) into containers destined to deep geological disposal facility. For these metal RAW

remote controlled segmentation is reduced to achieve necessary dimensions for containers destined to DGR.

Results for 4 waste treatment scenarios are presented in chapter 7 considering availability of decontamination and melting procedures for generated RAW (see conditions for calculations in chapter 2.3).

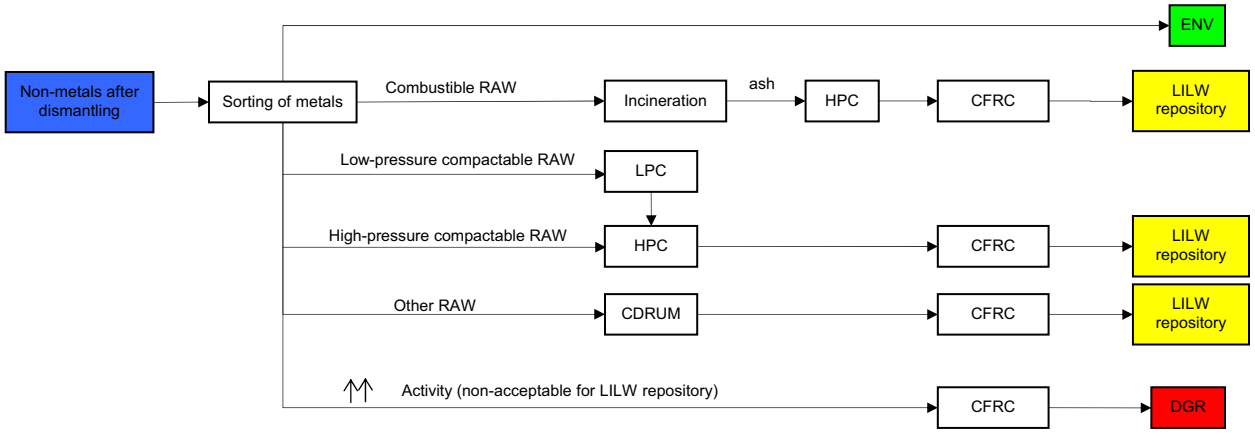
### 5.2.2 Waste scenario for non-metal solid RAW

Non-metal solid RAW after dismantling are sorted into 5 groups of materials:

- materials releasable into environment directly without treatment
- combustible RAW
- low-pressure compactable RAW
- high-pressure compactable RAW
- other non-metal solid RAW.

The above listed groups of non-metal solid RAW are clearly displayed on Fig. 5-2.

Fig. 5-2: Waste management scenario for non-metal solid RAW




where: LPC - low-pressure compaction.

Fig. 5-2 shows that in case of non-metals beyond the limits for free release into environment the final waste packages are disposed of in the near surface repository. Ash as the product of incineration of combustible non-metals RAW is mixed with paraffin, compressed in high-pressure compactor and finally cemented into FRC containers. Water as secondary waste from incinerator are used for preparing of active cement grout for filling FRC containers.

Other non-metal solid RAW are non-compressible and non-combustible RAW, such as contaminated concrete, scrap from grinding of contaminated building surfaces, are cemented into drums, placed into FRC containers and destined to the near surface repository.

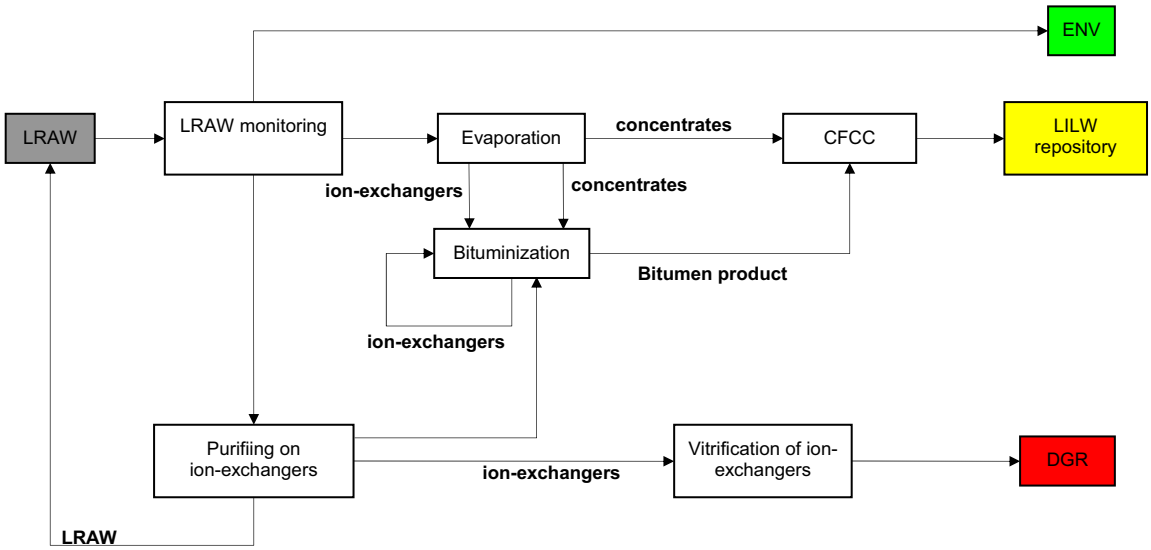
## *5.3 WASTE SCENARIO FOR LIQUID RADWASTE*

Liquid RAW from decommissioning are exclusively generated as secondary waste. Namely various used decontamination solutions from pre- and post-dismantling decontaminations of technological equipment and from decontamination of building surfaces. Moreover condensates and water from incinerator and from other RAW treatment technologies as well as water from sanitary loops.

Liquid RAW (LRAW) after radioactivity monitoring can be divided to three waste groups (see Fig. 5-3):

1. LRAW releasable into environment
2. LRAW advanced to evaporation procedure
3. LRAW advanced to cleaning on ion exchanger filters before any other treatment procedure

Fig. 5-3: Waste management scenario for liquid RAW




LRAW from the first group are discharged into environment directly after monitoring or after cleaning on ion exchanger filters.

Second group of LRAW are concentrated in evaporation unit later on either treated in bituminization plant or are used as an active cement grout for cementation of filled FRC containers destined to the near surface repository. Condensates from bituminization plant are cleaned on ion exchangers, monitored and discharged into environment.

In order to reduce the radioactivity level of the third group of LRAW, which does not meet radioactivity limits for evaporation unit, this LRAW is cleaned on ion exchangers, subsequently concentrated in evaporator and later on treated as the second group of LRAW .

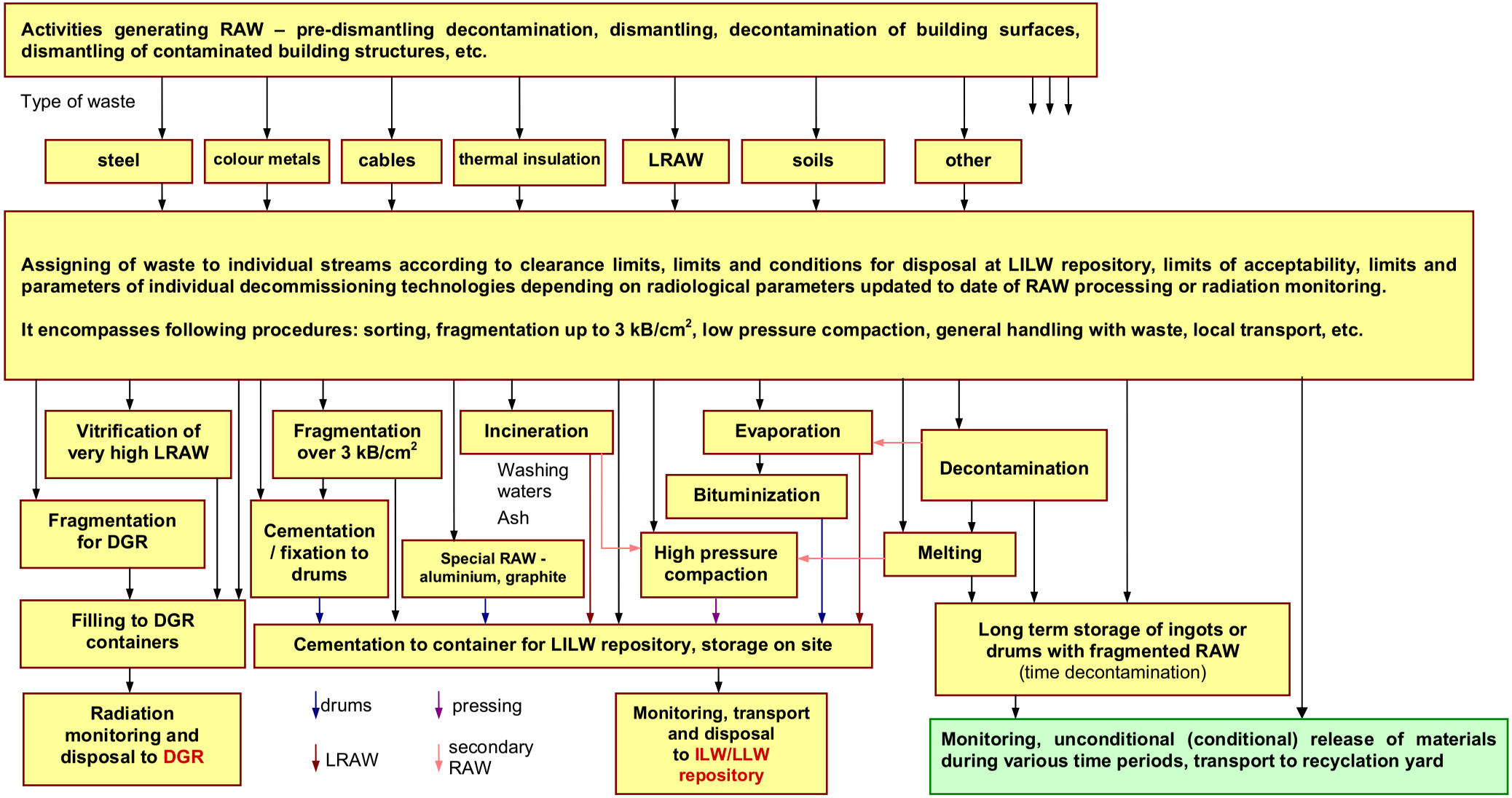
Clean-out of liquid media during operation, decommissioning or treatment on evaporation unit and bituminization plant respectively generates spent ion resins as the secondary RAW which are usually bituminised in drums and cemented in FRC containers disposed of in the near surface repository. Just in case of very high radioactivity of spent ion resins these are solidified in vitrification matrix. Vitrified cartridges are stored in special storage and are destined to deep geological repository. However, this type of waste is produced only in case of non-standard operation of nuclear facility. Given route is displayed on Fig. 5-3 only to demonstrate an ability of treatment such waste within waste scenario for liquid radwaste. For our OMEGA code calculations we do not suppose generation of given type of waste during Intermediate Storage Facility for Spent Fuel decommissioning.

Calculated quantities of liquid radwaste, such as contaminated waters, concentrates from evaporation unit and spent ion resins from Intermediate Storage Facility for Spent Fuel decommissioning are presented in chapter 7.

## *5.4 GENERAL SCHEME FOR WASTE MANAGEMENT*

Based on data of individual waste treatment and conditioning technologies, related to real flow of radioactive materials within the system for management of waste from decommissioning and from operation of the NPP's in Slovak Republic, the complete waste flow chart was developed and implemented in the computer code OMEGA. The scheme is presented on the Fig. 5-4.

Fig. 5-4 General scheme for waste management



# 6. DEVELOPMENT OF STANDARDIZED DECOMMISSIONING CALCULATION STRUCTURE FOR THE FACILITY

The chapter reviews the basic characteristics of the standardised cost structure for decommissioning purposes and the methods for its implementation into the real decommissioning projects.

## *6.1 STANDARDIZED COST STRUCTURE – REVIEW*

The standardised structure for decommissioning purposes was issued by OECD/NEA, IAEA and EU in 1999 in the document "A Proposed Standardised List of Costs Items for Decommissioning Purposes" (PSL) [6]. The document defines the structure of decommissioning activities for which the costs are to be presented. The reason for issuing the document were inconsistencies in presented costs of various decommissioning projects caused by different extent of activities, technical / local / financial factors, waste management systems, etc. The main purpose of the document is:

- To facilitate communication
- To promote uniformity
- To encourage common usage
- To avoid inconsistency or contradiction of results of costs evaluations
- To be of world wide interests to all decommissioners.

Basic chapters of standardised cost items:

01 Pre-decommissioning actions

02 Facility shutdown activities

03 Procurement of general equipment and material

04 Dismantling activities

05 Waste processing and disposal

06 Site security, surveillance and maintenance

07 Site restoration, cleanup and landscaping

08 Project management, engineering and site support

09 Research and development

10 Fuel and nuclear material

11 Other costs

The standardised structure defines following cost groups:

12.0100 Labour costs

12.0200 Capital, equipment and material costs

12.0300 Expenses

12.0400 Contingency

It is recommended that implementation of the "Proposed Standardised List of Items for Costing Purposes in the Decommissioning of Nuclear Installations" should be respected in the early stage during the development of the decommissioning database.

The standardised cost structure represents in principle the system of decommissioning activities structured in above listed chapters. The main aim was to develop a structure for presenting the costs for decommissioning, but at the same time it can be used for presenting also other decommissioning parameters for presenting the decommissioning projects. From this point of view (systems of decommissioning activities) the standardised structure can be used as the base for the calculation structure for calculation of costs and other

decommissioning parameters. Those issues of the individual decommissioning projects which are project specific, like the decommissioning work breakdown structure, can then be constructed using the items of the standardised calculation structure.

## *6.2 METHODS OF IMPLEMENTATION OF STANDARDIZED COST STRUCTURE*

The calculation structure used for the calculation of costs and other decommissioning parameters is in general the result of the interaction of the list of decommissioning activities to be done within the decommissioning project and of the inventory database. It means that sets of room-oriented decommissioning activities are repeated according to the structure building object – floor – room and set of decommissioning activities are generated for each inventory item within the room. Such a structure is repeated in various sections of the calculation structure for typical decommissioning activities like dismantling, decontamination of building surfaces, radiation monitoring of premises and other activities.

Other sections of the calculation structures are independent on the inventory database and have their own conditions for generation of calculation items.

The standardised calculation structure for calculating of the decommissioning parameters is characterised by the fact that it implements the published structure of decommissioning activities and in relevant sections (for example for dismantling) it uses for the elements of the decommissioning inventory database for generating the individual calculation items. Therefore the structure of the decommissioning inventory database should reflects also this requirements, it means that it should contains also the data needed for the generation of the standardised calculation structure.

The standardised calculation structure has also some special features which reflects the fact that the similar or the same decommissioning activities (again for example the dismantling) are distributed in more independent sections. The decommissioning inventory database items should facilitate the generation of the standardised calculation structure also for these cases.

## *6.3 IMPLEMENTATION OF STANDARDIZED COST STRUCTURE IN OMEGA CODE*

The implementation of the standardised structure of decommissioning activities, in order to achieve the standardised costs structure, can then be characterized in three main steps:

- Development of the detailed standardised structure of activities with numbered levels.
- Development of the decommissioning database with data elements enabling the generation of the standardized calculation structure
- Generation of the standardized calculation structure
- Management of the standardized calculation structure.

The first step represents the developing the detailed standardised structure of decommissioning activities by extending the three numbered levels of the published standardised structure. The extending represents 3 to 5 additional numbered levels, depending on the section of the standardised structure. In this way, a set of templates of standardised structure can be developed which are then used for generating of the standardised calculation structure in interaction with the decommissioning inventory database.

The second step is characterized by implementing additional database items related to premises items and decommissioning inventory items (chap. 4.4):

- Type of the building object. The parameter is used for generation of sections of the standardised calculation structure relevant for nuclear building objects with reactor, without reactors or non-nuclear facilities especially in chapters 4 and 7 of the definition of the standardised structure.
- Type of the decommissioning inventory item. The parameter is used for the definition of the group of the equipment like types of the building surface or types of the technological equipment. The data are used for definition of the section of the standardised structure where the database items are to be implemented.

- Category of the decommissioning inventory item. The parameter is used for selection of the calculation procedure for the item of the calculation structure and for selection calculation data dependent on the category.
- Number of the item of the standardised structure (PSL number) – a number from the detailed standardized structure used for generation of the calculation structure of the decommissioning option. The parameter is used for definition of the calculation item within the detailed numbered standardisation structure. The data are used for definition of the calculation structure for special items defined in standardised calculation structure like reactor structure, refuelling machines, etc.

For generation of the standardized calculation structure in the third step it is needed to develop also additional data which enable to generate the room oriented calculation structure according to the definition of individual sections of the standardized structure.

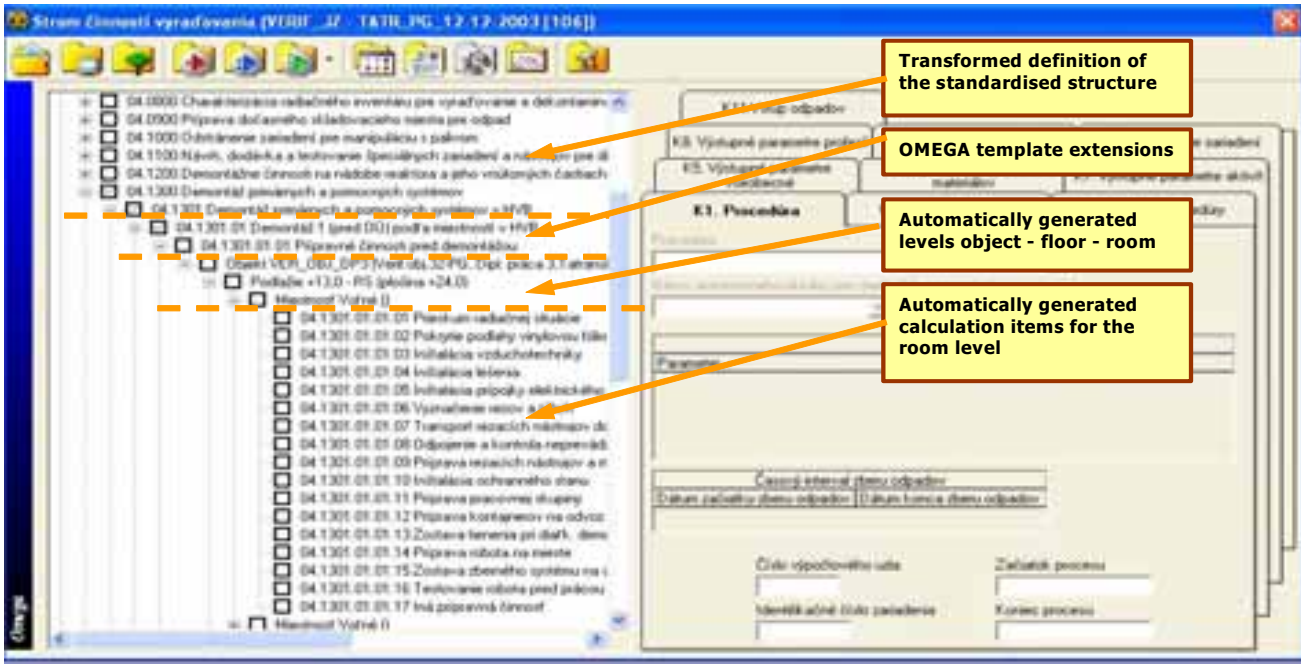
The simplified procedure for the implementation of the standardised structure of decommissioning activities is following (an example of the generated standardised cost calculation structure is presented on the Fig. 6-1):

1) To use the standardised PSL structure [1] as the input data
   - the original structure is categorized up to the third numbered level
   - list of decommissioning activities is defined for the lowest levels
2) Developing of the standardised template structures
   - extended standardised structure with lower numbered levels
3) Developing of the standardised structure of the calculation option (static structure)
   - user defined specific structure based on a selected template structure at lowest levels, where applicable, modes for generating of lower calculation levels are defined, e.g. object / floor /room / equipment structure
4) Generation of the executive standardised calculation structure
   - generated based on static standardised structure and facility inventory data
   - extent of calculation is defined by the user by switching decommissioning activities in generated executive calculation structure

Example of the executive calculation is on the Fig. 6-1. The duration of generation of the calculation structure at the current level of the code is approximately 20–25 hours for the calculation structure for a typical NPP and the number of calculation items is between $10^4$ to $10^5$. The calculation process itself for such a calculation extent lasts approximately 30 hours including generation of output formats and the Gantt chart. For the case of the model Intermediate Storage Facility for Spent Fuel calculation this values are of two orders lower.

This three–stage style of the work enables flexibility in developing the standardised calculation structures for any nuclear facility. The precondition is the inventory database for the nuclear facility with relevant structure and data needed for application of standardised structure. The methods for development of the inventory database with these properties were developed and applied for developing the calculation structure for model calculations for Intermediate Storage Facility for Spent Fuel.

Fig. 6-1 Example of an executive standardised cost calculation structure



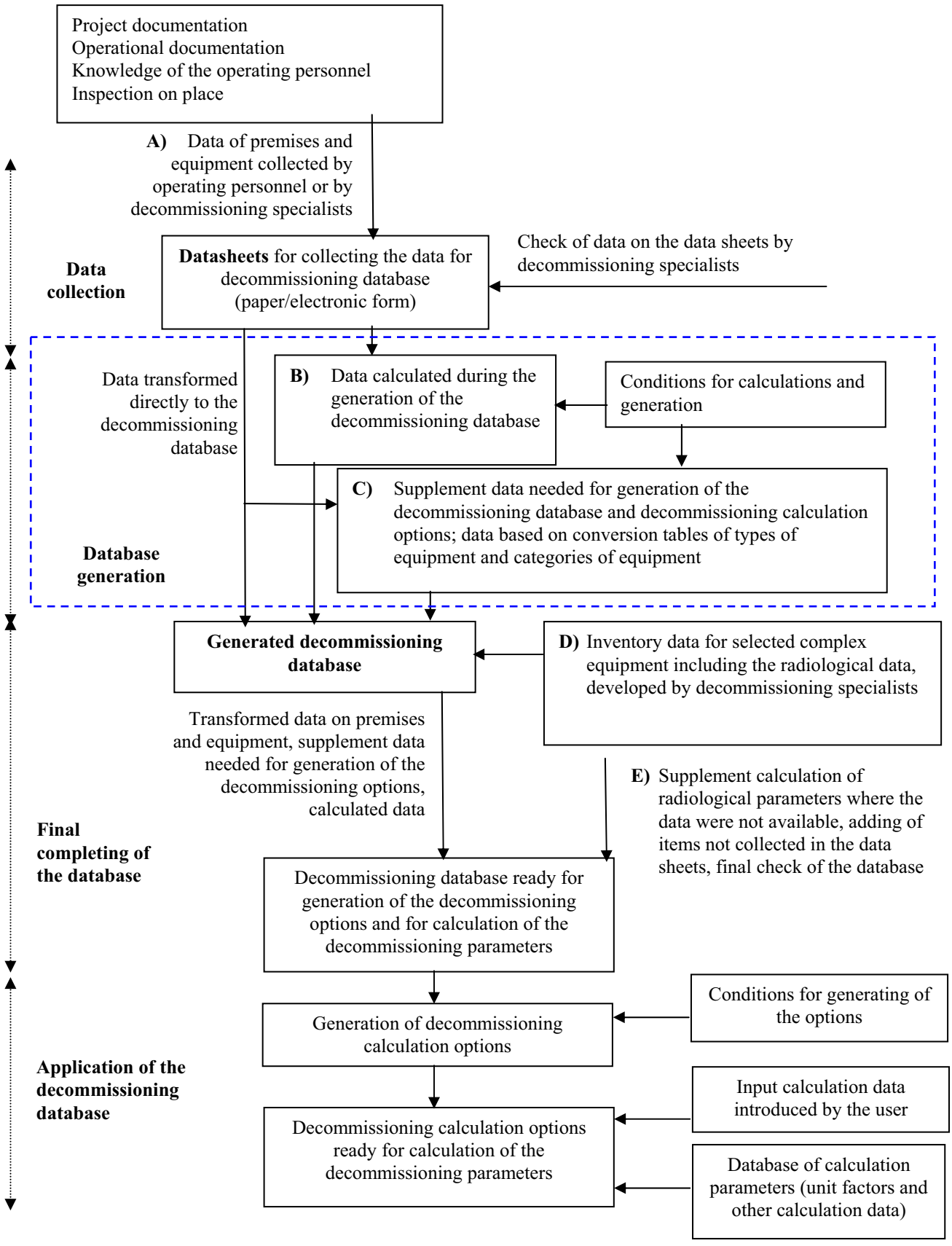

## 6.4 *EXECUTIVE CALCULATION STRUCTURE OF INTERMEDIATE STORAGE FACILITY FOR SPENT FUEL*

The executive calculation structure for the Intermediate Storage Facility for Spent Fuel was developed based on the procedure described in chapter 6.3. The structure contains all decommissioning activities as described in chapter 4. The calculation structure was generated based on the developed inventory database of the Intermediate Storage Facility for Spent Fuel and a standardised template developed from the general template of the standardised decommissioning structure developed for OMEGA code.

Before the generation of the standardised calculation structure for the Intermediate Storage Facility for Spent Fuel, the developed inventory database for completed for data needed for generation of the calculation structure, as described in the chapter 6.3.

The complete procedure from developing the inventory database to generating of the executive calculation structure is presented on the Fig. 6-2.

Fig. 6-2 Principal phases of development of the inventory database and generating of the calculation structure



Data of “A” type are the primary data to be collected from facility technical documentation and based on physical inspection in individual premises of the facility.

Data of “B” type are the secondary date derived from the primary data by calculation by decommissioning experts.

Data of “C” type are the data used in the generation of the calculation database and in generation (or definition) of the decommissioning calculation options.

Data of “D” type are the complete inventory data for complex reactor structures, developed in separate tasks. Preparation of this kind of data requires additional complex calculations like neutron flux calculations, calculation of activation of reactor construction of materials, development of a hierarchical inventory database structure which correspond to proposed dismantling procedure. Similar attitude is used also for other complex equipment like steam generators, volume compensators, primary piping and other equipment. This kind of data should be prepared by decommissioning specialists. This is not the general case for the Intermediate Storage Facility for Spent Fuel. The only equipment, for which this procedure could be applied in the frame of upgrading of the inventory database, is the refuelling machine

Data of “E” type are in general the radiological data, mostly the contamination levels and the nuclide composition of contamination or dose rate. It is expected that the main radiological parameters – the dose rate in the defined distance (0,5 m) from the equipment is collected in the frame of collecting the primary data by the operational personnel. The contamination data can be then calculated based on calculation models of categories of equipment, when they are not available as the primary data. The nuclide composition can be derived from radiological analysis of relevant samples.

# 7. PERFORMANCE OF TEST DECOMMISSIONING CALCULATIONS FOR INTERMEDIATE STORAGE FACILITY FOR SPENT FUEL USING OMEGA CODE

Decommissioning cost calculations were performed for four options. This options differ by scenario used which represents availability of waste management technologies which could be used within decommissioning process to enhance amount of steel (mainly carbon steel) releasable from facility decommissioning. These scenarios are marked as S1-S4 and include following technologies:

- Scenario S1: Post-dismantling decontamination and melting for steel radwaste are available at decommissioning site.
- Scenario S2: Post-dismantling decontamination for steel radwaste is available at the site.
- Scenario S3: Melting for steel radwaste is available at the site.
- Scenario S4: Neither post-dismantling decontamination nor melting for steel radwaste are available at the site.

For each option, following set of parameters was calculated:

- Calculated results of main decommissioning parameters, such as costs, manpower and collective dose equivalent characterizing each decommissioning option.
- Results characterizing distribution of materials arisen from decommissioning, such as mass distribution of steel destined to repositories or released into environment and number of disposed radioactive waste containers.

These parameters were calculated for individual activities within calculation structure for each option, based on the PSL structure. Parameters are presented in following forms:

- Results presented within PSL structure. Main parameters costs, manpower and exposure of personnel for given PSL items are listed in individual tables. Tables are presented in Annexes 4, due to large extension PSL items. This type of results allows to browse decommissioning option on detailed level.
- Summarized results for whole calculation option. Costs, manpower, exposure and distribution of carbon steel are presented within these results. These results are presented in table and graph form and allow analyzing decommissioning option on overall level and comparing of individual options.
- Work breakdown structure – time schedule for option with scenario S1. This time schedule allows viewing time distribution of individual decommissioning activities during decommissioning process. Scenario S1 was selected as basic scenario, containing both technologies (post-dismantling decontamination and melting) for enhancement of releasing of steel to environment.

Summarized results and graphs with commentaries are presented in following text within this chapter. Over all values of costs, manpower and exposure for individual decommissioning options are listed in Table 7-1. Graphs related to this table are shown on Figures 7-1, 7-2, 7-3. Summary distribution of materials from decommissioning of Intermediate Storage Facility for Spent Fuel is presented in Table 7-2. Distribution of carbon steel arisen from decommissioning of Intermediate Storage Facility for Spent Fuel (contaminated, non-contaminated from dismantling of technological equipment and non-contaminated from demolition of building structures) is listed in Table 7-3 with associated graph on Figure 7-4.

Table 7-1 Values of manpower, exposure, costs for individual options of decommissioning

| | | **Scenario S1** | **Scenario S2** | **Scenario S3** | **Scenario S4** |
|---|---|---|---|---|---|
| Manpower | [manhours] | 233 660 | 231 520 | 233 528 | 230 369 |
| Exposure | [manmicroSv] | 74 548 | 69 672 | 74 268 | 68 790 |
| Costs | [€] | 4 313 871 | 4 319 124 | 4 317 179 | 4 310 707 |

Table 7-2 Summary distribution of materials from decommissioning of Intermediate Storage Facility for Spent Fuel

| | | Scenario S1 | Scenario S2 | Scenario S3 | Scenario S4 |
|---|---|---|---|---|---|
| **Output materials** | **Unit** | **Value** | **Value** | **Value** | **Value** |
| Metal materials released to environment | kg | 349 461 | 324 162 | 346 597 | 322 426 |
| Non-metal materials released to environment | kg | 1 838 693 | 1 838 693 | 1 838 693 | 1 838 693 |
| Metal RAW to repositories | kg | 3 917 | 29 216 | 6 781 | 30 952 |
| Non-metal RAW to repositories | kg | 5 191 | 5 191 | 5 191 | 5 191 |
| Amount of disposal containers FRC to repositories | ks | 13,96 | 17,35 | 14,41 | 17,66 |

Table 7-3 Total distribution of carbon steel for individual options of decommissioning

| | S 1 | | S 2 | | S 3 | | S 4 | |
|---|---|---|---|---|---|---|---|---|
| | Mass [kg] | Ratio | Mass [kg] | Ratio | Mass [kg] | Ratio | Mass [kg] | Ratio |
| Carbon steel released in the environment after dismantling | 52 916 | 15,14 | 52 916 | 15,14 | 52 916 | 15,14 | 52 916 | 15,14 |
| Carbon steel released in the environment after post-dismantling decontamination | 11 | 0,00 | 11 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| Carbon steel released in the environment after post-dismantling decontamination and melting | 25 299 | 7,24 | 0 | 0,00 | 24 171 | 6,91 | 0 | 0,00 |
| Building carbon steel released in the environment | 268 171 | 76,71 | 268 171 | 76,71 | 268 171 | 76,71 | 268 171 | 76,71 |
| Carbon steel disposed in LILW repository | 3 186 | 0,91 | 28 485 | 8,15 | 4 326 | 1,24 | 28 496 | 8,15 |
| Carbon steel disposed in DGR | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| **Total mass of carbon steel** | **349 583** | **100,00** | **349 583** | **100,00** | **349 583** | **100,00** | **349 583** | **100,00** |

Fig. 7-1 Costs for individual options of decommissioning

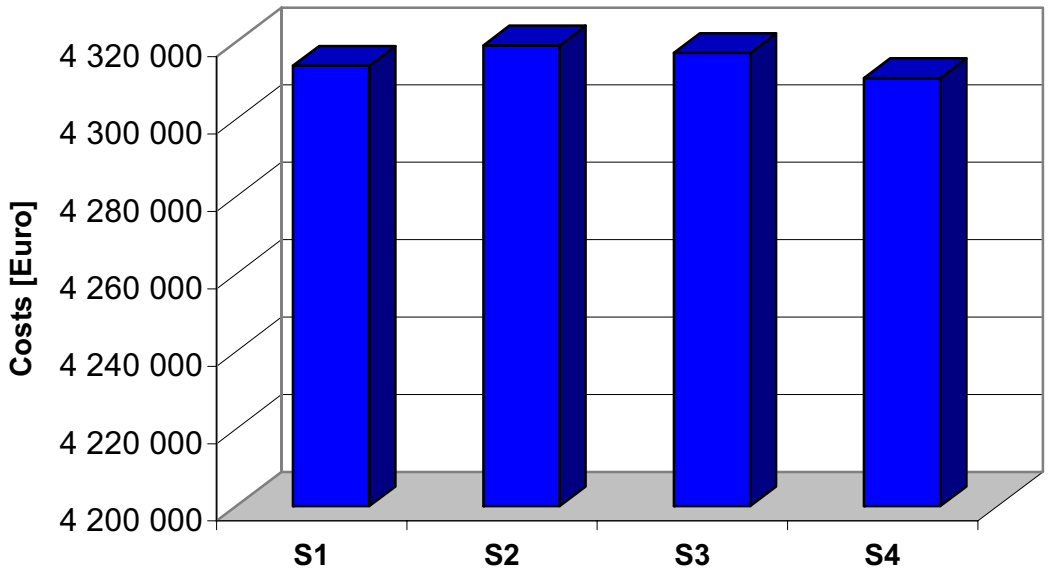


Fig. 7-2 Manpower for individual options of decommissioning

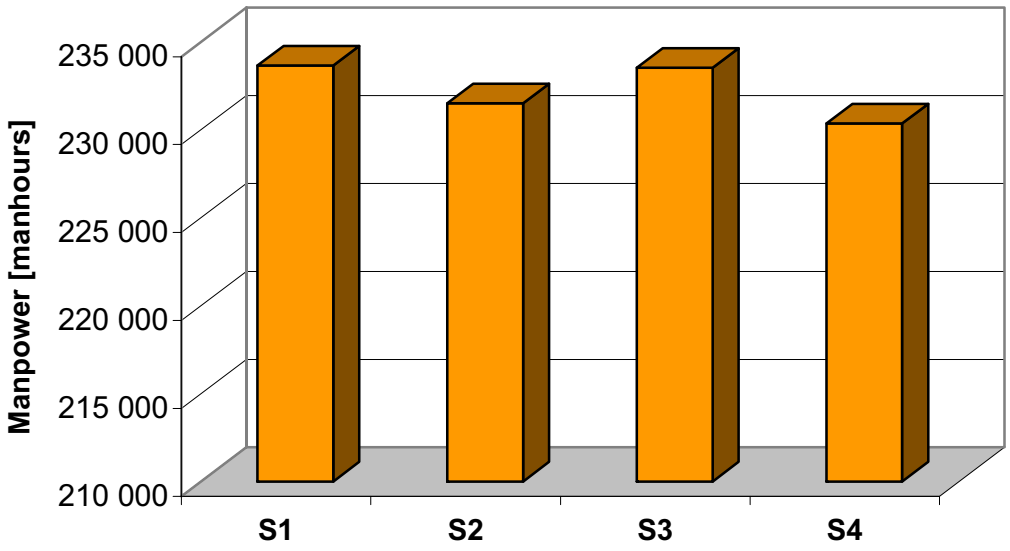



Fig. 7-3 Exposure for individual options of decommissioning

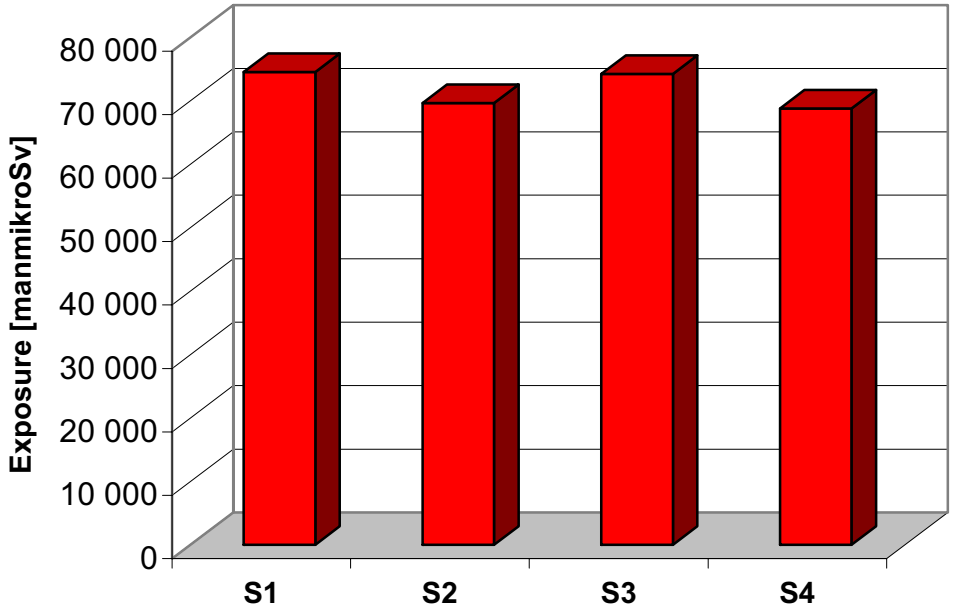
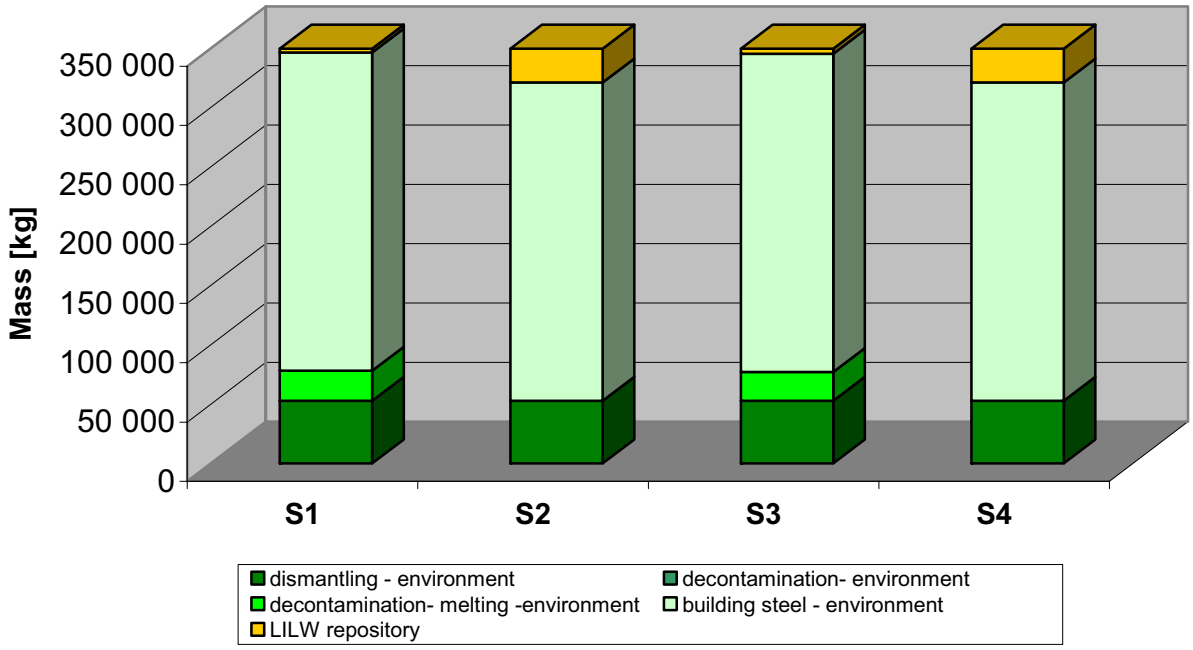


Fig. 7-4 Total distribution of carbon steel




Based on comparison of values of overall parameters (manpower, exposure, costs) for individual calculated decommissioning scenarios (see Table 7-1 and Figures 7-1, 7-2, 7-3) it can be observed that these values are similar. The reason of this is the fact that Intermediate Storage Facility for Spent Fuel is a small non-reactor nuclear facility where the mass ratio of contaminated materials (from contaminated equipment) to non-contaminated materials (from non-contaminated equipment and building structure materials) is low. From this point of view using of melting and decontamination of contaminated materials from technological equipment has no significant impact on overall manpower, exposure and costs of decommissioning.

Dismantling activities, activities of building surface decontamination, building surface radiation monitoring and also demolition activities are identical for all calculated scenarios of decommissioning. The same is also the set of period depended activities including (management, engineer support, security service, maintenance, etc.).

Waste processing activities are practically different only in the case of decontamination of metals, melting and disposal of containers at LILW repository. The definition of individual scenarios is presented at the beginning of the chapter.

Detailed values of manpower, exposure and costs for individual activities within decommissioning process are shown for all scenarios in PSL structure in Annexes 4.

Summary distribution of main groups of material for individual scenarios is shown in Table 7-2. Table shows differences in amounts of metal materials released into environment and disposal in LILW repository. It is also expressed by the amount of containers to repository.

Detailed influence of using melting and decontamination of metals based on used scenarios is shown on the case of carbon steel material distribution see Table 7-3 and Figure 7-4.

Tentative decommissioning work breakdown structure for Scenario S1: Post-dismantling decontamination and melting for steel radwaste available at decommissioning site is shown in Annex 5.

It has to be stressed that these tentative calculations are directly dependent on input data from Intermediate Storage Facility for Spent Fuel inventory (technological and radiological). Other important parameters are input technological and economical data used for individual decommissioning activities (manpower unit factors, capacities of decommissioning equipment and processing lines, wage parameters of workers, prices of consumption materials and media etc.).

# 8. IDENTIFICATION OF DIFFERENCES IN CALCULATION CONDITIONS RESULTING FROM SWEDISH AND SLOVAKIAN DECOMMISSIONING INFRASTRUCTURE

The chapter identifies possible differences in calculation conditions resulting from Swedish and Slovakian decommissioning infrastructure

Infrastructure of decommissioning represents whole system and structure of decommissioning process. It includes D&D techniques, waste management technologies including final disposal and releasing of materials arising from decommissioning process (including relevant radiological limits and conditions) and links among them characterizing flow of material and radioactivity and also support, administrative and management activities carried out during decommissioning process.

This infrastructure is common in its general features and can be used worldwide (see PSL structure document [6]) and it enables to use general methodology for decommissioning process evaluation in any country, but there can be differences which are resulting from legal and technical approach to decommissioning in individual country and thus they are country specific.

In calculation of the Intermediate Storage Facility for Spent Fuel decommissioning, Slovakian infrastructure of decommissioning was used together with relevant calculation data due to their actual availability. Although we expect similar character of decommissioning infrastructure in Sweden (Studsvik) conditions, there can be some differences identified. Typical identified areas of differences can be following:

1. Characterization of endpoints for waste arisen from the decommissioning process, unconditional, possible conditional releasing of materials and disposal at available repositories (HLW, LLW, ILW, VLLW).

   This characterization includes legal stipulated radiological limits and conditions for releasing of waste to environment and for disposal of RAW and also characterization of final packages authorized for disposal at available types of repositories including physical characteristics (dimensions, useful volumes and weights, availability for certain types of RAW, etc.).

   Characterization of endpoints used in Omega code according to Slovak conditions is mentioned in Annex 3.

2. Implementation of comparable dismantling, decontamination techniques and waste management technologies including their technological parameters.

   There are not expected significant differences in dismantling techniques, because basic types of dismantling techniques within decommissioning are commonly used worldwide (hands on dismantling by general tools, dismantling by grinders, circular saws, plasma set or oxygen-acetylene set, etc.). Differences can occur in capacities of these techniques (man-hours per kg of dismantled material) arising mostly from definition of involved activities.

   Similarly, basic practices and types of waste management technologies are also used in general, but for individual technologies some differences can occur concerning their availability on the site or according to the country policy, also technological parameters and characteristics of individual technologies (capacities, used chemical substances or media and their consumptions, workforce requirements) can be different. These differences are related to such waste management technologies as sorting of metals (carbon, stainless steel and colour metals) and other materials according to its type and level of radioactivity, fragmentation of sorted materials, post-dismantling decontamination of steel, low and high pressure compaction, melting of metals, decontamination of building surfaces, packaging of waste into authorized packages, radiation monitoring of packages and building surfaces, transports and disposal at individual types of repositories.

   Main parameters of techniques and technologies used within OMEGA calculation code are listed in Annex 2-2. Data listed in these datasheets are mentioned within colour legend, which distinguishes parameters of particular types by individual colours. There are coloured most significant parameters (mainly cost unit factor parameters, wages), parameters with significant impact of technological procedures (capacities of technologies and techniques, characteristics of processes) and also parameters depending on package type (drums, transport containers or disposal containers). Also amounts of

workers within professions of the working groups assigned to individual procedures, together with the time structure of their working time during performing the decommissioning activity.

3. Characterization of project management, engineering and various support activities.

   These types of activities are considered as period dependent activities, which are needed to be performed during individual phases or during whole duration of decommissioning project. Although, these activities are common for all projects of decommissioning, their necessity and extension can vary from project to project depending on national policy, facility characteristics (type and size) and for selected decommissioning option (immediate, deferred decommissioning or entombment). Characterization of these activities includes identification of their need, assigning of appropriate amount workers of individual professions and potential fixed costs.

   Period depending activities used in calculations and their parameters are listed in Annex 2-3.

4. Determination of proper values of cost unit factors and labour costs.

   These parameters have the highest impact on calculated cost. Cost unit factors (prices) for individual commodities used in decommissioning process can vary depending on country and even site. It includes unit prices of consumed media, chemical substances, energy, commonly used tools and working instruments.

   Also costs of workforce can significantly vary depending on country economics and other conditions and they have significant impact to overall costs arisen from decommissioning process. These costs are also depending on individual types of professions used in decommissioning process evaluation.

   It is a fair assumption, for calculations purposes, that any differences in the labour costs between the member-countries within the European Union will decrease in the medium long run.

   A failure to mitigate the present differences in salary levels etc. will urge for the need of legal and financial measures to stimulate the development towards more integrated and efficient markets.

   If the future labour costs will be in parity with the current Slovakian or Swedish level is hard to judge. The presence of efficient markets will however reduced the differences in the medium long term and ultimately reduce them in the long run.

   Most significant cost unit factors and wages of types of professions used in OMEGA code are listed in Annex 2-1.

# 9. SUMMARY OF PROJECT RESULTS

The main purpose of the presented study is to demonstrate the tentative application of the advanced costing methodology using the MEGA code for Intermediate Storage Facility for Spent Fuel in Studsvik. This task was performed in several work packages with the results described below. In the review chapter 2, the short description of the Intermediate Storage Facility for Spent Fuel, the cost calculation code OMEGA and initial conditions for tentative decommissioning calculations are presented. The results achieved in work packages, as presented in individual chapters are following:

**Chapter 3 - WP 1: Development of the data sheets for the facility input data applied in decommissioning calculation**

The room oriented Intermediate Storage Facility for Spent Fuel decommissioning inventory database was developed with the structure for application with the OMEGA code. The developed data include the data for buildings, floors, rooms and equipment in individual rooms.

The radiological data were developed based on preliminary radiological data presented in the SVAFO study [3], based on model calculations using the Microshield code and based on analysis of real radiological data of A1 NPP in Slovakia, where the range of contamination was analysed and applied in definition of contamination classes.

The calculation data, as defined in the OMEGA code were analysed, and the data recommended for implementation of the calculation system into the Swedish conditions were identified. The user friendly data sheets for data collection were developed.

**Chapter 4 - WP 2: Definition of extent of decommissioning activities**

Methods for definition of extent of decommissioning activities were presented in the chapter. The preparatory activities before starting dismantling were identified in a tentative extent. The decommissioning activities relevant for room oriented approach were identified, listed and characterised for dismantling, decontamination of building surfaces, final building RA-survey. The activities for site restoration , demolition and release of site were described.

Waste management activities for treatment, conditioning and disposal of individual types of waste as resulted during decommissioning were identified and described.

The management, support activities, maintenance and surveillance activities were developed in a tentative extent.

**Chapter 5 - WP 3: Definition of waste management scenario for Intermediate Storage Facility for Spent Fuel**

General approach to waste management scenarios is presented. Following waste managements scenarios were presented, as applied in the code OMEGA:

- Waste scenario for solid radwaste (metal RAW and non – metal solid RAW)
- Waste scenario for liquid RAW
- General scheme for waste management.

**Chapter 6 - WP 4: Development of standardized decommissioning calculation structure for the facility**

The chapter presents the overview of the standardized cost structure for decommissioning. The general methods and experience from implementation of the standardised cost structure are presented and the implementation of the standardised cost calculation structure in the computer code OMEGA are presented.

The procedure for development of the standardised calculation structure for the Intermediate Storage Facility for Spent Fuel is described.

**Chapter 7 - WP 5: Performance of test decommissioning calculations for Intermediate Storage Facility for Spent Fuel using the OMEGA code**

The tentative decommissioning cost calculations were performed for four options which differ in waste management in order to present the capabilities of the methodology and the code applied. Following set of parameters was calculated:

- Main decommissioning parameters, such as costs, manpower and collective dose equivalent characterizing each decommissioning option, formatted in standardized structure.
- Results characterizing distribution of materials arisen from decommissioning
- Tentative decommissioning time schedule.

**Chapter 8: Identification of differences in calculation conditions resulting from Swedish and Slovakian decommissioning infrastructure**

Typical identified areas of differences between Slovakian decommissioning infrastructure as applied in the tentative cost calculations and Sweden conditions were identified as follows:

- The endpoints for waste arisen from the decommissioning process, unconditional, possible conditional releasing of materials and disposal at available repositories (HLW, LLW, ILW, VLLW).
- Implementation of comparable dismantling, decontamination techniques and waste management technologies including their technological parameters.
- Differences in project management, engineering and various support activities.
- The local values of cost unit factors and labour costs.

# 10. IDENTIFICATIONS / PROPOSALS FOR FURTHER ACTIVITIES

The main results of the current project related to the Intermediate Storage Facility for Spent Fuel can be identified as:

- inventory decommissioning database
- identification of data needed for implementation in national or site specific cases
- standardised model calculation case, including applications of system for on-line management of waste from decommissioning.

This results represents a good starting position for further continuation in development of practical cases for development of decommissioning data needed for planning of a decommissioning project. The main feature of these cases could be:

- Full implementation of the Standardised List of Cost Items, as recommended by IAEA, OECD/NEA and EU which includes all technical and non-technical decommissioning activities
- Implementation of the system for on-line evaluation of waste management of waste arising from decommissioning.

The areas which could be the subject of further continuation of the project are following:

- Analysis of decommissioning infrastructure conditions in Studsvik / Sweden conditions which includes dismantling and decontamination techniques, waste management technologies, working force data, etc.
- Implementation of Swedish infrastructure conditions into OMEGA database and procedures
- Upgrading of the Intermediate Storage Facility for Spent Fuel inventory database (technological and mainly radiological characterization), model calculations for radiological characterisation, by analysis of available documentation, inspection on site, supplement radiological characterisation including sampling and analyses of samples
- Development of a document which reviews the methods of application of the Proposed Standardised List of Items for Costing Purposes (PSL) and methods for development of the decommissioning inventory databases in the frame of projects for calculation of decommissioning parameters. Such a document can be used for example also as a kind of manual or guide for the regulatory body
- Identification/description of main features of other life-cycle phases of a nuclear facility with relations to decommissioning, like the transition period from shut-down to licensed decommissioning phase.

# 11. CONCLUSIONS

This report resents the result of the third continuation of cooperation between the Swedish Nuclear Power Inspectorate (SKI) and the Slovak team of decommissioning experts from the companies DECOM Slovakia and Deconta, a.s., since 2004. The study below continues on findings and suggestions that were presented in two previous research projects.

The main aim of the current project was to develop the tentative implementation of the standardised cost calculation methodology, due to fact that the standardized cost calculation structure is highly recommended for application in decommissioning costing by the European main organizations involved in decommissioning (IAEA, EC and OECD/NEA).

The report presents the results of the tentative implementation of the standardized cost structure for the Intermediate Storage Facility for Spent Fuel in Studsvik, using the developed Intermediate Storage Facility for Spent Fuel inventory database, the computer code OMEGA and the data of the decommissioning infrastructure in Slovakia. The individual steps of implementation starting from developing the decommissioning facility inventory database, through defining the standardized calculation case, developing the executive standardized calculation structure up to calculating the data and discussing the results.

The achieved results are the base for next steps for continuation of the cooperation. Possible areas of cooperation are proposed and the areas to be analysed, which could result in implementation of the standardized decommissioning costing in Swedish conditions.

The tentative cost calculation show a cost level of around 4.3 milion EUR.

It shall be stated that this estimate is based on present Slovakian cost structure. If the calculation should be based on the present Swedish level of costs it make give a result that is profoundly higher.

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# 13. ANNEXES

**Annex 1 Inventory database of the Intermediate Storage Facility for Spent Fuel**

- Annex 1-1 List of the floors
- Annex 1-2 List of the rooms
- Annex 1-3 List of the technological and building equipments

**Annex 2 Calculation parameters (most important selected parameters)**

- Annex 2-1 General parameters
- Annex 2-2 Parameters of technological procedures
  - Annex 2-2-1 Set of calculation procedures for dismantling of technological equipment
  - Annex 2-2-2 Set of calculation procedures for decontamination of building surfaces
  - Annex 2-2-3 Set of calculation procedures for demolition of building
  - Annex 2-2-4 Set of calculation procedures for treatment technologies
  - Annex 2-2-5 Set of calculation procedures for radiation monitoring
  - Annex 2-2-6 Set of calculation procedures for transports
- Annex 2-3 Parameters of specific procedures (Period depended activities)
- Annex 2-4 Extend of preparation and finishing activities for dismantling

**Annex 3 Limits for unconditional release of materials to environment and limits for disposal of RAW of LILW repository to Mochovce Slovak Republic**

**Annex 4 Lists of calculated decommissioning activities and results of calculation, according the PSL structure**

- Annex 4-1 PSL structure of calculated decommissioning activities - Manpower
- Annex 4-2 PSL structure of calculated decommissioning activities - Exposure
- Annex 4-3 PSL structure of calculated decommissioning activities – Costs
- Annex 4-4 PSL structure of calculated decommissioning activities – Summary

**Annex 5 Tentative decommissioning work breakdown structure**

# Annex 1

# Inventory database of the FA facility

## Annex 1-1 List of the floors

| Identification number | Name of building | Name of floor | Underground floor |
|---|---|---|---|
| 1 | FA Facility Building | Cellar +17,90 +18,50 | 1 |
| 2 | FA Facility Building | Ground floor +21,50 | 0 |
| 3 | FA Facility Building | First floor +24,50 | 0 |

## Annex 1-2 List of the rooms

| ID | Name of Building | Name of floor | Number of room | Name of room | Room width (m) | Room length (m) | Room high (m) | Average dose rate (µGy/h) |
|---|---|---|---|---|---|---|---|---|
| 001 | FA Facility Building | Cellar +17,90 +18,50 | 0.01 | Stairway | 1,5 | 2,1 | 3 | 10 |
| 002 | FA Facility Building | Cellar +17,90 +18,50 | 0.02 | Corridor 1 | 1,5 | 3,1 | 3 | 10 |
| 003 | FA Facility Building | Cellar +17,90 +18,50 | 0.03 | Corridor 2 | 1,6 | 1,9 | 3 | 10 |
| 004 | FA Facility Building | Cellar +17,90 +18,50 | 0.04 | Electricity supply | 2 | 5,1 | 3,4 | 10 |
| 005 | FA Facility Building | Cellar +17,90 +18,50 | 0.05 | Telephone room | 2 | 3,4 | 3,4 | 10 |
| 006 | FA Facility Building | Cellar +17,90 +18,50 | 0.06 | Airlock | 1 | 1,8 | 3,5 | 10 |
| 007 | FA Facility Building | Cellar +17,90 +18,50 | 0.07 | Active piping corridor | 1 | 8,1 | 3 | 10 |
| 008 | FA Facility Building | Cellar +17,90 +18,50 | 0.08 | Heating unit | 4 | 7 | 3 | 10 |
| 009 | FA Facility Building | Cellar +17,90 +18,50 | 0.09 | Cellar 1 | 4,9 | 11,8 | 3,6 | 10 |
| 010 | FA Facility Building | Cellar +17,90 +18,50 | 0.10 | Stairway | 2 | 3,5 | 3,1 | 10 |
| 011 | FA Facility Building | Cellar +17,90 +18,50 | 0.11 | Cellar 2 | 2,2 | 3,7 | 3,1 | 10 |
| 012 | FA Facility Building | Cellar +17,90 +18,50 | 0.12 | Cell | 1,2 | 1,7 | 3,1 | 10 |
| 013 | FA Facility Building | Cellar +17,90 +18,50 | 0.13 | Ion-exchanger room | 0,9 | 0,9 | 3,1 | 10 |
| 014 | FA Facility Building | Cellar +17,90 +18,50 | 0.14 | Tank room | 3,3 | 5,8 | 3,1 | 10 |
| 015 | FA Facility Building | Cellar +17,90 +18,50 | 0.15 | Pump sump1 | 1,5 | 1,1 | 4,3 | 10 |
| 016 | FA Facility Building | Cellar +17,90 +18,50 | 0.16 | Pump sump2 | 1,5 | 1,1 | 4,3 | 10 |
| 017 | FA Facility Building | Ground floor +21,50 | 1.01 | Entrance hall | 5,3 | 14,3 | 6,3 | 5 |
| 018 | FA Facility Building | Ground floor +21,50 | 1.02 | Corridor | 1,5 | 3,1 | 3 | 5 |
| 019 | FA Facility Building | Ground floor +21,50 | 1.03 | Stairway | 1,5 | 2,1 | 3 | 5 |
| 020 | FA Facility Building | Ground floor +21,50 | 1.04 | Office | 4 | 5 | 3 | 5 |
| 021 | FA Facility Building | Ground floor +21,50 | 1.05 | Changing room | 5 | 4,5 | 3 | 5 |
| 022 | FA Facility Building | Ground floor +21,50 | 1.06 | Shower | 3,2 | 3 | 3,1 | 5 |
| 023 | FA Facility Building | Ground floor +21,50 | 1.07 | Toilet | 2,5 | 1,8 | 3 | 5 |
| 024 | FA Facility Building | Ground floor +21,50 | 1.08 | Shower niche | 2,5 | 2 | 3 | 5 |

| ID | Name of Building | Name of floor | Number of room | Name of room | Room width (m) | Room length (m) | Room high (m) | Average dose rate (µGy/h) |
|---|---|---|---|---|---|---|---|---|
| 025 | FA Facility Building | Ground floor +21,50 | 1.09 | Washing alcove 1 | 3,3 | 3,5 | 3,1 | 5 |
| 026 | FA Facility Building | Ground floor +21,50 | 1.11 | Washing alcove 2 | 2,8 | 3 | 3,1 | 5 |
| 027 | FA Facility Building | Ground floor +21,50 | 1.12 | Storage hall | 10 | 20 | 10 | 5 |
| 028 | FA Facility Building | Ground floor +21,50 | 1.13 | Decontamination basin | 3,8 | 5 | 1 | 5 |
| 029 | FA Facility Building | Ground floor +21,50 | 1.14 | Storage basin 1 | 3 | 3 | 7,5 | 5 |
| 030 | FA Facility Building | Ground floor +21,50 | 1.15 | Storage basin 2 | 3 | 3 | 7,5 | 5 |
| 031 | FA Facility Building | Ground floor +21,50 | 1.16 | Storage basin 3 | 3 | 3 | 7,5 | 5 |
| 032 | FA Facility Building | Ground floor +21,50 | 1.17 | Wash area | 3 | 4 | 3 | 5 |
| 038 | FA Facility Building | Ground floor +21,50 | 1.18 | Virtual room | 0 | 0 | 0 | 5 |
| 033 | FA Facility Building | First floor +24,50 | 2.01 | Corridor | 2,2 | 5,1 | 3,2 | 5 |
| 034 | FA Facility Building | First floor +24,50 | 2.02 | Ventilation, intake | 1,5 | 6 | 2,2 | 5 |
| 035 | FA Facility Building | First floor +24,50 | 2.03 | Ventilation, exhaust | 2,2 | 6,5 | 2,2 | 5 |
| 036 | FA Facility Building | First floor +24,50 | 2.04 | Ventilation shaft | 2,3 | 5 | 2,2 | 5 |
| 037 | FA Facility Building | First floor +24,50 | 2.05 | Roof, service unit | 5,4 | 7,5 | 3,2 | 5 |

## Annex 1-3 List of the technological and building equipments

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Pipe-CS_DN10, insulated | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 2,2 | 0,32 | 0 | 0,38 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 28, 29, 30 / 2 |
| 2 | Pipe-CS_DN25, insulated | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 7,8 | 0,25 | 0 | 0,32 | 0 | 0 | 0,002 | Piping (CS), diameter =< D25 mm | 28, 29, 30 / 12 |
| 3 | Cat. 6-pipe-A100 DN110 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 62,7 | 2,07 | 0 | 2,22 | 0 | 0 | 0,057 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 11 |
| 4 | Cat. 6-pipe-A100 DN110 embedded in floor | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 46 | 1,52 | 0 | 1,63 | 0 | 0 | 0,042 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 17 |
| 5 | Duct 19x19, internal insulation 1/2" | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 11,9 | 1,5 | 0 | 1,52 | 0 | 0 | 0,072 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 9 |
| 6 | Electrical cabinet | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 3,6 | 0 | 0 | 0,42 | 0 | 0 | 0,02 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 5 |
| 7 | Main cabinet 1 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 176,4 | 0 | 0 | 6,02 | 0 | 0 | 0,88 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 2 |
| 8 | Insulation | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 28,6 | 0 | 0 | 0 | 0 | 0 | 0,1 | Thermal insulations, non-metal covering | 28,29,30 / 2 |
| 9 | Insulation | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 12,6 | 0 | 0 | 0 | 0 | 0 | 0,04 | Thermal insulations, non-metal covering | 28,29,30 / 12 |
| 10 | Insulation | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 5,2 | 0 | 0 | 0 | 0 | 0 | 0,02 | Thermal insulations, non-metal covering | 43,44,45 / 1 |
| 11 | Insulation | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 5,52 | 0 | 0 | 0 | 0 | 0 | 0,02 | Thermal insulations, non-metal covering | 52,53,54 / 9 |
| 12 | Radiator | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 5 | 0 | 0 | 0,61 | 0 | 0 | 0,01 | Piece components (CS), mass <= 200 kg | 25,26,27 / 5 |
| 13 | Cold water pipe-Cu- | (Cellar +17,90 +18,50) - (0.02) - | 0,805 | 0,1 | 0 | 0,11 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 18 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | DN19 | Corridor 1 | | | | | | | | | |
| 14 | Hot water pipe-Cu-DN19, insulated | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 0,805 | 0,1 | 0 | 0,11 | 0 | 0 | 0 | Colour metals pipes | 43,44,45 / 1 |
| 16 | Deionised water pipe-PP-DN50 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 1 | 0,25 | 0 | 0,3 | 0 | 0 | 0,003 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 15 |
| 15 CC1 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 0,81 | 0,1 | 5000000 | 0,12 | 400000 | 10 | 0,00204 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/14 – part 1 |
| 15 CC2 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 1,12 | 0,13 | 50000000 | 0,16 | 400000 | 100 | 0,0028 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/14 – part 2 |
| 15 CC3 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 1,32 | 0,16 | 500000000 | 0,19 | 400000 | 1000 | 0,033 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/14 – part 3 |
| 15 CC4 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.02) - Corridor 1 | 0,35 | 0,04 | 1000000000 | 0,05 | 400000 | 2000 | 0,00086 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/14 – part 4 |
| 17 | Pipe-CS_DN10, insulated | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 0,6 | 0,09 | 0 | 0,11 | 0 | 0 | 0,01 | Piping (CS), diameter =< D25 mm | 25,26,27 / 15 |
| 18 | Pipe-CS_DN25, insulated | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 13,2 | 0,42 | 0 | 0,54 | 0 | 0 | 0,003 | Piping (CS), diameter =< D25 mm | 28,29,30 / 11 |
| 19 | Cat. 6-pipe-A100 DN110 | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 8,4 | 0,28 | 0 | 0,3 | 0 | 0 | 0,008 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 3 |
| 20 | Duct 14x14, internal insulation 1/2" | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 9,7 | 1,21 | 0 | 1,23 | 0 | 0 | 0,043 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 8 |
| 21 | Insulation | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 7,9 | 0 | 0 | 0 | 0 | 0 | 0 | Thermal insulations, non-metal covering | 25,26,27 / 15 |
| 22 | Insulation | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 21,3 | 0 | 0 | 0 | 0 | 0 | 0,07 | Thermal insulations, non-metal covering | 28,29,30 / 11 |
| 23 | Insulation | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 8,5 | 0 | 0 | 0 | 0 | 0 | 0,03 | Thermal insulations, non-metal covering | 37,38,39 / 18 |
| 24 | Insulation | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 4,36 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 52,53,54 / 8 |
| 25 | Cold water pipe-Cu-DN19 | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 1,3 | 0,15 | 0 | 0,16 | 0 | 0 | 0,001 | Colour metals pipes | 37,38,39 / 17 |
| 26 | Cold water pipe-Cu-DN19, insulated | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 1,309 | 0,16 | 0 | 0,17 | 0 | 0 | 0,001 | Colour metals pipes | 37,38,39 / 18 |
| 27 | Cat.4 pipe-PE-Ap74 DN90 | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 4,2 | 0,57 | 0 | 0,67 | 0 | 0 | 0,013 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 6 |
| 28 | Deionised water pipe-PP-DN50 | (Cellar +17,90 +18,50) - (0.03) - Corridor 2 | 9 | 0,22 | 0 | 0,26 | 0 | 0 | 0,003 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 11 |
| 29 | Pipe-CS_DN10, insulated | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 0,9 | 0,13 | 0 | 0,15 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 25,26,27 / 19 |
| 30 | Incl. Power cables | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 15 | 0 | 0 | 0 | 0 | 0 | 0,05 | Electrical cables & conductors; (Cu), 1 kV power cables | 16,17,18 / 18 |
| 31 | Cables in floor gully | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 31,3 | 0 | 0 | 0 | 0 | 0 | 0,05 | Controll & low-voltage cables (Cu) | 16,17,18 / 20 |
| 32 | Cables in floor gully | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 15 | 0 | 0 | 0 | 0 | 0 | 0,02 | Controll & low-voltage cables (Cu) | 19,20,21 / 1 |
| 33 | Switchyard | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 705,6 | 0 | 0 | 6,02 | 0 | 0 | 3,53 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 17 |
| 34 | Insulation | (Cellar +17,90 +18,50) - (0.04) - Electricity supply | 11,3 | 0 | 0 | 0 | 0 | 0 | 0 | Thermal insulations, non-metal covering | 25,26,27 / 19 |
| 35 | Pipe-CS_DN10, insulated | (Cellar +17,90 +18,50) - (0.05) - Telephone room | 1,8 | 0,25 | 0 | 0,3 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 28,29,30 / 1 |
| 36 | Electrical cabinet | (Cellar +17,90 +18,50) - (0.05) - Telephone room | 3,6 | 0 | 0 | 0,42 | 0 | 0 | 0,02 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 7 |
| 37 | Junction box | (Cellar +17,90 +18,50) - (0.05) - Telephone room | 84 | 0 | 0 | 3,86 | 0 | 0 | 0,42 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 11 |
| 38 | Rectifier | (Cellar +17,90 +18,50) - (0.05) - | 84 | 0 | 0 | 3,86 | 0 | 0 | 0,42 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 12 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telephone room | | | | | | | | | |
| 39 | Insulation | (Cellar +17,90 +18,50) - (0.05) - Telephone room | 22,6 | 0 | 0 | 0 | 0 | 0 | 0,08 | Thermal insulations, non-metal covering | 28,29,30 / 1 |
| 40 | Radiator | (Cellar +17,90 +18,50) - (0.05) - Telephone room | 3 | 0 | 0 | 0,42 | 0 | 0 | 0,01 | Piece components (CS), mass <= 200 kg | 25,26,27 / 3 |
| 41 CC1 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,23 | 0,04 | 5000000 | 0,04 | 400000 | 10 | 0,00045 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/4 – part 1 |
| 41 CC2 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,31 | 0,05 | 50000000 | 0,06 | 400000 | 100 | 0,00062 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/4 – part 2 |
| 41 CC3 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,37 | 0,06 | 500000000 | 0,07 | 400000 | 1000 | 0,00073 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/4 – part 3 |
| 41 CC4 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,1 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00019 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/4 – part 4 |
| 42 CC1 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,68 | 0,78 | 5000000 | 0,79 | 400000 | 10 | 0,01945 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/5 – part 1 |
| 42 CC2 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,93 | 1,07 | 50000000 | 1,09 | 400000 | 100 | 0,02678 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/5 – part 2 |
| 42 CC3 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 1,1 | 1,26 | 500000000 | 1,29 | 400000 | 1000 | 0,03151 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/5 – part 3 |
| 42 CC4 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.06) - Airlock | 0,29 | 0,33 | 1000000000 | 0,34 | 400000 | 2000 | 0,00826 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/5 – part 4 |
| 43 | Tr pipe-CS-DN15 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 1,2 | 0,05 | 0 | 0,06 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 49,50,51 / 5 |
| 46 | Cat. 6-drain pipe, DN100 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 8,5 | 1,1 | 0 | 1,12 | 0 | 0 | 0,027 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 4 |
| 47 | Cat. 6-pipe-A100 DN110 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 12,5 | 0,41 | 0 | 0,44 | 0 | 0 | 0,011 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 22 |
| 48 | Cat. 6-pipe-A75 DN85 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 14,4 | 0,48 | 0 | 0,53 | 0 | 0 | 0,01 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 1 |
| 49 | Cat. 6-pipe-Av100 DN110 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 154,8 | 5,11 | 0 | 5,48 | 0 | 0 | 0,141 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 21 |
| 50 | Cat. 7-pipe-A150 DN160 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 284,8 | 6,28 | 0 | 6,75 | 0 | 0 | 0,251 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 2 |
| 51 | Cat. 8-pipe-A150 DN160 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 284,8 | 6,28 | 0 | 6,75 | 0 | 0 | 0,251 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 3 |
| 52 | Insulation | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 3,9 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 40,41,42 / 17 |
| 53 | Cold water pipe-Cu-DN19 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 0,503 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 16 |
| 54 | Cold water pipe-Cu-DN32 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 1,279 | 0,1 | 0 | 0,11 | 0 | 0 | 0,001 | Colour metals pipes | 40,41,42 / 15 |
| 55 | Hot water pipe-Cu-DN32, insulated | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 1,279 | 0,1 | 0 | 0,11 | 0 | 0 | 0,001 | Colour metals pipes | 40,41,42 / 17 |
| 58 | Deionised water pipe-PP-DN50 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 0,9 | 0,22 | 0 | 0,26 | 0 | 0 | 0,003 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 14 |
| 44 CC1 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 7,12 | 0,22 | 5000000 | 0,25 | 400000 | 10 | 0,00384 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/15 – part 1 |
| 44 CC2 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 9,81 | 0,31 | 50000000 | 0,34 | 400000 | 100 | 0,00529 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/ 15– part 2 |
| 44 CC3 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 11,54 | 0,36 | 500000000 | 0,4 | 400000 | 1000 | 0,00623 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/15– part 3 |
| 44 CC4 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 3,03 | 0,1 | 1000000000 | 0,11 | 400000 | 2000 | 0,00163 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/15– part 4 |
| 45 CC1 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 4,52 | 0,14 | 5000000 | 0,16 | 400000 | 10 | 0,00294 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/16 – part 1 |
| 45 CC2 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.07) - | 6,23 | 0,2 | 50000000 | 0,21 | 400000 | 100 | 0,00405 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/16 – part 2 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Active piping corridor | | | | | | | | | |
| 45 CC3 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 7,33 | 0,23 | 500000000 | 0,25 | 400000 | 1000 | 0,00476 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/16 – part 3 |
| 45 CC4 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 1,92 | 0,06 | 1000000000 | 0,07 | 400000 | 2000 | 0,00125 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/16 – part 4 |
| 56 CC1 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 2,53 | 0,38 | 5000000 | 0,47 | 400000 | 10 | 0,00475 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/6 – part 1 |
| 56 CC2 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 3,49 | 0,52 | 50000000 | 0,64 | 400000 | 100 | 0,00654 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/6 – part 2 |
| 56 CC3 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 4,1 | 0,62 | 500000000 | 0,76 | 400000 | 1000 | 0,00769 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/6 – part 3 |
| 56 CC4 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 1,08 | 0,16 | 1000000000 | 0,2 | 400000 | 2000 | 0,00202 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/6 – part 4 |
| 57 CC1 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 7,83 | 0,78 | 5000000 | 0,94 | 400000 | 10 | 0,01945 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/7 – part 1 |
| 57 CC2 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 10,78 | 1,07 | 50000000 | 1,29 | 400000 | 100 | 0,02678 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/7 – part 2 |
| 57 CC3 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 12,68 | 1,26 | 500000000 | 1,52 | 400000 | 1000 | 0,03151 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/7 – part 3 |
| 57 CC4 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.07) - Active piping corridor | 3,32 | 0,33 | 1000000000 | 0,4 | 400000 | 2000 | 0,00826 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/7 – part 4 |
| 59 | Pipe-CS_DN15, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,7 | 0,1 | 0 | 0,14 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 28,29,30 / 5 |
| 60 | Pipe-CS_DN20, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 56,1 | 2,22 | 0 | 2,82 | 0 | 0 | 0,011 | Piping (CS), diameter =< D25 mm | 28,29,30 / 9 |
| 61 | Pipe-CS_DN25, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 44,9 | 1,44 | 0 | 1,83 | 0 | 0 | 0,009 | Piping (CS), diameter =< D25 mm | 28,29,30 / 13 |
| 62 | Pipe-CS_DN40, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 31,1 | 1,08 | 0 | 1,26 | 0 | 0 | 0,011 | Piping (CS), diameter =< D25 mm | 31,32,33 / 3 |
| 63 | Pipe-CS_DN50, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 79,5 | 2,45 | 0 | 2,81 | 0 | 0 | 0,031 | Piping (CS), diameter =< D25 mm | 31,32,33 / 5 |
| 66 | Cat. 6 floor drain | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 5 | 0,46 | 0 | 0,54 | 0 | 0 | 0,027 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 6 |
| 67 | Pipe-CS-DN60, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 313,9 | 7,44 | 0 | 8,56 | 0 | 0 | 0,112 | Piping (CS), D25 < diameter <= D100 mm | 34,35,36 / 9 |
| 68 | Tr pipe-CS-DN15 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,1 | 0,08 | 0 | 0,11 | 0 | 0 | 0 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 2 |
| 69 | Tr pipe-CS-DN40 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 3,6 | 0,13 | 0 | 0,15 | 0 | 0 | 0,001 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 1 |
| 70 | Dehumidifier ? | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 100 | 2,9 | 0 | 3,7 | 0 | 0 | 0,25 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 25,26,27 / 6 |
| 71 | Glycol container | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 60 | 2,8 | 0 | 3,12 | 0 | 0 | 0,36 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 19,20,21 / 13 |
| 72 | Hot water tank | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 300 | 6,9 | 0 | 7,68 | 0 | 0 | 1,28 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 22,23,24 / 6 |
| 73 | Compressed air tank | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 500 | 9,5 | 0 | 11,52 | 0 | 0 | 2,59 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 19,20,21 / 14 |
| 74 | Heat exchanger, radiators | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 500 | 3,2 | 0 | 3,6 | 0 | 0 | 0,32 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 22,23,24 / 7 |
| 75 | P1 - pump, heating equipment DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 10 | 0,25 | 0 | 0,32 | 0 | 0 | 0,01 | Pumps (CS), mass <= 50 kg | 19,20,21 / 15 |
| 76 | P2 - circulation pump, heating unit DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 5 | 0,25 | 0 | 0,32 | 0 | 0 | 0,01 | Pumps (CS), mass <= 50 kg | 22,23,24 / 1 |
| 77 | P3 - circulation pump, heating unit DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 15 | 0,35 | 0 | 0,42 | 0 | 0 | 0,02 | Pumps (CS), mass <= 50 kg | 22,23,24 / 2 |
| 78 | P4 - circulation pump, | (Cellar +17,90 +18,50) - (0.08) - | 5 | 0,25 | 0 | 0,32 | 0 | 0 | 0,01 | Pumps (CS), mass <= 50 kg | 22,23,24 / 3 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | heating unit DN25 | Heating unit | | | | | | | | | |
| 79 | P5 - pump, heating unit DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 50 | 0,95 | 0 | 1,12 | 0 | 0 | 0,08 | Pumps (CS), mass <= 50 kg | 22,23,24 / 4 |
| 80 | Compresor | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 150 | 3,1 | 0 | 3,52 | 0 | 0 | 0,45 | Pumps (CS), mass > 50 kg, at least one dimension > 1m | 22,23,24 / 5 |
| 81 | Heat exchanger, valves | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 500 | 2,8 | 0 | 3,6 | 0 | 0 | 0,32 | Valves (CS), mass <= 50 kg | 22,23,24 / 8 |
| 82 | Motorised valve DN15 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 10 | 0,29 | 0 | 0,4 | 0 | 0 | 0,03 | Valves (CS), mass <= 50 kg | 34,35,36 / 10 |
| 83 | Motorised valve DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 8 | 0,42 | 0 | 0,78 | 0 | 0 | 0,05 | Valves (CS), mass <= 50 kg | 34,35,36 / 11 |
| 84 | Motorised valve DN32 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 10 | 0,65 | 0 | 0,9 | 0 | 0 | 0,05 | Valves (CS), mass <= 50 kg | 34,35,36 / 12 |
| 85 | Motorised valve DN40 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 10 | 0,65 | 0 | 0,9 | 0 | 0 | 0,05 | Valves (CS), mass <= 50 kg | 34,35,36 / 13 |
| 86 | Motorised valve DN50 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 15 | 0,9 | 0 | 1,22 | 0 | 0 | 0,08 | Valves (CS), mass <= 50 kg | 34,35,36 / 14 |
| 87 | Motorised valve DN60 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 20 | 1,1 | 0 | 1,44 | 0 | 0 | 0,11 | Valves (CS), mass <= 50 kg | 34,35,36 / 15 |
| 88 | Non-return valve DN20 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 1 | 0,04 | 0 | 0,04 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 37,38,39 / 1 |
| 89 | Non-return valve DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 1 | 0,05 | 0 | 0,06 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 37,38,39 / 2 |
| 90 | Safety valve DN15 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 1 | 0,09 | 0 | 0,1 | 0 | 0 | 0,005 | Valves (CS), mass <= 50 kg | 31,32,33 / 15 |
| 91 | Safety valve DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2 | 0,12 | 0 | 0,14 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 34,35,36 / 1 |
| 92 | Valve DN10 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 3 | 0,05 | 0 | 0,07 | 0 | 0 | 0,005 | Valves (CS), mass <= 50 kg | 34,35,36 / 2 |
| 93 | Valve DN20 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 26 | 0,05 | 0 | 0,06 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 34,35,36 / 3 |
| 94 | Valve DN25 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 8 | 0,06 | 0 | 0,08 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 34,35,36 / 4 |
| 95 | Valve DN32 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 12 | 0,08 | 0 | 0,1 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 34,35,36 / 5 |
| 96 | Valve DN40 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 24 | 0,09 | 0 | 0,13 | 0 | 0 | 0,02 | Valves (CS), mass <= 50 kg | 34,35,36 / 6 |
| 97 | Valve DN50 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 30 | 0,13 | 0 | 0,2 | 0 | 0 | 0,03 | Valves (CS), mass <= 50 kg | 34,35,36 / 7 |
| 98 | Valve DN60 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 30 | 0,22 | 0 | 0,32 | 0 | 0 | 0,06 | Valves (CS), mass <= 50 kg | 34,35,36 / 8 |
| 99 | Motor | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 50 | 0 | 0 | 0,78 | 0 | 0 | 0,05 | Electric motors, mass <= 50 kg | 25,26,27 / 10 |
| 100 | Duct 19x19, internal insulation 1/2" | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 56,7 | 7,14 | 0 | 7,22 | 0 | 0 | 0,343 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 8 |
| 101 | Duct 24x24 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 4,5 | 0,57 | 0 | 0,58 | 0 | 0 | 0,035 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 6 |
| 102 | Filter DN60 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 5 | 0,26 | 0 | 0,32 | 0 | 0 | 0 | Air conditioning systems, filter casings (CS), dimension <= 1m | 37,38,39 / 3 |
| 103 | Cable on support | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 22,5 | 0 | 0 | 0 | 0 | 0 | 0,04 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 2 |
| 104 | Cable support 150 mm | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 9,4 | 0 | 0 | 0 | 0 | 0 | 0,04 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 6 |
| 105 | Cables in cement floor conduits | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 62,5 | 0 | 0 | 0 | 0 | 0 | 0,1 | Electrical cables & conductors; (Cu), 1 kV power cables | 16,17,18 / 19 |
| 106 | Insulation | (Cellar +17,90 +18,50) - (0.08) - | 7,4 | 0 | 0 | 0 | 0 | 0 | 0,02 | Thermal insulations, non-metal covering | 28,29,30 / 5 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heating unit | | | | | | | | | |
| 107 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 128,3 | 0 | 0 | 0 | 0 | 0 | 0,43 | Thermal insulations, non-metal covering | 28,29,30 / 9 |
| 108 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 72,6 | 0 | 0 | 0 | 0 | 0 | 0,24 | Thermal insulations, non-metal covering | 28,29,30 / 13 |
| 109 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 39,8 | 0 | 0 | 0 | 0 | 0 | 0,13 | Thermal insulations, non-metal covering | 31,32,33 / 3 |
| 110 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 81,1 | 0 | 0 | 0 | 0 | 0 | 0,27 | Thermal insulations, non-metal covering | 31,32,33 / 5 |
| 111 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 40 | 0 | 0 | 0 | 0 | 0 | 0,13 | Thermal insulations, non-metal covering | 31,32,33 / 9 |
| 112 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 53,3 | 0 | 0 | 0 | 0 | 0 | 0,18 | Thermal insulations, non-metal covering | 31,32,33 / 13 |
| 113 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 234,7 | 0 | 0 | 0 | 0 | 0 | 0,78 | Thermal insulations, non-metal covering | 34,35,36 / 9 |
| 114 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 37,9 | 0 | 0 | 0 | 0 | 0 | 0,13 | Thermal insulations, non-metal covering | 43,44,45 / 4 |
| 115 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 22,1 | 0 | 0 | 0 | 0 | 0 | 0,07 | Thermal insulations, non-metal covering | 43,44,45 / 5 |
| 116 | Insulation | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 26,23 | 0 | 0 | 0 | 0 | 0 | 0,09 | Thermal insulations, non-metal covering | 55,56,57 / 8 |
| 117 | Equipment cabinet | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 6,4 | 0 | 0 | 0,64 | 0 | 0 | 0,03 | Non-portable small equipment & instruments (CS), mass <= 50kg | 16,17,18 /1 |
| 119 | Cold water pipe-Cu-DN19 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 4,8 | 0,57 | 0 | 0,63 | 0 | 0 | 0,003 | Colour metals pipes | 43,44,45 / 3 |
| 120 | Cold water pipe-Cu-DN38 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 16,2 | 1,26 | 0 | 1,36 | 0 | 0 | 0,012 | Colour metals pipes | 43,44,45 / 2 |
| 121 | Hot water pipe-Cu-DN19, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 3,4 | 0,41 | 0 | 0,45 | 0 | 0 | 0,002 | Colour metals pipes | 43,44,45 / 5 |
| 122 | Hot water pipe-Cu-DN32, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 12,5 | 0,98 | 0 | 1,08 | 0 | 0 | 0,008 | Colour metals pipes | 43,44,45 / 4 |
| 123 | Pipe-Cu-DN19 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 7,8 | 0,92 | 0 | 1,02 | 0 | 0 | 0,004 | Colour metals pipes | 31,32,33 / 8 |
| 124 | Pipe-Cu-DN19, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 6,2 | 0,73 | 0 | 0,81 | 0 | 0 | 0,003 | Colour metals pipes | 31,32,33 / 9 |
| 125 | Pipe-Cu-DN32, insulated | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 17,7 | 1,39 | 0 | 1,52 | 0 | 0 | 0,011 | Colour metals pipes | 31,32,33 / 13 |
| 127 | Deionised water pipe-PP-DN15 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,1 | 0,05 | 0 | 0,06 | 0 | 0 | 0 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 17 |
| 128 | Deionised water pipe-PP-DN50 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 4,1 | 0,99 | 0 | 1,17 | 0 | 0 | 0,012 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 16 |
| 126 CC1 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,32 | 0,57 | 5000000 | 0,57 | 400000 | 10 | 0,01131 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/8 – part 1 |
| 126 CC2 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,44 | 0,78 | 50000000 | 0,79 | 400000 | 100 | 0,01557 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/8 – part 2 |
| 126 CC3 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,51 | 0,92 | 500000000 | 0,93 | 400000 | 1000 | 0,01832 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/8 – part 3 |
| 126 CC4 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,13 | 0,24 | 1000000000 | 0,24 | 400000 | 2000 | 0,0048 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/8 – part 4 |
| 64 CC1 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 1,58 | 0,05 | 5000000 | 0,05 | 400000 | 10 | 0,0009 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/17 – part 1 |
| 64 CC2 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,18 | 0,07 | 50000000 | 0,07 | 400000 | 100 | 0,00125 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/17 – part 2 |
| 64 CC3 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,56 | 0,08 | 500000000 | 0,09 | 400000 | 1000 | 0,00147 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/17 – part 3 |
| 64 CC4 | Cat. 4-pipe-A65 DN70 | (Cellar +17,90 +18,50) - (0.08) - | 0,67 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00038 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/17 – part 4 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heating unit | | | | | | | | | |
| 65 CC1 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 1,81 | 0,06 | 5000000 | 0,06 | 400000 | 10 | 0,00113 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/18 – part 1 |
| 65 CC2 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,49 | 0,08 | 50000000 | 0,09 | 400000 | 100 | 0,00156 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/18 – part 2 |
| 65 CC3 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 2,93 | 0,09 | 500000000 | 0,1 | 400000 | 1000 | 0,00183 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/18 – part 3 |
| 65 CC4 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.08) - Heating unit | 0,77 | 0,02 | 1000000000 | 0,03 | 400000 | 2000 | 0,00048 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/18 – part 4 |
| 129 | Pipe-CS_DN10 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,2 | 0,03 | 0 | 0,04 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 25,26,27 / 13 |
| 130 | Pipe-CS_DN20, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 74,2 | 1,87 | 0 | 2,38 | 0 | 0 | 0,009 | Piping (CS), diameter =< D25 mm | 28,29,30 / 7 |
| 131 | Pipe-CS_DN32, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 98,5 | 3,16 | 0 | 3,81 | 0 | 0 | 0,025 | Piping (CS), diameter =< D25 mm | 28,29,30 / 15 |
| 132 | Pipe-CS_DN40, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15,9 | 0,55 | 0 | 0,64 | 0 | 0 | 0,006 | Piping (CS), diameter =< D25 mm | 31,32,33 / 2 |
| 133 | 08Pipe-CS-DN15 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,3 | 0,36 | 0 | 0,49 | 0 | 0 | 0,001 | Piping (CS), D25 < diameter <= D100 mm | 37,38,39 / 9 |
| 134 | 08Pipe-CS-DN20 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,6 | 0,14 | 0 | 0,18 | 0 | 0 | 0,001 | Piping (CS), D25 < diameter <= D100 mm | 37,38,39 / 8 |
| 137 | Cat. 7-pipe-A150 DN160 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 45,6 | 1 | 0 | 1,08 | 0 | 0 | 0,04 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 6 |
| 138 | Cat. 8-pipe-A150 DN160 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 11,4 | 0,25 | 0 | 0,27 | 0 | 0 | 0,01 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 9 |
| 139 | Tr pipe-CS-DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,8 | 0,06 | 0 | 0,07 | 0 | 0 | 0,001 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 10 |
| 141 | Cat. 7-funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15 | 0,7 | 0 | 0,8 | 0 | 0 | 0,05 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 46,47,48 / 4 |
| 142 | Cat. 7-water trap | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 10 | 0,46 | 0 | 0,52 | 0 | 0 | 0,02 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 46,47,48 / 5 |
| 143 | Cat. 8-funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15 | 0,7 | 0 | 0,8 | 0 | 0 | 0,05 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 46,47,48 / 7 |
| 144 | Cat. 8-water trap | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 10 | 0,46 | 0 | 0,52 | 0 | 0 | 0,02 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 46,47,48 / 8 |
| 150 | 04B201, Motor | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 10 | 0 | 0 | 0,62 | 0 | 0 | 0,01 | Electric motors, mass <= 50 kg | 25,26,27 / 7 |
| 151 | 05B201, Motor | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 25 | 0 | 0 | 1,18 | 0 | 0 | 0,07 | Electric motors, mass <= 50 kg | 25,26,27 / 8 |
| 152 | 06B302, Motor | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 25 | 0 | 0 | 1,18 | 0 | 0 | 0,07 | Electric motors, mass <= 50 kg | 25,26,27 / 9 |
| 153 | Duct 24x19 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 52,63 | 5,68 | 0 | 5,85 | 0 | 0 | 0,31 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 16 |
| 154 | Duct 24x19 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 18,58 | 2,01 | 0 | 2,06 | 0 | 0 | 0,109 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 17 |
| 155 | Duct 24x24 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 74,6 | 9,42 | 0 | 9,5 | 0 | 0 | 0,57 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 11 |
| 156 | Duct dia =100 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 12,01 | 2,04 | 0 | 2,12 | 0 | 0 | 0,051 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 5 |
| 157 | Filter F1 + damper | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 50 | 3,4 | 0 | 3,82 | 400000 | 500 | 0,5 | Air conditioning systems, filter casings (CS), dimension <= 1m | 10,11,12/6 |
| 158 | Filter F2 + valve | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 30 | 1,4 | 0 | 1,6 | 400000 | 500 | 0,13 | Air conditioning systems, filter casings (CS), dimension <= 1m | 10,11,12/7 |
| 159 | Cable on support | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 87,8 | 0 | 0 | 0 | 0 | 0 | 0,14 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 3 |
| 160 | Cable support 150 mm | (Cellar +17,90 +18,50) - (0.09) - | 16,9 | 0 | 0 | 0 | 0 | 0 | 0,07 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 7 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cellar 1 | | | | | | | | | |
| 161 | Cable support 150 mm | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 16,9 | 0 | 0 | 0 | 0 | 0 | 0,07 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 8 |
| 162 | El. Heater 25 kW (in T201) | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 20 | 0 | 0 | 0,22 | 400000 | 50 | 0,03 | General electric equipment, (CS) mass <= 50 kg | 1,2,3/1 |
| 163 | Electrical cabinet | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 8,1 | 0 | 0 | 0,36 | 0 | 0 | 0,04 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 6 |
| 164 | Monitoring unit | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,7 | 0 | 0 | 0,36 | 0 | 0 | 0,01 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 15 |
| 165 | Control unit | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 388,8 | 0 | 0 | 10,8 | 0 | 0 | 1,94 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 13 |
| 166 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 108 | 0 | 0 | 0 | 0 | 0 | 0,36 | Thermal insulations, non-metal covering | 28,29,30 / 7 |
| 167 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 136,7 | 0 | 0 | 0 | 0 | 0 | 0,46 | Thermal insulations, non-metal covering | 28,29,30 / 15 |
| 168 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 20,4 | 0 | 0 | 0 | 0 | 0 | 0,07 | Thermal insulations, non-metal covering | 31,32,33 / 2 |
| 169 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 23,2 | 0 | 0 | 0 | 0 | 0 | 0,08 | Thermal insulations, non-metal covering | 37,38,39 / 14 |
| 170 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,8 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 37,38,39 / 15 |
| 171 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 29,3 | 0 | 0 | 0 | 0 | 0 | 0,1 | Thermal insulations, non-metal covering | 37,38,39 / 16 |
| 172 | Insulation | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 18,8 | 0 | 0 | 0 | 0 | 0 | 0,06 | Thermal insulations, non-metal covering | 43,44,45 / 10 |
| 174 | Radiator | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 13 | 0 | 0 | 1,69 | 0 | 0 | 0,03 | Piece components (CS), mass <= 200 kg | 22,23,24 / 10 |
| 175 | Radiator | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15 | 0 | 0 | 2 | 0 | 0 | 0,04 | Piece components (CS), mass <= 200 kg | 22,23,24 / 11 |
| 176 | Scupper 225 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 10 | 0,49 | 1000000000 | 0,54 | 400000 | 500 | 0,05 | Piece components (CS), mass <= 200 kg | 7,8,9 /11 |
| 177 | Water trap | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 10 | 0,48 | 1000000000 | 0,52 | 400000 | 500 | 0,02 | Piece components (CS), mass <= 200 kg | 7,8,9 /10 |
| 178 | 08Pipe-Cu-DN8 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 39,1 | 5,02 | 0 | 6,28 | 0 | 0 | 0,01 | Colour metals pipes | 37,38,39 / 4 |
| 179 | Cold water pipe-Cu-DN19 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 4,53 | 0,54 | 0 | 0,59 | 0 | 0 | 0,003 | Colour metals pipes | 37,38,39 / 13 |
| 180 | Cold water pipe-Cu-DN38 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,18 | 0,72 | 0 | 0,77 | 0 | 0 | 0,007 | Colour metals pipes | 37,38,39 / 12 |
| 181 | Hot water pipe-Cu-DN19, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 4,53 | 0,54 | 0 | 0,59 | 0 | 0 | 0,003 | Colour metals pipes | 37,38,39 / 16 |
| 182 | Hot water pipe-Cu-DN25, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,493 | 0,04 | 0 | 0,04 | 0 | 0 | 0 | Colour metals pipes | 37,38,39 / 15 |
| 183 | Hot water pipe-Cu-DN32, insulated | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 7,675 | 0,6 | 0 | 0,66 | 0 | 0 | 0,005 | Colour metals pipes | 37,38,39 / 14 |
| 192 | 08Pipe-SS-DN25 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2 | 0,1 | 0 | 0,12 | 0 | 0 | 0,001 | Piping (SS), D25 < diameter <= D100 mm | 37,38,39 / 7 |
| 193 | 08Pipe-SS-DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,7 | 0,41 | 0 | 0,47 | 0 | 0 | 0,004 | Piping (SS), D25 < diameter <= D100 mm | 37,38,39 / 6 |
| 197 | Deionised water pipe-PP-DN25 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,4 | 0,12 | 0 | 0,15 | 0 | 0 | 0,001 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 8 |
| 198 | Deionised water pipe-PP-DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 8,9 | 2,12 | 0 | 2,51 | 0 | 0 | 0,026 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 7 |
| 199 | Salt water pipe-PVC-DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 7,3 | 2,12 | 0 | 2,43 | 0 | 0 | 0,026 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 9 |
| 200 | Salt water pipe-PVC- | (Cellar +17,90 +18,50) - (0.09) - | 2,2 | 0,63 | 0 | 0,72 | 0 | 0 | 0,008 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 10 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | DN50, insulated | Cellar 1 | | | | | | | | | |
| 135 CC1 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,9 | 0,03 | 5000000 | 0,03 | 400000 | 10 | 0,00068 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/12 – part 1 |
| 135 CC2 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,25 | 0,04 | 50000000 | 0,04 | 400000 | 100 | 0,00093 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/12 – part 2 |
| 135 CC3 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,47 | 0,05 | 500000000 | 0,05 | 400000 | 1000 | 0,0011 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/12– part 3 |
| 135 CC4 | Cat. 4-pipe-A75 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,38 | 0,01 | 1000000000 | 0,01 | 400000 | 2000 | 0,00029 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/1 2– part 4 |
| 136 CC1 | Cat. 4-pipe-AR70 DN70 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,77 | 0,05 | 5000000 | 0,05 | 400000 | 10 | 0,0009 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/13 – part 1 |
| 136 CC2 | Cat. 4-pipe-AR70 DN70 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,06 | 0,07 | 50000000 | 0,07 | 400000 | 100 | 0,00125 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/13– part 2 |
| 136 CC3 | Cat. 4-pipe-AR70 DN70 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,25 | 0,08 | 500000000 | 0,08 | 400000 | 1000 | 0,00147 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/13– part 3 |
| 136 CC4 | Cat. 4-pipe-AR70 DN70 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,33 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00038 | Piping (CS), D25 < diameter <= D100 mm | 7,8,9/13– part 4 |
| 140 CC1 | Cat. 4 funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,26 | 0,16 | 5000000 | 0,18 | 400000 | 10 | 0,01131 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 7,8,9/ 9 – part 1 |
| 140 CC2 | Cat. 4 funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,11 | 0,22 | 50000000 | 0,25 | 400000 | 100 | 0,01557 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 7,8,9/ 9– part 2 |
| 140 CC3 | Cat. 4 funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,66 | 0,26 | 500000000 | 0,29 | 400000 | 1000 | 0,01832 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 7,8,9/ 9– part 3 |
| 140 CC4 | Cat. 4 funnel | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,96 | 0,07 | 1000000000 | 0,08 | 400000 | 2000 | 0,0048 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 7,8,9/ 9– part 4 |
| 145 CC1 | 05T210 Tank for cleanig fluid | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 158,32 | 3,64 | 5000000 | 4,05 | 400000 | 10 | 1,10822 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/4 – part 1 |
| 145 CC2 | 05T210 Tank for cleanig fluid | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 218 | 5,02 | 50000000 | 5,58 | 400000 | 100 | 1,526 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/4 – part 2 |
| 145 CC3 | 05T210 Tank for cleanig fluid | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 256,44 | 5,9 | 500000000 | 6,56 | 400000 | 1000 | 1,79509 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/4 – part 3 |
| 145 CC4 | 05T210 Tank for cleanig fluid | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 67,24 | 1,55 | 1000000000 | 1,72 | 400000 | 2000 | 0,47069 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/4 – part 4 |
| 146 CC1 | 04E101 Heat exchanger | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 22,62 | 0,11 | 5000000 | 0,13 | 400000 | 10 | 0,00452 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 4,5,6/8 – part 1 |
| 146 CC2 | 04E101 Heat exchanger | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 31,14 | 0,16 | 50000000 | 0,18 | 400000 | 100 | 0,00623 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 4,5,6/8 – part 2 |
| 146 CC3 | 04E101 Heat exchanger | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 36,63 | 0,18 | 500000000 | 0,21 | 400000 | 1000 | 0,00733 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 4,5,6/8 – part 3 |
| 146 CC4 | 04E101 Heat exchanger | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,61 | 0,05 | 1000000000 | 0,06 | 400000 | 2000 | 0,00192 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 4,5,6/8 – part 4 |
| 147 CC1 | 04B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,26 | 0,05 | 5000000 | 0,05 | 400000 | 10 | 0,00226 | Pumps (CS), mass <= 50 kg | 4,5,6/5 – part 1 |
| 147 CC2 | 04B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,11 | 0,07 | 50000000 | 0,07 | 400000 | 100 | 0,00311 | Pumps (CS), mass <= 50 kg | 4,5,6/5 – part 2 |
| 147 CC3 | 04B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,66 | 0,08 | 500000000 | 0,09 | 400000 | 1000 | 0,00366 | Pumps (CS), mass <= 50 kg | 4,5,6/5 – part 3 |
| 147 CC4 | 04B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,96 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00096 | Pumps (CS), mass <= 50 kg | 4,5,6/5 – part 4 |
| 148 CC1 | 05B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 11,31 | 0,16 | 5000000 | 0,18 | 400000 | 10 | 0,01131 | Pumps (CS), mass <= 50 kg | 4,5,6/6 – part 1 |
| 148 CC2 | 05B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15,57 | 0,22 | 50000000 | 0,25 | 400000 | 100 | 0,01557 | Pumps (CS), mass <= 50 kg | 4,5,6/6 – part 2 |
| 148 CC3 | 05B201 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 18,32 | 0,26 | 500000000 | 0,29 | 400000 | 1000 | 0,01832 | Pumps (CS), mass <= 50 kg | 4,5,6/6 – part 3 |
| 148 | 05B201 Pump | (Cellar +17,90 +18,50) - (0.09) - | 4,8 | 0,07 | 1000000000 | 0,08 | 400000 | 2000 | 0,0048 | Pumps (CS), mass <= 50 kg | 4,5,6/6 – part 4 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CC4 | | Cellar 1 | | | | | | | | | |
| 149 CC1 | 06B302 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 11,31 | 0,16 | 5000000 | 0,18 | 400000 | 10 | 0,01131 | Pumps (CS), mass <= 50 kg | 4,5,6/7 – part 1 |
| 149 CC2 | 06B302 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15,57 | 0,22 | 50000000 | 0,25 | 400000 | 100 | 0,01557 | Pumps (CS), mass <= 50 kg | 4,5,6/7 – part 2 |
| 149 CC3 | 06B302 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 18,32 | 0,26 | 500000000 | 0,29 | 400000 | 1000 | 0,01832 | Pumps (CS), mass <= 50 kg | 4,5,6/7 – part 3 |
| 149 CC4 | 06B302 Pump | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 4,8 | 0,07 | 1000000000 | 0,08 | 400000 | 2000 | 0,0048 | Pumps (CS), mass <= 50 kg | 4,5,6/7 – part 4 |
| 184 CC1 | 03 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,44 | 0,15 | 5000000 | 0,17 | 400000 | 10 | 0,00158 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/3- part 1 |
| 184 CC2 | 03 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 4,73 | 0,2 | 50000000 | 0,23 | 400000 | 100 | 0,00218 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/3- part 2 |
| 184 CC3 | 03 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 5,57 | 0,24 | 500000000 | 0,27 | 400000 | 1000 | 0,00256 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/3- part 3 |
| 184 CC4 | 03 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,46 | 0,06 | 1000000000 | 0,07 | 400000 | 2000 | 0,00067 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/3- part 4 |
| 185 CC1 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 22,82 | 1,25 | 5000000 | 1,35 | 400000 | 10 | 0,01561 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/4- part 1 |
| 185 CC2 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 31,42 | 1,72 | 50000000 | 1,85 | 400000 | 100 | 0,02149 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/4- part 2 |
| 185 CC3 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 36,96 | 2,02 | 500000000 | 2,18 | 400000 | 1000 | 0,02528 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/4- part 3 |
| 185 CC4 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,69 | 0,53 | 1000000000 | 0,57 | 400000 | 2000 | 0,00663 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/4- part 4 |
| 186 CC1 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 5,22 | 0,3 | 5000000 | 0,33 | 400000 | 10 | 0,00384 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/5- part 1 |
| 186 CC2 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 7,19 | 0,41 | 50000000 | 0,45 | 400000 | 100 | 0,00529 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/5- part 2 |
| 186 CC3 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 8,46 | 0,49 | 500000000 | 0,53 | 400000 | 1000 | 0,00623 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/5- part 3 |
| 186 CC4 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,22 | 0,13 | 1000000000 | 0,14 | 400000 | 2000 | 0,00163 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/5- part 4 |
| 187 CC1 | 05 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 13 | 0,71 | 5000000 | 0,77 | 400000 | 10 | 0,00882 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/6- part 1 |
| 187 CC2 | 05 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 17,91 | 0,98 | 50000000 | 1,06 | 400000 | 100 | 0,01215 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/6- part 2 |
| 187 CC3 | 05 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 21,06 | 1,15 | 500000000 | 1,24 | 400000 | 1000 | 0,01429 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/6- part 3 |
| 187 CC4 | 05 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 5,52 | 0,3 | 1000000000 | 0,33 | 400000 | 2000 | 0,00375 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/6- part 4 |
| 188 CC1 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 52,36 | 2,86 | 5000000 | 3,09 | 400000 | 10 | 0,03573 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/7- part 1 |
| 188 CC2 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 72,1 | 3,94 | 50000000 | 4,25 | 400000 | 100 | 0,04921 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/7- part 2 |
| 188 CC3 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 84,81 | 4,63 | 500000000 | 5 | 400000 | 1000 | 0,05788 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/7- part 3 |
| 188 CC4 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 22,24 | 1,21 | 1000000000 | 1,31 | 400000 | 2000 | 0,01518 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/7- part 4 |
| 189 CC1 | 07 Tubing - SS - DN25 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,7 | 0,09 | 5000000 | 0,1 | 400000 | 10 | 0,00045 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/10- part 1 |
| 189 CC2 | 07 Tubing - SS - DN25 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,34 | 0,12 | 50000000 | 0,14 | 400000 | 100 | 0,00062 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/10 part 2 |
| 189 CC3 | 07 Tubing - SS - DN25 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,75 | 0,14 | 500000000 | 0,16 | 400000 | 1000 | 0,00073 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/10- part 3 |
| 189 | 07 Tubing - SS - DN25 | (Cellar +17,90 +18,50) - (0.09) - | 0,72 | 0,04 | 1000000000 | 0,04 | 400000 | 2000 | 0,00019 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/10- part 4 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CC4 | | Cellar 1 | | | | | | | | | |
| 190 CC1 | 07 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,7 | 0,09 | 5000000 | 0,1 | 400000 | 10 | 0,0009 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/9- part 1 |
| 190 CC2 | 07 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,34 | 0,13 | 50000000 | 0,14 | 400000 | 100 | 0,00125 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/9- part 2 |
| 190 CC3 | 07 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,75 | 0,15 | 500000000 | 0,17 | 400000 | 1000 | 0,00147 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/9- part 3 |
| 190 CC4 | 07 Tubing - SS - DN40 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,72 | 0,04 | 1000000000 | 0,04 | 400000 | 2000 | 0,00038 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/9- part 4 |
| 191 CC1 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 1,88 | 0,1 | 5000000 | 0,11 | 400000 | 10 | 0,00136 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/8- part 1 |
| 191 CC2 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 2,58 | 0,14 | 50000000 | 0,15 | 400000 | 100 | 0,00187 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/8- part 2 |
| 191 CC3 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,04 | 0,17 | 500000000 | 0,18 | 400000 | 1000 | 0,0022 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/8- part 3 |
| 191 CC4 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,8 | 0,04 | 1000000000 | 0,05 | 400000 | 2000 | 0,00058 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/8- part 4 |
| 194 CC1 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,23 | 0,04 | 5000000 | 0,04 | 400000 | 10 | 0,00045 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/15 – part 1 |
| 194 CC2 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,31 | 0,05 | 50000000 | 0,06 | 400000 | 100 | 0,00062 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/15 – part 2 |
| 194 CC3 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,37 | 0,06 | 500000000 | 0,07 | 400000 | 1000 | 0,00073 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/15 – part 3 |
| 194 CC4 | Cat. 3-pipe-PE-Ap51 DN50 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 0,1 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00019 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/15 – part 4 |
| 195 CC1 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 9,52 | 1,14 | 5000000 | 1,37 | 400000 | 10 | 0,02262 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/16 – part 1 |
| 195 CC2 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 13,11 | 1,56 | 50000000 | 1,88 | 400000 | 100 | 0,03114 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/16 – part 2 |
| 195 CC3 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 15,42 | 1,84 | 500000000 | 2,22 | 400000 | 1000 | 0,03663 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/16 – part 3 |
| 195 CC4 | Cat. 4-pipe-PE-Ap74 DN80 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 4,04 | 0,48 | 1000000000 | 0,58 | 400000 | 2000 | 0,00961 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 4,5,6/16 – part 4 |
| 196 CC1 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 8,16 | 0,82 | 5000000 | 0,98 | 400000 | 10 | 0,02036 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/1 – part 1 |
| 196 CC2 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 11,24 | 1,12 | 50000000 | 1,35 | 400000 | 100 | 0,02803 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/1 – part 2 |
| 196 CC3 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 13,23 | 1,32 | 500000000 | 1,59 | 400000 | 1000 | 0,03297 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/1 – part 3 |
| 196 CC4 | Cat. 4-pipe-PE-Ap90 DN100 | (Cellar +17,90 +18,50) - (0.09) - Cellar 1 | 3,47 | 0,35 | 1000000000 | 0,42 | 400000 | 2000 | 0,00865 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/1 – part 4 |
| 236 | Pipe-CS_DN15, insulated | (Cellar +17,90 +18,50) - (0.10) - Stairway | 13,4 | 0,52 | 0 | 0,7 | 0 | 0 | 0,002 | Piping (CS), diameter =< D25 mm | 28, 29, 30 / 3 |
| 239 | Radiator | (Cellar +17,90 +18,50) - (0.10) - Stairway | 8 | 0 | 0 | 1,09 | 0 | 0 | 0,02 | Piece components (CS), mass <= 200 kg | 22,23,24 / 9 |
| 238 | Insulation | (Cellar +17,90 +18,50) - (0.10) - Stairway | 37 | 0 | 0 | 0 | 0 | 0 | 0,123 | Thermal insulations, non-metal covering | 28, 29, 30 / 3 |
| 201 | Pipe-CS_DN10 | (Cellar +17,90 +18,50) - (0.11) - Cellar 2 | 0,4 | 0,06 | 0 | 0,08 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 25,26,27 / 12 |
| 202 | Radiator | (Cellar +17,90 +18,50) - (0.11) - Cellar 2 | 12 | 0 | 0 | 1,56 | 0 | 0 | 0,03 | Piece components (CS), mass <= 200 kg | 22,23,24 / 12 |
| 204 | 08Pipe-Cu-DN8 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 1,5 | 0,19 | 0 | 0,24 | 0 | 0 | 0 | Colour metals pipes | 37,38,39 / 5 |
| 203 CC1 | Ion - exchanger | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 11,31 | 0,15 | 5000000 | 0,17 | 400000 | 10 | 0,02262 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 13, 14, 15 / 2 - part 1 |
| 203 | Ion - exchanger | (Cellar +17,90 +18,50) - (0.13) - | 15,57 | 0,2 | 50000000 | 0,23 | 400000 | 100 | 0,03114 | Tanks and containers (CS), diameter < D 1 m, thickness of | 13, 14, 15 / 2 – part 2 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CC2 | | Ion-exchanger room | | | | | | | | wall <= 20 mm | |
| 203 CC3 | Ion - exchanger | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 18,32 | 0,24 | 500000000 | 0,27 | 400000 | 1000 | 0,03663 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 13, 14, 15 / 2 - part 3 |
| 203 CC4 | Ion - exchanger | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 4,8 | 0,06 | 1000000000 | 0,07 | 400000 | 2000 | 0,00961 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 13, 14, 15 / 2 - part 4 |
| 205 CC1 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 1,95 | 0,11 | 5000000 | 0,12 | 400000 | 10 | 0,00136 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 11 - part 1 |
| 205 CC2 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 2,68 | 0,15 | 50000000 | 0,16 | 400000 | 100 | 0,00187 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 11 - part 2 |
| 205 CC3 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 3,15 | 0,17 | 500000000 | 0,19 | 400000 | 1000 | 0,0022 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 11 - part 3 |
| 205 CC4 | 04 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 0,83 | 0,05 | 1000000000 | 0,05 | 400000 | 2000 | 0,00058 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 11 - part 4 |
| 206 CC1 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 0,45 | 0,03 | 5000000 | 0,03 | 400000 | 10 | 0,00034 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 12 - part 1 |
| 206 CC2 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 0,62 | 0,03 | 50000000 | 0,04 | 400000 | 100 | 0,00047 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 12 - part 2 |
| 206 CC3 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 0,73 | 0,04 | 500000000 | 0,05 | 400000 | 1000 | 0,00055 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 12 - part 3 |
| 206 CC4 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.13) - Ion-exchanger room | 0,19 | 0,01 | 1000000000 | 0,01 | 400000 | 2000 | 0,00017 | Piping (SS), D25 < diameter <= D100 mm | 1, 2, 3 / 12 - part 4 |
| 207 | Pipe-CS_DN32, insulated | (Cellar +17,90 +18,50) - (0.14) - Tank room | 22 | 0,7 | 0 | 0,85 | 0 | 0 | 0,006 | Piping (CS), diameter =< D25 mm | 31,32,33 / 1 |
| 211 | Duct 24x19 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 68,11 | 7,36 | 0 | 7,57 | 0 | 0 | 0,401 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 1 |
| 212 | Duct dia =100 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 0,9 | 0,16 | 0 | 0,16 | 0 | 0 | 0,004 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 6 |
| 213 | Insulation | (Cellar +17,90 +18,50) - (0.14) - Tank room | 30,5 | 0 | 0 | 0 | 0 | 0 | 0,1 | Thermal insulations, non-metal covering | 31,32,33 / 1 |
| 208 CC1 | 06T303 Overflow tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 18,09 | 0,47 | 5000000 | 0,54 | 400000 | 10 | 0,05699 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/11 – part 1 |
| 208 CC2 | 06T303 Overflow tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 24,91 | 0,65 | 50000000 | 0,75 | 400000 | 100 | 0,07848 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/1 1– part 2 |
| 208 CC3 | 06T303 Overflow tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 29,31 | 0,77 | 500000000 | 0,88 | 400000 | 1000 | 0,09232 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/1 1– part 3 |
| 208 CC4 | 06T303 Overflow tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 0,19 | 0,01 | 1000000000 | 0,01 | 400000 | 2000 | 0,00014 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/1 1– part 4 |
| 209 CC1 | 06T301 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 226,17 | 4,59 | 5000000 | 5,15 | 400000 | 10 | 1,63406 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/9 – part 1 |
| 209 CC2 | 06T301 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 311,43 | 6,32 | 50000000 | 7,09 | 400000 | 100 | 2,25007 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/9 – part 2 |
| 209 CC3 | 06T301 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 366,35 | 7,44 | 500000000 | 8,35 | 400000 | 1000 | 2,64685 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/9 – part 3 |
| 209 CC4 | 06T301 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 96,06 | 1,95 | 1000000000 | 2,19 | 400000 | 2000 | 0,69403 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/9 – part 4 |
| 210 CC1 | 06T302 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 226,17 | 4,59 | 5000000 | 5,15 | 400000 | 10 | 1,63406 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/10 – part 1 |
| 210 CC2 | 06T302 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 311,43 | 6,32 | 50000000 | 7,09 | 400000 | 100 | 2,25007 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/1 0– part 2 |
| 210 CC3 | 06T302 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 366,35 | 7,44 | 500000000 | 8,35 | 400000 | 1000 | 2,64685 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/10 – part 3 |
| 210 CC4 | 06T302 Waste tank | (Cellar +17,90 +18,50) - (0.14) - Tank room | 96,06 | 1,95 | 1000000000 | 2,19 | 400000 | 2000 | 0,69403 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 4,5,6/1 0– part 4 |
| 214 CC1 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 14,77 | 0,81 | 5000000 | 0,87 | 400000 | 10 | 0,01018 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/13- part 1 |
| 214 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - | 20,43 | 1,11 | 50000000 | 1,2 | 400000 | 100 | 0,01401 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/13- part 2 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CC2 | | Tank room | | | | | | | | | |
| 214 CC3 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 23,92 | 1,3 | 500000000 | 1,41 | 400000 | 1000 | 0,01649 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/13- part 3 |
| 214 CC4 | 06 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 6,27 | 0,34 | 1000000000 | 0,37 | 400000 | 2000 | 0,00432 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/13- part 4 |
| 215 CC1 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 4,89 | 0,27 | 5000000 | 0,29 | 400000 | 10 | 0,00339 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/14- part 1 |
| 215 CC2 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 6,73 | 0,37 | 50000000 | 0,4 | 400000 | 100 | 0,00467 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/14- part 2 |
| 215 CC3 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 7,91 | 0,43 | 500000000 | 0,47 | 400000 | 1000 | 0,0055 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/14- part 3 |
| 215 CC4 | 07 Tubing - SS - DN50 | (Cellar +17,90 +18,50) - (0.14) - Tank room | 2,07 | 0,11 | 1000000000 | 0,12 | 400000 | 2000 | 0,00144 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/14- part 4 |
| 225 | Fan intake dia=350 | (First floor +24,50) - (2.01) - Corridor | 3,7 | 0 | 0 | 0 | 0 | 0 | 0,05 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 52,53,54 / 3 |
| 226 | Fan PF-1 and motor | (First floor +24,50) - (2.01) - Corridor | 20 | 0 | 0 | 0,78 | 0 | 0 | 0,05 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 52,53,54 / 1 |
| 228 | Duct 19x19, external insulation 1/2" | (First floor +24,50) - (2.01) - Corridor | 20,9 | 2,63 | 0 | 2,66 | 0 | 0 | 0,126 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 1 |
| 229 | Duct 19x19, internal insulation 1/2" | (First floor +24,50) - (2.01) - Corridor | 3,6 | 0,45 | 0 | 0,46 | 0 | 0 | 0,022 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 5 |
| 230 | Duct 57x38, external insulation 1/2" | (First floor +24,50) - (2.01) - Corridor | 41,8 | 5,3 | 0 | 5,32 | 0 | 0 | 0,606 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 6 |
| 232 | Insulation | (First floor +24,50) - (2.01) - Corridor | 1,66 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 52,53,54 / 5 |
| 233 | Insulation | (First floor +24,50) - (2.01) - Corridor | 11,08 | 0 | 0 | 0 | 0 | 0 | 0,04 | Thermal insulations, non-metal covering | 55,56,57 / 1 |
| 234 | Insulation | (First floor +24,50) - (2.01) - Corridor | 21,32 | 0 | 0 | 0 | 0 | 0 | 0,07 | Thermal insulations, non-metal covering | 55,56,57 / 6 |
| 346 | 03T101 deionise liquid tank | (First floor +24,50) - (2.02) - Ventilation, intake | 1200 | 22,1 | 0 | 25,48 | 0 | 0 | 7,84 | Tanks and containers (CS), diameter >= D 1 m, typical wall thickness 12 mm | 19,20,21 / 11 |
| 347 | EB 1 air preheater | (First floor +24,50) - (2.02) - Ventilation, intake | 10 | 0 | 0 | 0 | 0 | 0 | 0,03 | Heat exchangers (CS) , diameter <= 1m, typical wall thickness 20 mm | 61,62,63 / 1 |
| 348 | Air conditioning unit inclusive fan VA1, air preheater, fil | (First floor +24,50) - (2.02) - Ventilation, intake | 1500 | 17,92 | 0 | 17,92 | 0 | 0 | 5,76 | Ventilators (CS), mass <= 50 kg | 58,59,60 / 9 |
| 349 | Exhaust valve | (First floor +24,50) - (2.02) - Ventilation, intake | 10 | 1,1 | 0 | 1,3 | 0 | 0 | 0,01 | Valves (CS), mass <= 50 kg | 52,53,54 / 4 |
| 350 | Duct 115x33 | (First floor +24,50) - (2.02) - Ventilation, intake | 34,9 | 4,43 | 0 | 4,44 | 0 | 0 | 0,569 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 5 |
| 351 | Duct 115x38 | (First floor +24,50) - (2.02) - Ventilation, intake | 48 | 6,1 | 0 | 6,12 | 0 | 0 | 0,874 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 7 |
| 352 | Duct 24x19, internal insulation 1/2" | (First floor +24,50) - (2.02) - Ventilation, intake | 20,3 | 2,56 | 0 | 2,58 | 0 | 0 | 0,137 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 16 |
| 353 | Duct 24x24, external insulation 1/2" | (First floor +24,50) - (2.02) - Ventilation, intake | 21,9 | 2,76 | 0 | 2,78 | 0 | 0 | 0,167 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 2 |
| 354 | Duct 57x38, external insulation 1/2" | (First floor +24,50) - (2.02) - Ventilation, intake | 58,2 | 7,38 | 0 | 7,41 | 0 | 0 | 0,845 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 9 |
| 355 | Duct 9x14, internal insulation 1/2" | (First floor +24,50) - (2.02) - Ventilation, intake | 18,8 | 2,35 | 0 | 2,39 | 0 | 0 | 0,066 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 15 |
| 356 | Insulation | (First floor +24,50) - (2.02) - Ventilation, intake | 10,38 | 0 | 0 | 0 | 0 | 0 | 0,03 | Thermal insulations, non-metal covering | 52,53,54 / 15 |
| 357 | Insulation | (First floor +24,50) - (2.02) - Ventilation, intake | 10,67 | 0 | 0 | 0 | 0 | 0 | 0,04 | Thermal insulations, non-metal covering | 52,53,54 / 16 |
| 358 | Insulation | (First floor +24,50) - (2.02) - Ventilation, intake | 11,45 | 0 | 0 | 0 | 0 | 0 | 0,04 | Thermal insulations, non-metal covering | 55,56,57 / 2 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 359 | Insulation | (First floor +24,50) - (2.02) - Ventilation, intake | 29,69 | 0 | 0 | 0 | 0 | 0 | 0,1 | Thermal insulations, non-metal covering | 55,56,57 / 9 |
| 360 | Cold water pipe-Cu-DN19 | (First floor +24,50) - (2.02) - Ventilation, intake | 0,5 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 14 |
| 362 | Deionised water pipe-PP-DN50 | (First floor +24,50) - (2.02) - Ventilation, intake | 0,7 | 0,16 | 0 | 0,19 | 0 | 0 | 0,002 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 13 |
| 361 CC1 | 03 Tubing - SS - DN50 | (First floor +24,50) - (2.02) - Ventilation, intake | 0,95 | 0,1 | 5000000 | 0,11 | 400000 | 10 | 0,00187 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/3– part 1 |
| 361 CC2 | 03 Tubing - SS - DN50 | (First floor +24,50) - (2.02) - Ventilation, intake | 1,31 | 0,14 | 50000000 | 0,15 | 400000 | 100 | 0,00187 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/3 – part 2 |
| 361 CC3 | 03 Tubing - SS - DN50 | (First floor +24,50) - (2.02) - Ventilation, intake | 1,54 | 0,17 | 500000000 | 0,17 | 400000 | 1000 | 0,0022 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/3 – part 3 |
| 361 CC4 | 03 Tubing - SS - DN50 | (First floor +24,50) - (2.02) - Ventilation, intake | 0,4 | 0,04 | 1000000000 | 0,05 | 400000 | 2000 | 0,00058 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/3 – part 4 |
| 363 | Pipe-CS_DN50, defroster | (First floor +24,50) - (2.03) - Ventilation, exhaust | 8,2 | 0,25 | 0 | 0,29 | 0 | 0 | 0,003 | Piping (CS), diameter =< D25 mm | 31,32,33 / 4 |
| 364 | Tr pipe-CS-DN15 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 1,8 | 0,07 | 0 | 0,1 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 46,47,48 / 20 |
| 365 | Cat. 6 floor drain | (First floor +24,50) - (2.03) - Ventilation, exhaust | 6 | 0,29 | 0 | 0,38 | 0 | 0 | 0,02 | Piping (CS), D25 < diameter <= D100 mm | 49,50,51 / 7 |
| 366 | Cat. 6-pipe-Av100 DN110 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 31,4 | 1,04 | 0 | 1,11 | 0 | 0 | 0,028 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 18 |
| 367 | Cat. 8 drain pipe DN100 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 4,9 | 0,63 | 0 | 0,64 | 0 | 0 | 0,016 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 19 |
| 368 | Expansion tank, approx 60 lit. | (First floor +24,50) - (2.03) - Ventilation, exhaust | 40 | 1,98 | 0 | 2,2 | 0 | 0 | 0,43 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 19,20,21 / 12 |
| 369 | Fan EFA-1 with motor, gearbox, girder | (First floor +24,50) - (2.03) - Ventilation, exhaust | 150 | 0 | 0 | 1,9 | 0 | 0 | 0,25 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 49,50,51 / 11 |
| 370 | Fan EFA-2 with motor, gearbox, girder | (First floor +24,50) - (2.03) - Ventilation, exhaust | 200 | 0 | 0 | 2,1 | 0 | 0 | 0,25 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 49,50,51 / 12 |
| 371 | Duct 115x33 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 18,6 | 2,36 | 0 | 2,37 | 0 | 0 | 0,304 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 14 |
| 372 | Duct 19x19 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 30,1 | 3,24 | 0 | 3,34 | 0 | 0 | 0,159 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 15 |
| 373 | Duct 19x19, external insulation 1/2" | (First floor +24,50) - (2.03) - Ventilation, exhaust | 73,4 | 9,25 | 0 | 9,35 | 0 | 0 | 0,444 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 10 |
| 374 | Duct 24x19 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 4,644 | 0,5 | 0 | 0,52 | 0 | 0 | 0,027 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 3 |
| 375 | Duct 24x24 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 17,3 | 2,19 | 0 | 2,21 | 0 | 0 | 0,132 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 11 |
| 376 | Duct 38x33 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 76,68 | 8,38 | 0 | 8,52 | 0 | 0 | 0,752 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 4 |
| 377 | Duct 57x38, external insulation 1/2" | (First floor +24,50) - (2.03) - Ventilation, exhaust | 102,9 | 13,05 | 0 | 13,11 | 0 | 0 | 1,495 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 12 |
| 378 | Duct dia =300 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 20,15 | 2,26 | 0 | 2,31 | 0 | 0 | 0,17 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 8 |
| 379 | Duct dia=350 Al | (First floor +24,50) - (2.03) - Ventilation, exhaust | 60,8 | 6,81 | 0 | 6,93 | 0 | 0 | 0,596 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 13 |
| 380 | Filter F1 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 100 | 0 | 0 | 0 | 0 | 0 | 1,02 | Air conditioning systems, filter casings (CS), dimension <= 1m | 61,62,63 / 2 |
| 381 | Cable on support | (First floor +24,50) - (2.03) - Ventilation, exhaust | 54 | 0 | 0 | 0 | 0 | 0 | 0,09 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 5 |
| 382 | Cable support 150 mm | (First floor +24,50) - (2.03) - Ventilation, exhaust | 22,5 | 0 | 0 | 0 | 0 | 0 | 0,09 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 10 |
| 384 | Insulation | (First floor +24,50) - (2.03) - Ventilation, exhaust | 32,5 | 0 | 0 | 0 | 0 | 0 | 0,11 | Thermal insulations, non-metal covering | 31,32,33 / 12 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 385 | Insulation | (First floor +24,50) - (2.03) - Ventilation, exhaust | 38,95 | 0 | 0 | 0 | 0 | 0 | 0,13 | Thermal insulations, non-metal covering | 55,56,57 / 10 |
| 386 | Insulation | (First floor +24,50) - (2.03) - Ventilation, exhaust | 52,53 | 0 | 0 | 0 | 0 | 0 | 0,18 | Thermal insulations, non-metal covering | 55,56,57 / 12 |
| 387 | Damper and actuator | (First floor +24,50) - (2.03) - Ventilation, exhaust | 20 | 0 | 0 | 0 | 0 | 0 | 0,096 | Steel constructions, (CS), hangings of piping, general hangings | 58,59,60 / 13 |
| 388 | Radiator | (First floor +24,50) - (2.03) - Ventilation, exhaust | 10 | 0 | 0 | 1,31 | 0 | 0 | 0,02 | Piece components (CS), mass <= 200 kg | 25,26,27 / 4 |
| 389 | Diffuser 33x38 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 25,56 | 1,42 | 0 | 1,41 | 0 | 0 | 0,125 | Colour metals pipes | 58,59,60 / 14 |
| 390 | Pipe-Cu-DN19 | (First floor +24,50) - (2.03) - Ventilation, exhaust | 4,23 | 0,5 | 0 | 0,55 | 0 | 0 | 0,002 | Colour metals pipes | 31,32,33 / 7 |
| 391 | Pipe-Cu-DN32, insulated | (First floor +24,50) - (2.03) - Ventilation, exhaust | 10,7 | 0,84 | 0 | 0,92 | 0 | 0 | 0,007 | Colour metals pipes | 31,32,33 / 12 |
| 392 | Duct 14x14 | (First floor +24,50) - (2.04) - Ventilation shaft | 10,08 | 1,63 | 0 | 1,68 | 0 | 0 | 0,059 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 14 |
| 393 | Duct 19x19 | (First floor +24,50) - (2.04) - Ventilation shaft | 14,3 | 1,8 | 0 | 1,82 | 0 | 0 | 0,087 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 10 |
| 394 | Duct 24x19 | (First floor +24,50) - (2.04) - Ventilation shaft | 23,22 | 2,51 | 0 | 2,58 | 0 | 0 | 0,137 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58, 59, 60 / 2 |
| 395 | Duct 24x24, internal insulation 1/2" | (First floor +24,50) - (2.04) - Ventilation shaft | 22,6 | 2,86 | 0 | 2,88 | 0 | 0 | 0,173 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 3 |
| 396 | Insulation | (First floor +24,50) - (2.04) - Ventilation shaft | 10,62 | 0 | 0 | 0 | 0 | 0 | 0,04 | Thermal insulations, non-metal covering | 55,56,57 / 3 |
| 397 | Stack external insulation 100 mm DN350 | (First floor +24,50) - (2.05) - Roof, service unit | 88,3 | 9,89 | 0 | 10,06 | 0 | 0 | 0,865 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 12 |
| 398 | Stack insulation | (First floor +24,50) - (2.05) - Roof, service unit | 381,7 | 0 | 0 | 0 | 0 | 0 | 1,27 | Thermal insulations, non-metal covering | 58,59,60 / 12 |
| 216 | Pipe-CS_DN10, insulated | (Ground floor +21,50) - (1.01) - Entrance hall | 0,1 | 0,01 | 0 | 0,02 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 25,26,27 / 16 |
| 217 | Pipe-CS_DN15, insulated | (Ground floor +21,50) - (1.01) - Entrance hall | 3,4 | 0,13 | 0 | 0,18 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 28,29,30 / 4 |
| 218 | Duct 19x19, internal insulation 1/2" | (Ground floor +21,50) - (1.01) - Entrance hall | 17,9 | 2,26 | 0 | 2,28 | 0 | 0 | 0,108 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 13 |
| 219 | Insulation | (Ground floor +21,50) - (1.01) - Entrance hall | 1,12 | 0 | 0 | 0 | 0 | 0 | 0 | Thermal insulations, non-metal covering | 25,26,27 / 16 |
| 220 | Insulation | (Ground floor +21,50) - (1.01) - Entrance hall | 9,4 | 0 | 0 | 0 | 0 | 0 | 0,03 | Thermal insulations, non-metal covering | 28,29,30 / 4 |
| 221 | Insulation | (Ground floor +21,50) - (1.01) - Entrance hall | 8,28 | 0 | 0 | 0 | 0 | 0 | 0,03 | Thermal insulations, non-metal covering | 52,53,54 / 13 |
| 222 | Radiator | (Ground floor +21,50) - (1.01) - Entrance hall | 12 | 0 | 0 | 1,62 | 0 | 0 | 0,03 | Piece components (CS), mass <= 200 kg | 22,23,24 / 13 |
| 223 | Radiator | (Ground floor +21,50) - (1.01) - Entrance hall | 15 | 0 | 0 | 1,93 | 0 | 0 | 0,04 | Piece components (CS), mass <= 200 kg | 22,23,24 / 14 |
| 224 | Cold water pipe-Cu-DN38 | (Ground floor +21,50) - (1.01) - Entrance hall | 4,592 | 0,36 | 0 | 0,39 | 0 | 0 | 0,004 | Colour metals pipes | 37,38,39 / 19 |
| 227 | Duct 14x14 | (Ground floor +21,50) - (1.02) - Corridor | 25,1 | 3,15 | 0 | 3,19 | 0 | 0 | 0,112 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 55,56,57 / 4 |
| 231 | Main cabinet 3 | (Ground floor +21,50) - (1.02) - Corridor | 388,8 | 0 | 0 | 6,02 | 0 | 0 | 1,94 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 4 |
| 235 CC1 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.02) - Corridor | 2,24 | 0,27 | 5000000 | 0,32 | 400000 | 10 | 0,00543 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/2 – part 1 |
| 235 CC2 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.02) - Corridor | 3,08 | 0,37 | 50000000 | 0,44 | 400000 | 100 | 0,00747 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/2 – part 2 |
| 235 CC3 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.02) - Corridor | 3,63 | 0,43 | 500000000 | 0,52 | 400000 | 1000 | 0,00879 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/2 – part 3 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 235 CC4 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.02) - Corridor | 0,95 | 0,11 | 1000000000 | 0,14 | 400000 | 2000 | 0,00231 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/2 – part 4 |
| 237 | Control unit | (Ground floor +21,50) - (1.03) - Stairway | 3,2 | 0 | 0 | 0,48 | 0 | 0 | 0,02 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 14 |
| 240 | Pipe-CS_DN10 | (Ground floor +21,50) - (1.04) - Office | 0,2 | 0,03 | 0 | 0,03 | 0 | 0 | 0 | Piping (CS), diameter =< D25 mm | 25,26,27 / 14 |
| 241 | Pipe-CS_DN10, insulated | (Ground floor +21,50) - (1.04) - Office | 2,1 | 0,3 | 0 | 0,36 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 25,26,27 / 17 |
| 242 | Insulation | (Ground floor +21,50) - (1.04) - Office | 27,1 | 0 | 0 | 0 | 0 | 0 | 0 | Thermal insulations, non-metal covering | 25,26,27 / 17 |
| 243 | Radiator | (Ground floor +21,50) - (1.04) - Office | 10 | 0 | 0 | 0,62 | 0 | 0 | 0,02 | Piece components (CS), mass <= 200 kg | 22,23,24 / 15 |
| 244 | Radiator | (Ground floor +21,50) - (1.04) - Office | 4 | 0 | 0 | 0,47 | 0 | 0 | 0,01 | Piece components (CS), mass <= 200 kg | 22,23,24 / 16 |
| 245 | Pipe-CS_DN10, insulated | (Ground floor +21,50) - (1.05) - Changing room | 3,2 | 0,45 | 0 | 0,54 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 25,26,27 / 18 |
| 246 | Cat. 8 Drain pipe DN100 | (Ground floor +21,50) - (1.05) - Changing room | 7,3 | 0,94 | 0 | 0,96 | 0 | 0 | 0,024 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 12 |
| 247 | Duct 14x14 | (Ground floor +21,50) - (1.05) - Changing room | 9,7 | 1,21 | 0 | 1,23 | 0 | 0 | 0,043 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 7 |
| 248 | Duct 19x19 | (Ground floor +21,50) - (1.05) - Changing room | 17,9 | 2,26 | 0 | 2,28 | 0 | 0 | 0,108 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 52,53,54 / 12 |
| 249 | Insulation | (Ground floor +21,50) - (1.05) - Changing room | 40,1 | 0 | 0 | 0 | 0 | 0 | 0 | Thermal insulations, non-metal covering | 25,26,27 / 18 |
| 250 | Insulation | (Ground floor +21,50) - (1.05) - Changing room | 6,5 | 0 | 0 | 0 | 0 | 0 | 0,02 | Thermal insulations, non-metal covering | 40,41,42 / 1 |
| 251 | Washing machine | (Ground floor +21,50) - (1.05) - Changing room | 50 | 0 | 0 | 0 | 0 | 0 | 0,546 | Non-portable small equipment & instruments (CS), mass <= 50kg | 64,65,66 / 3 |
| 252 | Radiator | (Ground floor +21,50) - (1.05) - Changing room | 20 | 0 | 0 | 1,31 | 0 | 0 | 0,05 | Piece components (CS), mass <= 200 kg | 22,23,24 / 17 |
| 253 | Cold water pipe-Cu-DN19 | (Ground floor +21,50) - (1.05) - Changing room | 0,5 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 37,38,39 / 20 |
| 254 | Cold water pipe-Cu-DN19, insulated | (Ground floor +21,50) - (1.05) - Changing room | 1 | 0,12 | 0 | 0,13 | 0 | 0 | 0,001 | Colour metals pipes | 40,41,42 / 1 |
| 255 | Pipe-SS-DN50, floor heater | (Ground floor +21,50) - (1.05) - Changing room | 13,2 | 0,72 | 0 | 0,78 | 0 | 0 | 0,009 | Piping (SS), D25 < diameter <= D100 mm | 31,32,33 / 14 |
| 256 | Insulation | (Ground floor +21,50) - (1.06) - Shower | 6,5 | 0 | 0 | 0 | 0 | 0 | 0,02 | Thermal insulations, non-metal covering | 40,41,42 / 3 |
| 257 | Cat. 4 - Floor drain | (Ground floor +21,50) - (1.06) - Shower | 5 | 0,49 | 1000000000 | 0,54 | 400000 | 500 | 0,027 | Piece components (CS), mass <= 200 kg | 7,8,9/14 |
| 258 | Cold water pipe-Cu-DN13 | (Ground floor +21,50) - (1.06) - Shower | 0,7 | 0,08 | 0 | 0,09 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 2 |
| 259 | Cold water pipe-Cu-DN19, insulated | (Ground floor +21,50) - (1.06) - Shower | 1 | 0,12 | 0 | 0,13 | 0 | 0 | 0,001 | Colour metals pipes | 40,41,42 / 3 |
| 260 | Cat. 4 Bowl | (Ground floor +21,50) - (1.07) - Toilet | 15 | 1,1 | 1000000000 | 1,3 | 400000 | 200 | 0,1 | Other general equipment | 10,11,12/1 |
| 261 | Cat. 6 Toilet | (Ground floor +21,50) - (1.07) - Toilet | 20 | 1,1 | 0 | 1,48 | 0 | 0 | 0,12 | Other general equipment | 25,26,27 / 11 |
| 262 | Cold water pipe-Cu-DN13 | (Ground floor +21,50) - (1.07) - Toilet | 0,5 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 4 |
| 263 | Hot water pipe-Cu-DN13 | (Ground floor +21,50) - (1.07) - Toilet | 0,5 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 5 |
| 118 | Radiator | (Ground floor +21,50) - (1.08) - Shower niche | 5 | 0 | 0 | 0,62 | 0 | 0 | 0,01 | Piece components (CS), mass <= 200 kg | 13,14,15/3 |
| 264 | Cat. 6 floor drain | (Ground floor +21,50) - (1.08) - Shower niche | 5 |  | 0 | 0,54 | 0 | 0 | 0,027 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 13 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 173 | Cat. 4 Wash unit | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 50 | 3,8 | 1000000000 | 4,22 | 400000 | 500 | 0,546 | Sampling boxes (CS) | 10,11,12 / 2 |
| 265 | Cat. 6-pipe-A100 DN110 | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 31,4 | 1,04 | 0 | 1,11 | 0 | 0 | 0,028 | Piping (CS), diameter =< D25 mm | 46,47,48 / 14 |
| 266 | Tr pipe-CS-DN15 | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 3,7 | 0,14 | 0 | 0,19 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 46,47,48 / 15 |
| 267 | Insulation | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 23,2 | 0 | 0 | 0 | 0 | 0 | 0,08 | Thermal insulations, non-metal covering | 31,32,33 / 11 |
| 268 | Insulation | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 1,9 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 40,41,42 / 8 |
| 269 | Insulation | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 3,3 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 40,41,42 / 9 |
| 270 | Cold water pipe-Cu-DN25 | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 1 | 0,08 | 0 | 0,09 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 7 |
| 271 | Cold water pipe-Cu-DN32 | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 0,6 | 0,05 | 0 | 0,05 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 6 |
| 272 | Hot water pipe-Cu-DN19, insulated | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 0,5 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 9 |
| 273 | Hot water pipe-Cu-DN32, insulated | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 0,6 | 0,05 | 0 | 0,05 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 8 |
| 274 | Pipe-Cu-DN19 | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 3 | 0,36 | 0 | 0,4 | 0 | 0 | 0,002 | Colour metals pipes | 31,32,33 / 6 |
| 275 | Pipe-Cu-DN32, insulated | (Ground floor +21,50) - (1.09) - Washing alcove 1 | 7,7 | 0,6 | 0 | 0,66 | 0 | 0 | 0,005 | Colour metals pipes | 31,32,33 / 11 |
| 276 | Cat. 6-pipe-A100 DN110 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 31,4 | 1,04 | 0 | 1,11 | 0 | 0 | 0,028 | Piping (CS), D25 < diameter <= D100 mm | 46,47,48 / 16 |
| 277 | Insulation | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 9,8 | 0 | 0 | 0 | 0 | 0 | 0,03 | Thermal insulations, non-metal covering | 40,41,42 / 11 |
| 278 | Cat. 4 Wash unit | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 50 | 3,8 | 1000000000 | 4,22 | 400000 | 500 | 0,546 | Sampling boxes (CS) | 10,11,12/3 |
| 279 | Cold water pipe-Cu-DN19 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 3 | 0,36 | 0 | 0,4 | 0 | 0 | 0,002 | Colour metals pipes | 40,41,42 / 10 |
| 280 | Cold water pipe-Cu-DN19, insulated | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 1,5 | 0,18 | 0 | 0,2 | 0 | 0 | 0,001 | Colour metals pipes | 40.41.42 / 11 |
| 282 | Deionised water pipe-PP-DN50 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 2 | 0,47 | 0 | 0,56 | 0 | 0 | 0,006 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 43,44,45 / 12 |
| 281 CC1 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 0,95 | 0,11 | 5000000 | 0,14 | 400000 | 10 | 0,00226 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/3 – part 1 |
| 281 CC2 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 1,31 | 0,16 | 50000000 | 0,19 | 400000 | 100 | 0,00311 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/3 – part 2 |
| 281 CC3 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 1,54 | 0,18 | 500000000 | 0,22 | 400000 | 1000 | 0,00366 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/3 – part 3 |
| 281 CC4 | Cat. 4-pipe-PE-Ap74 DN80 | (Ground floor +21,50) - (1.11) - Washing alcove 2 | 0,4 | 0,05 | 1000000000 | 0,06 | 400000 | 2000 | 0,00096 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 7,8,9/3 – part 4 |
| 283 | Pipe-CS_DN20 | (Ground floor +21,50) - (1.12) - Storage hall | 52,8 | 2,09 | 0 | 2,65 | 0 | 0 | 0,01 | Piping (CS), diameter =< D25 mm | 28,29,30 / 6 |
| 284 | Pipe-CS_DN20, insulated | (Ground floor +21,50) - (1.12) - Storage hall | 30,1 | 1,19 | 0 | 1,52 | 0 | 0 | 0,006 | Piping (CS), diameter =< D25 mm | 28,29,30 / 8 |
| 285 | Pipe-CS_DN25 | (Ground floor +21,50) - (1.12) - Storage hall | 67,1 | 2,16 | 0 | 2,72 | 0 | 0 | 0,013 | Piping (CS), diameter =< D25 mm | 28,29,30 / 10 |
| 286 | Pipe-CS_DN32 | (Ground floor +21,50) - (1.12) - Storage hall | 3,8 | 0,12 | 0 | 0,15 | 0 | 0 | 0,001 | Piping (CS), diameter =< D25 mm | 28,29,30 / 14 |
| 287 | 08Pipe-CS-DN15 | (Ground floor +21,50) - (1.12) - Storage hall | 19,7 | 0,76 | 0 | 1,04 | 0 | 0 | 0,003 | Piping (CS), D25 < diameter <= D100 mm | 37,38,39 / 11 |
| 288 | 08Pipe-CS-DN20 | (Ground floor +21,50) - (1.12) - Storage hall | 22,7 | 0,9 | 0 | 1,14 | 0 | 0 | 0,004 | Piping (CS), D25 < diameter <= D100 mm | 37,38,39 / 10 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 290 | Handling machine, shielding cask, cable drum, motor | (Ground floor +21,50) - (1.12) - Storage hall | 100 | 0 | 0 | 0 | 0 | 0 | 0,25 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 10,11,12/9 |
| 291 | Fan EF1, with motor | (Ground floor +21,50) - (1.12) - Storage hall | 50 | 0 | 0 | 4,34 | 0 | 0 | 0,06 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 49,50,51 / 8 |
| 292 | Fan EF2, with motor | (Ground floor +21,50) - (1.12) - Storage hall | 50 | 0 | 0 | 4,34 | 0 | 0 | 0,06 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 49,50,51 / 9 |
| 293 | Fan EF3, with motor | (Ground floor +21,50) - (1.12) - Storage hall | 50 | 0 | 0 | 4,34 | 0 | 0 | 0,06 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 49,50,51 / 10 |
| 294 | Fan VA-2, VA-3 | (Ground floor +21,50) - (1.12) - Storage hall | 60 | 0 | 0 | 1,7 | 0 | 0 | 0,3 | Ventilators (CS), mass > 50 kg, at least one dimension > 1m | 52,53,54 / 2 |
| 295 | Air distributor | (Ground floor +21,50) - (1.12) - Storage hall | 40 | 1,86 | 0 | 1,86 | 0 | 0 | 0,276 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 10 |
| 296 | Air distributor | (Ground floor +21,50) - (1.12) - Storage hall | 60 | 1,2 | 0 | 1,2 | 0 | 0 | 0,09 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 11 |
| 297 | Duct dia =300 | (Ground floor +21,50) - (1.12) - Storage hall | 162,1 | 18,18 | 0 | 18,54 | 0 | 0 | 1,364 | Air conditioning components - piping (CS), cross section < 0,16 m2 | 58,59,60 / 7 |
| 298 | Cable on support | (Ground floor +21,50) - (1.12) - Storage hall | 110 | 0 | 0 | 0 | 0 | 0 | 0,18 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 4 |
| 299 | Cable support 150 mm | (Ground floor +21,50) - (1.12) - Storage hall | 37,5 | 0 | 0 | 0 | 0 | 0 | 0,15 | Electrical cables & conductors; (Cu), 1 kV power cables | 19,20,21 / 9 |
| 300 | Electrical cabinet | (Ground floor +21,50) - (1.12) - Storage hall | 7,5 | 0 | 0 | 0,33 | 0 | 0 | 0,04 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 8 |
| 301 | Electrical cabinet | (Ground floor +21,50) - (1.12) - Storage hall | 14,4 | 0 | 0 | 0,42 | 0 | 0 | 0,07 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 9 |
| 302 | Monitoring unit | (Ground floor +21,50) - (1.12) - Storage hall | 5,4 | 0 | 0 | 0,36 | 0 | 0 | 0,03 | General electric equipment, (CS) mass <= 50 kg | 16,17,18 / 16 |
| 303 | Handling machine, troley, cabinet | (Ground floor +21,50) - (1.12) - Storage hall | 60 | 0 | 0 | 4 | 0 | 0 | 0,3 | General electric equipment, (CS) mass > 50 kg | 16,17,18 / 10 |
| 304 | Main cabinet 2 | (Ground floor +21,50) - (1.12) - Storage hall | 388,8 | 0 | 0 | 6,02 | 0 | 0 | 1,94 | General electric equipment, (CS) mass > 50 kg | 16,17,18 /3 |
| 305 | Insulation | (Ground floor +21,50) - (1.12) - Storage hall | 68,9 | 0 | 0 | 0 | 0 | 0 | 0,23 | Thermal insulations, non-metal covering | 28,29,30 / 8 |
| 306 | Insulation | (Ground floor +21,50) - (1.12) - Storage hall | 3,3 | 0 | 0 | 0 | 0 | 0 | 0,01 | Thermal insulations, non-metal covering | 40,41,42 / 13 |
| 307 | Handling machine, trolley/lower frame | (Ground floor +21,50) - (1.12) - Storage hall | 2000 | 0 | 0 | 0 | 0 | 0 | 2,63 | Steel constructions, (CS), hangings of piping, general hangings | 61,62,63 / 5 |
| 308 | Handling machine, trolley/upper frame | (Ground floor +21,50) - (1.12) - Storage hall | 600 | 0 | 0 | 0 | 0 | 0 | 0,75 | Steel constructions, (CS), hangings of piping, general hangings | 61,62,63 / 4 |
| 309 | Pipe support | (Ground floor +21,50) - (1.12) - Storage hall | 279 | 0 | 0 | 7,1 | 400000 | 10 | 0,177 | Steel constructions, (CS), hangings of piping, general hangings | Appendix 4 |
| 310 | Handling machine, trolley/stand | (Ground floor +21,50) - (1.12) - Storage hall | 6200 | 0 | 0 | 0 | 0 | 0 | 22 | Steel constructions, (CS), plattforms and stages | 61,62,63 / 3 |
| 311 | Handling machine, trolley, steps etc | (Ground floor +21,50) - (1.12) - Storage hall | 300 | 0 | 0 | 0 | 0 | 0 | 1,4 | Steel constructions, (CS), stairs, ladders, railings | 61,62,63 / 8 |
| 312 | Handling machine, shielding cask, grab | (Ground floor +21,50) - (1.12) - Storage hall | 100 | 0 | 1000000000 | 1,04 | 400000 | 10 | 0,05 | Steel constructions, (CS), dismantling appliances | 61,62,63 / 11 |
| 313 | Handling machine, trolley/walkway etc | (Ground floor +21,50) - (1.12) - Storage hall | 500 | 0 | 0 | 0 | 0 | 0 | 2,64 | Hoisting equipment (CS), electrical tackles | 61,62,63 / 7 |
| 314 | Handling machine, gantry | (Ground floor +21,50) - (1.12) - Storage hall | 3000 | 0 | 0 | 0 | 0 | 0 | 66 | Hoisting equipment (CS), cranes | 61,62,63 / 9 |
| 315 | Handling machine, gantry, machinery | (Ground floor +21,50) - (1.12) - Storage hall | 200 | 0 | 0 | 0 | 0 | 0 | 0,15 | Hoisting equipment (CS), cranes | 61,62,63 / 10 |
| 316 | Service gantry, complete | (Ground floor +21,50) - (1.12) - Storage hall | 3000 | 0 | 0 | 0 | 0 | 0 | 9 | Hoisting equipment (CS), cranes | 64,65,66 / 1 |
| 317 | Travelling crane, complete | (Ground floor +21,50) - (1.12) - Storage hall | 25000 | 0 | 0 | 0 | 0 | 0 | 17 | Hoisting equipment (CS), cranes | 64,65,66 / 2 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 318 | Handling machine, trolley/machinery | (Ground floor +21,50) - (1.12) - Storage hall | 200 | 0 | 0 | 0 | 0 | 0 | 0,18 | Non-portable small equipment & instruments (CS), mass > 50kg | 61,62,63 / 6 |
| 319 | Cat. 4 Drain SS | (Ground floor +21,50) - (1.12) - Storage hall | 6 | 0,34 | 1000000000 | 0,38 | 400000 | 500 | 0,03 | Gulleys, (SS) | 10,11,12/4 |
| 325 | Handling machine, shielding cask | (Ground floor +21,50) - (1.12) - Storage hall | 24058 | 17,2 | 0 | 19,46 | 400000 | 10 | 3,23 | Casing of technological euipment (CS), thickness < 100 mm | 10,11,12/8 |
| 326 | Radiator | (Ground floor +21,50) - (1.12) - Storage hall | 300 | 0 | 0 | 7,86 | 0 | 0 | 0,74 | Piece components (CS), mass <= 200 kg | 22,23,24 / 19 |
| 327 | Radiator | (Ground floor +21,50) - (1.12) - Storage hall | 40 | 0 | 0 | 5,05 | 0 | 0 | 0,09 | Piece components (CS), mass <= 200 kg | 22,23,24 / 20 |
| 328 | Radiator | (Ground floor +21,50) - (1.12) - Storage hall | 25 | 0 | 0 | 3,18 | 0 | 0 | 0,06 | Piece components (CS), mass <= 200 kg | 25,26,27 / 1 |
| 329 | Radiator | (Ground floor +21,50) - (1.12) - Storage hall | 20 | 0 | 0 | 2,56 | 0 | 0 | 0,05 | Piece components (CS), mass <= 200 kg | 25,26,27 / 2 |
| 330 | Contaminated steel | (Ground floor +21,50) - (1.12) - Storage hall | 100 | 0 | 0 | 0,2 | 400000 | 500 | 0 | Building structure - carbon steel | Appendix 6 |
| 331 | Cold water pipe-Cu-DN19 | (Ground floor +21,50) - (1.12) - Storage hall | 0,503 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 12 |
| 332 | Hot water pipe-Cu-DN19, insulated | (Ground floor +21,50) - (1.12) - Storage hall | 0,503 | 0,06 | 0 | 0,07 | 0 | 0 | 0 | Colour metals pipes | 40,41,42 / 13 |
| 333 | Pipe-Cu-DN19, floor heater | (Ground floor +21,50) - (1.12) - Storage hall | 27,18 | 3,22 | 0 | 3,56 | 0 | 0 | 0,015 | Colour metals pipes | 31,32,33 / 10 |
| 417 | Handling machine, shielding cask - inner linning | (Ground floor +21,50) - (1.12) - Storage hall | 942 | 0 | 0 | 5,28 | 3000000000 | 2000 | 0 | Casing of technological euipment (CS), thickness < 100 mm | 10,11,12/8 |
| 289 CC1 | 05C201 Filling funnel | (Ground floor +21,50) - (1.12) - Storage hall | 0,45 | 0,05 | 5000000 | 0,05 | 400000 | 10 | 0,00226 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/12 – part 1 |
| 289 CC2 | 05C201 Filling funnel | (Ground floor +21,50) - (1.12) - Storage hall | 0,62 | 0,07 | 50000000 | 0,07 | 400000 | 100 | 0,00311 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/12 – part 2 |
| 289 CC3 | 05C201 Filling funnel | (Ground floor +21,50) - (1.12) - Storage hall | 0,73 | 0,08 | 500000000 | 0,09 | 400000 | 1000 | 0,00366 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/12 – part 3 |
| 289 CC4 | 05C201 Filling funnel | (Ground floor +21,50) - (1.12) - Storage hall | 0,19 | 0,02 | 1000000000 | 0,02 | 400000 | 2000 | 0,00096 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/12 – part 4 |
| 334 CC1 | 03 Tubing - SS - DN40 | (Ground floor +21,50) - (1.12) - Storage hall | 9,21 | 0,4 | 5000000 | 0,45 | 400000 | 10 | 0,00384 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/16- part 1 |
| 334 CC2 | 03 Tubing - SS - DN40 | (Ground floor +21,50) - (1.12) - Storage hall | 12,68 | 0,54 | 50000000 | 0,61 | 400000 | 100 | 0,00529 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/16- part 2 |
| 334 CC3 | 03 Tubing - SS - DN40 | (Ground floor +21,50) - (1.12) - Storage hall | 14,91 | 0,64 | 500000000 | 0,72 | 400000 | 1000 | 0,00623 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/16- part 3 |
| 334 CC4 | 03 Tubing - SS - DN40 | (Ground floor +21,50) - (1.12) - Storage hall | 3,91 | 0,17 | 1000000000 | 0,19 | 400000 | 2000 | 0,00163 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/16- part 4 |
| 335 CC1 | 03 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 10,4 | 0,57 | 5000000 | 0,61 | 400000 | 10 | 0,00701 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/15- part 1 |
| 335 CC2 | 03 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 14,33 | 0,78 | 50000000 | 0,84 | 400000 | 100 | 0,00965 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/15- part 2 |
| 335 CC3 | 03 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 16,85 | 0,92 | 500000000 | 0,99 | 400000 | 1000 | 0,01136 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/15- part 3 |
| 335 CC4 | 03 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 4,42 | 0,24 | 1000000000 | 0,26 | 400000 | 2000 | 0,00298 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/15- part 4 |
| 336 CC1 | 04 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 33,18 | 1,81 | 5000000 | 1,96 | 400000 | 10 | 0,02262 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/17- part 1 |
| 336 CC2 | 04 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 45,69 | 2,49 | 50000000 | 2,69 | 400000 | 100 | 0,03114 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/17- part 2 |
| 336 CC3 | 04 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 53,74 | 2,93 | 500000000 | 3,17 | 400000 | 1000 | 0,03663 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/17- part 3 |
| 336 CC4 | 04 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 14,09 | 0,77 | 1000000000 | 0,83 | 400000 | 2000 | 0,00961 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/17- part 4 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 337 CC1 | 05 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 2,6 | 0,14 | 5000000 | 0,15 | 400000 | 10 | 0,00181 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/18- part 1 |
| 337 CC2 | 05 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 3,58 | 0,2 | 50000000 | 0,21 | 400000 | 100 | 0,00249 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/18- part 2 |
| 337 CC3 | 05 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 4,21 | 0,23 | 500000000 | 0,25 | 400000 | 1000 | 0,00293 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/18- part 3 |
| 337 CC4 | 05 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 1,1 | 0,06 | 1000000000 | 0,07 | 400000 | 2000 | 0,00077 | Piping (SS), D25 < diameter <= D100 mm | 1,2,3/18- part 4 |
| 338 CC1 | 06 Tubing - plast- DN80 | (Ground floor +21,50) - (1.12) - Storage hall | 7,17 | 1,03 | 5000000 | 1,2 | 400000 | 10 | 0,02058 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 1,2,3/2- part 1 |
| 338 CC2 | 06 Tubing - plast- DN80 | (Ground floor +21,50) - (1.12) - Storage hall | 9,87 | 1,42 | 50000000 | 1,65 | 400000 | 100 | 0,02834 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 1,2,3/2- part 2 |
| 338 CC3 | 06 Tubing - plast- DN80 | (Ground floor +21,50) - (1.12) - Storage hall | 11,61 | 1,67 | 500000000 | 1,95 | 400000 | 1000 | 0,03334 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 1,2,3/2- part 3 |
| 338 CC4 | 06 Tubing - plast- DN80 | (Ground floor +21,50) - (1.12) - Storage hall | 3,05 | 0,44 | 1000000000 | 0,51 | 400000 | 2000 | 0,00874 | Piping (PE, PP ..), D25 < diameter <= D100 mm | 1,2,3/2- part 4 |
| 339 CC1 | 06 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 3,26 | 0,18 | 5000000 | 0,19 | 400000 | 10 | 0,00226 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/1 – part 1 |
| 339 CC2 | 06 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 4,48 | 0,25 | 50000000 | 0,26 | 400000 | 100 | 0,00311 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/1 – part 2 |
| 339 CC3 | 06 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 5,28 | 0,29 | 500000000 | 0,31 | 400000 | 1000 | 0,00366 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/1 – part 3 |
| 339 CC4 | 06 Tubing - SS - DN50 | (Ground floor +21,50) - (1.12) - Storage hall | 1,38 | 0,08 | 1000000000 | 0,08 | 400000 | 2000 | 0,00096 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/1 – part 4 |
| 340 CC1 | 07 Tubing - SS - DN25 | (Ground floor +21,50) - (1.12) - Storage hall | 0,43 | 0,02 | 5000000 | 0,02 | 400000 | 10 | 0,00023 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/2 – part 1 |
| 340 CC2 | 07 Tubing - SS - DN25 | (Ground floor +21,50) - (1.12) - Storage hall | 0,59 | 0,03 | 50000000 | 0,03 | 400000 | 100 | 0,00031 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/2 – part 2 |
| 340 CC3 | 07 Tubing - SS - DN25 | (Ground floor +21,50) - (1.12) - Storage hall | 0,7 | 0,03 | 500000000 | 0,04 | 400000 | 1000 | 0,00037 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/2 – part 3 |
| 340 CC4 | 07 Tubing - SS - DN25 | (Ground floor +21,50) - (1.12) - Storage hall | 0,18 | 0,01 | 1000000000 | 0,01 | 400000 | 2000 | 0,0001 | Piping (SS), D25 < diameter <= D100 mm | 4,5,6/2 – part 4 |
| 341 | Cask support 2 | (Ground floor +21,50) - (1.13) - Decontamination basin | 624 | 3,1 | 0 | 3,6 | 400000 | 10 | 0,8 | Steel constructions, (CS), hangings of piping, general hangings | 13,14,15/1 |
| 342 | Cat. 4 Drain SS | (Ground floor +21,50) - (1.13) - Decontamination basin | 6 | 0,34 | 1000000000 | 0,38 | 400000 | 500 | 0,03 | Gulleys, (SS) | 10,11,12/5 |
| 343 | Cladding, SS | (Ground floor +21,50) - (1.13) - Decontamination basin | 1510 | 21 | 1000000000 | 26 | 400000 | 1000 | 0,26 | Stainless steel linings, (SS) | 10,11,12/10 |
| 344 | Cask support 1 | (Ground floor +21,50) - (1.13) - Decontamination basin | 123 | 2,6 | 0 | 2,94 | 400000 | 10 | 0,34 | Other general equipment | 10,11,12/11 |
| 345 CC1 | 01B301 Submersible pump | (Ground floor +21,50) - (1.14) - Storage basin 1 | 2,26 | 0,06 | 5000000 | 0,07 | 400000 | 10 | 0,00226 | Pumps (CS), mass <= 50 kg | 4,5,6/13 – part 1 |
| 345 CC2 | 01B301 Submersible pump | (Ground floor +21,50) - (1.14) - Storage basin 1 | 3,11 | 0,09 | 50000000 | 0,1 | 400000 | 100 | 0,00311 | Pumps (CS), mass <= 50 kg | 4,5,6/13 – part 2 |
| 345 CC3 | 01B301 Submersible pump | (Ground floor +21,50) - (1.14) - Storage basin 1 | 3,66 | 0,1 | 500000000 | 0,12 | 400000 | 1000 | 0,00366 | Tanks and containers (CS), diameter < D 1 m, thickness of wall <= 20 mm | 4,5,6/13 – part 3 |
| 345 CC4 | 01B301 Submersible pump | (Ground floor +21,50) - (1.14) - Storage basin 1 | 0,96 | 0,03 | 1000000000 | 0,03 | 400000 | 2000 | 0,00096 | Pumps (CS), mass <= 50 kg | 4,5,6/13 – part 4 |
| 320 | Steel | (Ground floor +21,50) - (1.18) - Virtual room | 22000 | 0 | 0 | 0 | 0 | 0 | 0 | Steel skeletons, (CS) | Appendix 6 |
| 321 | Reinforced concrete | (Ground floor +21,50) - (1.18) - Virtual room | 1110506 | 0 | 0 | 0 | 0 | 0 | 0 | Reinforced concrete, thickness <= 400 mm | Appendix 10 |
| 322 | Contaminated concrete | (Ground floor +21,50) - (1.18) - Virtual room | 5000 | 19 | 0 | 3,3 | 400000 | 10 | 0 | Contaminated concrete | Appendix 6 |
| 323 | Rebar | (Ground floor +21,50) - (1.18) - Virtual room | 32000 | 0 | 0 | 0 | 0 | 0 | 0 | Steel skeletons, (CS) | Appendix 6 |

| Identif. number | Name of technological or building equipment | Name of object and room | Weight [kg] | Inner surface [$m^2$] | Inner surface contamination [$Bq/m^2$] | Outer surface [$m^2$] | Outer surface contamination [$Bq/m^2$] | Dose rate [µGy/h] | Inner volume [$m^3$] | Category of technological or building equipment | Pointer to SVAFO study information in Bilaga 3a [pages/row] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 324 | Unsorted debis (windows, doors etc.) | (Ground floor +21,50) - (1.18) - Virtual room | 54000 | 0 | 0 | 0 | 0 | 0 | 0 | Other building construction | Appendix 6 |
| 399 | Building surfaces items - walls (chem. decontamination) | (Ground floor +21,50) - (1.18) - Virtual room | 0 | 0 | 0 | 155,4 | 40000 | 1 | 0 | Other building construction | Appendix 7 |
| 400 | Building surfaces items - flors (mech. decontamination) | (Ground floor +21,50) - (1.18) - Virtual room | 0 | 0 | 0 | 348,1 | 40000 | 1 | 0 | Building surface ( epoxid system) | Appendix 7 |
| 401 | Building surfaces items - storage basins (mech. decontamination) | (Ground floor +21,50) - (1.18) - Virtual room | 0 | 0 | 0 | 333,6 | 400000 | 10 | 0 | Building surface (cement screeding, epoxid paint) | Appendix 7 |
| 403 | Roofing and wall membrane | (Ground floor +21,50) - (1.18) - Virtual room | 836500 | 0 | 0 | 0 | 0 | 0 | 0 | Reinforced concrete, thickness <= 400 mm | Appendix 9 |
| 404 | Demolishing interior walls | (Ground floor +21,50) - (1.18) - Virtual room | 49600 | 0 | 0 | 0 | 0 | 0 | 0 | Masonry | Appendix 10 |

# Annex 2

# Calculation parameters (most important selected parameters)

**General data for all questionnaires**

## Labour cost unit factors

| Profession | average salary paid to to worker | unit |
|---|---|---|
| manager (average personel on the management level) | 14 | €/manhour |
| senior engineer (experienced engineer, more then 10 years of experience in the field) | 8 | €/manhour |
| engineer (standard engineer) | 6,5 | €/manhour |
| operator (qualified operator in relevant branch) | 5 | €/manhour |
| administrative worker | 5 | €/manhour |
| worker (skilled, qualified craftsman) | 4 | €/manhour |
| auxiliary worker (only basic training) | 2 | €/manhour |
| Total sum of social security contributions, insurance, social charges and other charges paid by the company | 38 | % of the average salary |

## Selected cost unit factors for general use in calculation

| Cost unit factor | Value | Unit |
|---|---|---|
| Cost unit factor of demineralised water | 2 | €/m3 |
| Cost unit factor of cooling water | 0,05 | €/m3 |
| Cost unit factor of electrolyte for decontamination of metals | 51 | €/m3 |
| Cost unit factor of decontamination solvents for chemical bath decontamination | 10,5 | €/m3 |
| Cost unit factor of detergent | 625 | €/m3 |
| Cost unit factor of aceton | 1500 | €/m3 |
| Cost unit factor of neutralising reagent | 725 | €/m3 |
| Cost unit factor of ionex exchanger | 60 | €/m3 |
| Cost unit factor of bitumen | 217,5 | €/m3 |
| Cost unit factor of steam | 22,5 | €/t |
| Cost unit factor of cement powder | 0,075 | €/kg |
| Cost unit factor of acetylene | 4,5 | €/Nm3 |
| Cost unit factor of oxygen | 1,25 | €/Nm3 |
| Cost unit factor of compressed air | 0,03 | €/Nm3 |
| Cost unit factor of plastic foil | 2 | €/kg |
| Cost unit factor of filters for ventilation systems | 50 | €/pc |
| Cost unit factor of disposal container | 3750 | €/container |
| Cost unit factor of standard drum (200 l volume) | 25 | €/drum |
| Cost unit factor of electricity | 0,035 | €/kWh |
| Cost unit factor of fuel oil | 1,05 | €/kg |

Other costs unit factors (several hundreds) have minor impact on calculation of decmmissioning parameters and will be checked in next reviews

## Other general data

| Parameter | Value | Unit |
|---|---|---|
| Work days per year | 250 | - |
| Work hours per shift | 8 | - |
| Inner volume of drum for waste | 0,2 | m3 |
| Inner volume of fibre-rainforced container (FRC) for waste (final disposal package, dimensions 1,7 x 1,7 x 1,7m) | 3,1 | m3 |
| Dose rate of background in facility | 0,2 | mikroGy/h |
| Period of air change through airconditioning systems | 2 | changes/h |

**Use of colors for review of parameters**

| Color | Meaning of the color |
|---|---|
| no color | informative value for the first review, will be reviewed in next in-depth reviews |
| | parameter with most significant impact on cost, should be udapted for Swedish conditions |
| | parameter based on volume of 200L drum, should be updated for Swedish conditions if different package is used |
| | parameter based on volume of fibre-rainforced container (FRC), should be updated for Swedish conditions if different package is used |
| | parameter with significant impact on cost, could be updated in next reviews |

**Set of calculation procedures for dismantling of technological equipment**

***Preparatory activities in individual rooms before starting the dismantling:***

P1 - Survey of radiological situation
P2 - Covering of floor by protective foil
P3 - Installation of scaffolding
P4 - Installation of temporary air-conditioning
P5 - Instalation of temporary electric and other media conections
P6 - Disconnection and revision of decommissioned technological equipment
P7 - Marking of cuts and areas
P8 - Delivery of working tools and equipments
P9 - Preparation of working tools and equipments
P10 - Preparation of transport containers
P11 - Installation of protective tent
P12 - Working grup instructions

***Dismantling ig technological equipment-realization***

D1 - Dismantling (manual) by hydraulic shears in CA
D2 - Dismantling (manual) by hydraulic shears out of CA
D3 - Dismantling (manual) by oxygen-acetylene set in CA
D4 - Dismantling (manual) by oxygen-acetylene set out of CA
D5 - Dismantling (manual) by plasma set in CA
D6 - Dismantling (manual) by  plasma set out of CA
D7 - Dismantling (manual) by circular saw in CA
D8 - Dismantling (manual) by circular saw out of CA
D9 - Dismantling (manual) by hand tools (wrenches, etc.) in CA
D10 - Dismantling (manual) by hand tools (wrenches, etc.) out of CA

***Finishing activities in individual rooms after decommissioning:***

F1 - Removal of scaffolding
F2 - Removal of protective foil
F3 - Removal of temporary air-conditioning
F4 - Removal of temporary electric and other media conections
F5 - Removal of working tools and equipments
F6 - Removal of protective tent
F7 - Removal of transport containers
F8 - Cleaning of room

## Preparation activities for dismantling of technological equipment - mechanical

### Survey of radiological situation

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,32 | man.hour/m2 |
| Constant unit factor | 9,75 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,3 |
| operator | 2 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 0 |

### Covering of floor by protective foil

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,32 | man.hour/m2 |
| Constant unit factor | 9,75 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Installation of scaffolding

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 1 | man.hour/scaffolding square |
| Constant unit factor | 8 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Installation of temporary air-conditioning

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 12 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Installation of temporary electric and other media connections

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Disconnection and revision of decommissioned technological equipment

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,13 | man.hour/m2 |
| Constant unit factor | 3,25 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Marking of cuts and areas

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,18 | man.hour/m2 |
| Constant unit factor | 5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 0 |

### Delivery of working tools and equipments

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,21 | man.hour/m2 |
| Constant unit factor | 10,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Preparation of working tools and equipments

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,22 | man.hour/m2 |
| Constant unit factor | 3,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Preparation of transport containers

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Internal volume of transport container | 1,5 | m3 |
| Manpower unit factor | 0,28 | man.hour/container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Installation of protective tent

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,21 | man.hour/m2 |
| Constant unit factor | 4,9 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Working grup instructions

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,23 | man.hour/m2 |
| Constant unit factor | 3,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Dismantling procedure

## Dismantling (manual) by hydraulic shears in CA

**Input technological parameters for Piping (CS), diameter <= Ø25 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 160 | man.hour/t |

**Input technological parameters for Air conditioning components - piping (CS), cross section < 0,16 m$^2$**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 48 | man.hour/t |

**Input technological parameters for Controll & low-voltage cables (Cu)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 1890 | man.hour/t |

**Input technological parameters for Electrical cables & conductors; (Cu), 1 kV power cables**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 67 | man.hour/t |

**Input technological parameters for Thermal insulations, non-metal covering**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 69 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by hydraulic shears out of CA

**Input technological parameters for Piping (CS), diameter <= Ø25 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 144 | man.hour/t |

**Input technological parameters for Air conditioning components - piping (CS), cross section < 0,16 m$^2$**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 43 | man.hour/t |

**Input technological parameters for Controll & low-voltage cables (Cu)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 1890 | man.hour/t |

**Input technological parameters for Electrical cables & conductors; (Cu), 1 kV power cables**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 67 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

**Input technological parameters for Thermal insulations, non-metal covering**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 69 | man.hour/t |

## Dismantling (manual) by oxygen-acetylene set in CA

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 30 | man.hour/t |

**Input technological parameters for General electric equipment, mass > 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 19 | man.hour/t |

**Input technological parameters for Heat exchangers (CS) , each dimension <= 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 22,5 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 21 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), electrical tackles**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 18,5 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass > 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 29 | man.hour/t |

**Input technological parameters for Other general equipment**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 13 | man.hour/t |

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 27 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 56,5 | man.hour/t |

**Input technological parameters for Pumps (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 15 | man.hour/t |

**Input technological parameters for Sampling boxes (CS)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 19 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 29 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), platforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 19,5 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), stairs, ladders, railings**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 11,6 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter < Ø 1 m, thickness of wall <= 20 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 9,5 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter >= Ø 1 m, typical wall thickness 12 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 11 | man.hour/t |

**Input technological parameters for Valves (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 115 | man.hour/t |

**Input technological parameters for Ventilators (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 14,5 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by oxygen-acetylene set out of CA

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 30 | man.hour/t |

**Input technological parameters for General electric equipment, mass > 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 19 | man.hour/t |

**Input technological parameters for Heat exchangers (CS) , each dimension <= 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 22,5 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 19 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), electrical tackles**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 18,5 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass > 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 29 | man.hour/t |

**Input technological parameters for Other general equipment**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 13 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 52 | man.hour/t |

**Input technological parameters for Pumps (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 12 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 26 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), platforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 17,5 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), stairs, ladders, railings**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 10,5 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter < Ø 1 m, thickness of wall <= 20 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 8 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter >= Ø 1 m, typical wall thickness 12 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 10 | man.hour/t |

**Input technological parameters for Valves (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 103 | man.hour/t |

**Input technological parameters for Ventilators (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 13 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by plasma set in CA

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 7,7 | kWh/t |
| Manpower unit factor | 46 | man.hour/t |

**Input technological parameters for Casing of technological euipment (CS), thickness < 100 mm)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 13 | kWh/t |
| Manpower unit factor | 44 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 10 | kWh/t |
| Manpower unit factor | 21,5 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 3,2 | kWh/t |
| Manpower unit factor | 26 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 32 | kWh/t |
| Manpower unit factor | 55 | man.hour/t |

**Input technological parameters for Stainless steel linings (SS)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 19,5 | kWh/t |
| Manpower unit factor | 59,5 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 8 | kWh/t |
| Manpower unit factor | 26 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), platforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 7 | kWh/t |
| Manpower unit factor | 17 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter >= Ø 1 m, typical wall thickness 12 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 11 | kWh/t |
| Manpower unit factor | 11,5 | man.hour/t |

## Dismantling (manual) by plasma set out of CA

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 7,7 | kWh/t |
| Manpower unit factor | 46 | man.hour/t |

**Input technological parameters for Casing of technological euipment (CS), thickness < 100 mm)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 10,9 | kWh/t |
| Manpower unit factor | 43 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 10 | kWh/t |
| Manpower unit factor | 19 | man.hour/t |

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 2,9 | kWh/t |
| Manpower unit factor | 23 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 26,6 | kWh/t |
| Manpower unit factor | 48 | man.hour/t |

**Input technological parameters for Stainless steel linings (SS)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 19,5 | kWh/t |
| Manpower unit factor | 53 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 8 | kWh/t |
| Manpower unit factor | 23 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), plattforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 7 | kWh/t |
| Manpower unit factor | 17 | man.hour/t |

**Input technological parameters for Tanks and containers (CS), diameter >= Ø 1 m, typical wall thickness 12 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 13 | kWh/t |
| Manpower unit factor | 10 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by circular saw in CA

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 6,5 | kWh/t |
| Manpower unit factor | 29 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 31 | kWh/t |
| Manpower unit factor | 62 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 14 | kWh/t |
| Manpower unit factor | 37 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), plattforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 12 | kWh/t |
| Manpower unit factor | 28 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by circular saw out of CA

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 5 | kWh/t |
| Manpower unit factor | 26 | man.hour/t |

**Input technological parameters for Piping (CS), Ø25 < diameter <= Ø100 mm**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 31 | kWh/t |
| Manpower unit factor | 54 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), hangings of piping, general hangings**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 12 | kWh/t |
| Manpower unit factor | 34 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), plattforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of electric power | 11 | kWh/t |
| Manpower unit factor | 26 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Dismantling (manual) by hand tools (wrenches, etc.) in CA

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 36 | man.hour/t |

**Input technological parameters for Electric motors, mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 45 | man.hour/t |

**Input technological parameters for Electrical cables & conductors; (Cu), 1 kV power cables**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 82 | man.hour/t |

**Input technological parameters for General electric equipment, mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 51 | man.hour/t |

**Input technological parameters for General electric equipment, mass > 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 16 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 30,5 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), electrical tackles**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 31 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass <= 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 58 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass > 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 37,6 | man.hour/t |

**Input technological parameters for Other general equipment**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 68 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 36 | man.hour/t |

**Input technological parameters for Pumps (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 56 | man.hour/t |

**Input technological parameters for Pumps (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 15 | man.hour/t |

**Input technological parameters for Sampling boxes (CS)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 26 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), dismantling appliances**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 14 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), plattforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 15 | man.hour/t |

**Input technological parameters for Thermal insulations, non-metal covering**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 75 | man.hour/t |

**Input technological parameters for Valves (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 152 | man.hour/t |

**Input technological parameters for Ventilators (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 20 | man.hour/t |

**Dismantling (manual) by hand tools (wrenches, etc.) out of CA**

**Input technological parameters for Air conditioning components - piping (CS), cross section < 0,16 m2**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 36 | man.hour/t |

**Input technological parameters for Air conditioning systems, filter casings (CS), dimension <= 1 m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 30 | man.hour/t |

**Input technological parameters for Electric motors, mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 40 | man.hour/t |

**Input technological parameters for Electrical cables & conductors; (Cu), 1 kV power cables**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 74 | man.hour/t |

**Input technological parameters for General electric equipment, mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 45 | man.hour/t |

**Input technological parameters for General electric equipment, mass > 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 14,5 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), cranes**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 20 | man.hour/t |

**Input technological parameters for Hoisting equipment (CS), electrical tackles**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 20,5 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass <= 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 53 | man.hour/t |

**Input technological parameters for Non-portable small equipment & instruments (CS), mass > 50kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 33 | man.hour/t |

**Input technological parameters for Other general equipment**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 62 | man.hour/t |

**Input technological parameters for Piece components (CS), mass ≤ 200 kg)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 33 | man.hour/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 1 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

**Input technological parameters for Pumps (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 51 | man.hour/t |

**Input technological parameters for Pumps (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 42 | man.hour/t |

**Input technological parameters for Sampling boxes (CS)**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 23,5 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), dismantling appliances**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 12,5 | man.hour/t |

**Input technological parameters for Steel constructions, (CS), plattforms and stages**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 18 | man.hour/t |

**Input technological parameters for Thermal insulations, non-metal covering**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 75 | man.hour/t |

**Input technological parameters for Valves (CS), mass <= 50 kg**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 98 | man.hour/t |

**Input technological parameters for Ventilators (CS), mass > 50 kg, at least one dimension > 1m**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 17 | man.hour/t |

## Finishing of dismantling

### Removal of scaffolding

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,95 | man.hour/scaffolding square |
| Constant unit factor | 7 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Removal of protective foil

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,14 | man.hour/m2 |
| Constant unit factor | 10,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Removal of temporary air-conditioning

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 3,5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Removal of temporary electricand other media connections

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 3,5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

### Removal of working tools and equipments

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,18 | man.hour/m2 |
| Constant unit factor | 4 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Removal of protective tent

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,14 | man.hour/m2 |
| Constant unit factor | 4,9 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Removal of transport containers

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 1,4 | man.hour/container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Cleaning of room

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 0,13 | man.hour/m2 |
| Constant unit factor | 8,4 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

**Time ratio of related non-productive parts to productive part of operation (whole work group)**

| Non-productive time part | Ratio to productive time part |
|---|---|
| Entry to Uncontrolled Area | 3,00% |
| Work preparation in Uncontrolled Area | 2,00% |
| Work breaks in Uncontrolled Area | 6,00% |
| Moving within Uncontrolled Area | 2,00% |
| Entry to Controlled Area | 3,00% |
| Work preparation in Controlled Area | 3,00% |
| ALARA breaks | 6,00% |
| Work breaks in Controlled Area | 4,00% |
| Moving within Controlled Area | 4,00% |
| Work finishing in Controlled Area | 3,00% |
| Exit from Controlled Area | 5,00% |
| Exit from Uncontrolled Area | 3,00% |

**Set of calculation procedures for decontamination of building surfaces**

***Preparatory activities in individual rooms prior decontamination:***
P1 - Covering of floor surface by protective foils
P2 - Installation of scaffolding
P3 - Marking and delineating of surfaces
P4 - Installation of temporal air-conditioning
P5 - Installation of temporal electric and others media connections
P6 - Delivery of working tools and equipments to the working place
P7 - Preparation of working tools and equipments for the work
P8 - Installation of protective tents
P9 - Preparation of transport containers
P10 - Instructions for the decontamination working group

***Decontamination of building surfaces - selected technologies***
D1 - Hands-on mechanical decontamination
D2 - Hands-on detergent foam application

***Finishing activities in individual rooms after decontamination:***
F1 - Removal of scaffolding
F2 - Removal of protective foils from floor surface
F3 - Removal of temporary air-conditioning
F4 - Removal of temporary electric and other media connections
F5 - Removal of working tools and equipments
F6 - Removal of protective tents
F7 - Removal of transport containers

## Preparation activities for decontamination of building surfaces

### Covering of floor surface by protective foils

Hands on covering of floor by plastic foil. Transport of foil to room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Consumption unit factor of plastic foil | 0,025 | kg/ m2 |
| Manpower unit factor | 0,22 | man.hour/ m2 |
| Constant unit factor for preparatory and finishing activities | 10,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Installation of scaffolding

Hands on installation of scaffolding.Transport of materials to room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 3 | man.hour/room |
| Constant unit factor for preparatory and finishing activities | 8 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Marking and delineating of surfaces

Hands on marking of surface contaminated areas.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,25 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 4 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,5 |
| clerk | 0 |
| worker | 0,8 |
| auxilliary worker | 0 |

### Installation of temporary air-conditioning

Hands on installation of temporary air-conditioning. Transport of equipment to room is included.

**Calculation parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 5 | man.hour/room |

**Work group structure**

| Profession | Number of personel for each profesion |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,3 |
| operator | 4 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Installation of temporary electric and other media connections

Hands on installation of temporal electric connection.Transport of materials to room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,3 |
| operator | 4 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Delivery of working tools and equipments to the working place

Transport of tools and equipments to room.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,14 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 7,35 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Preparation of working tools and equipments for the work

Hands on preparation working tools and equipments.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,15 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 10 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Installation of protective tents

Hands on installation of protective tent.Transport of materials to room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,12 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Preparation of transport containers

Preparation of containers for waste (transport of containers into the room is included).

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Internal volume of transport container | 0,2 | m3 |
| Manpower unit factor | 0,4 | man.hour/container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Instructions for the decontamination working group

Instucting of decontamination crew, tasks assignment.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,3 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Realization the decontamination

### Decontamination of building surfaces - mechanical

Hands on mechanical decontamination of building surfaces by manual grinding equipment.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Thickness of shaved layer | 0,02 | m |
| Shaving capacity of equipment | 0,08 | m3/h |
| Input power | 1,5 | kW |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0,125 |
| engineer | 0 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Decontamination of building surfaces - detergent foam application + vacuum cleanning + washing

Hands on mechanical decontamination of building surfaces by foam application and vacuum cleaning equipments.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Consumption unit factor of demineralised water (foam application) | 0,00025 | m^3/m^2 |
| Consumption unit factor of demineralised water (foam washing) | 0,005 | m^3/m^2 |
| Input power for foam application equipment | 1 | kW |
| Input power for vacuum cleaning equipment | 2 | kW |
| Consumption unit factor of detergent (used in demineralised water volu | 0,1 | m^3/m^3 |
| Volume salinity of generated liquid radioactive waste | 1 | kg/m^3 |
| Time of foam action | 0,25 | h/equipment/room |
| Capacity of eqipment (foam application) | 5 | m^2/h |
| Capacity of eqipment (vacuum cleaning) | 10 | m^2/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,125 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Completion activities after decontamination of building surfaces

### Removal of scaffolding

Hands on removal of scaffolding.Transport of materials from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 2,3 | man.hour/room |
| Constant unit factor for preparatory and finishing activities | 7 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

### Removal of protective foils from floor surface

Hands on removal of plastic foil.Transport of material from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,28 | man.hour/ m2 |
| Constant unit factor for preparatory and finishing activities | 10,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Removal of temporary air-conditioning

Hands on removal of temporal air-conditioning.Transport of equipment from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 3,5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Removal of temporary electricand other media connections

Hands on removal temporal electric connection.Transport of material from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 3,5 | man.hour/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Removal of working tools and equipments

Hands on removal of working tools and equipments.Transport of equipment from room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,25 | man.hour/m2 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Removal of protective tents

Hands on removal ofprotective tent.Transport ofmaterials from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,14 | man.hour/m2 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Removal of transport containers

Hands on removal of transport containers.Transport of transport containers from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 1,2 | man.hour/ container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

**Time ratio of related non-productive parts to productive part of operation (whole work group)**

| Non-productive time part | Ratio to productive time part |
|---|---|
| Entry to Uncontrolled Area | 3,00% |
| Work preparation in Uncontrolled Area | 2,00% |
| Work breaks in Uncontrolled Area | 6,00% |
| Moving within Uncontrolled Area | 2,00% |
| Entry to Controlled Area | 3,00% |
| Work preparation in Controlled Area | 3,00% |
| ALARA breaks | 6,00% |
| Work breaks in Controlled Area | 4,00% |
| Moving within Controlled Area | 4,00% |
| Work finishing in Controlled Area | 3,00% |
| Exit from Controlled Area | 5,00% |
| Exit from Uncontrolled Area | 3,00% |

**Demolition technologies**

**Set of calculation procedures for demolition of building**

1 Demolition of walling by excavator
2 Demolition of other building material by excavator
3 Demolition of concrete by demolition sheers
4 Demolition of reinforced-concrete (to 400mm) by demolition shears
5 Demolition of steel skeletons by oxygen-acetylene cutting set
6 Demolition of roof skeletons by oxygen-acetylene cutting set
7 Transport of backfill material
8 Preparation of rooms for backfilling
9 Backfilling of rooms by debris
10 Final landscape

## Demolition of walling by excavator

Complete demolition of masonry walling by excavator
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Quantity | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 1,5 | kg/t |
| Manpower unit factor | 2 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Demolition of other building material by excavator

Complete demolition of other building material by excavator
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 4,2 | kg/t |
| Manpower unit factor | 20 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Demolition of concrete by demolition shears

Complete demolition of usual concrete by shears
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 2,5 | kg/t |
| Manpower unit factor | 6 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

## Demolition of reinforced-concrete (to 400mm) by demolition shears

Complete demolition of renforced-concrete by shears, excavator and oxygen cutting set
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 3,5 | kg/t |
| Consumption factor of electric energy | 0,17 | kWh/t |
| Manpower unit factor | 8 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Demolition of steel skeletons by oxygen-acetylene cutting set

Complete demolition of steel skeletons by oxygen cutting set and crane
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 1,5 | kg/t |
| Manpower unit factor | 20 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Demolition of roof skeletons by oxygen-acetylene cutting set

Complete demolition of roofs by oxygen cutting set and crane
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 1,5 | kg/t |
| Manpower unit factor | 20 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Transport of backfill material

Transport of demolished material and debris to backfilling of rooms

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 0,1 | kg/t |
| Manpower unit factor | 1,9 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Preparation of rooms for backfilling

Preparation of room for backfilling, demolition of room floors

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 1,5 | kg/t |
| Consumption factor of electric energy | 2,2 | kWh/t |
| Manpower unit factor | 9 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Backfilling of rooms by debris

Backfilling of rooms by debris

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Manpower unit factor | 1,2 | man.hour/t |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 1 |
| clerk | 0 |
| worker | 1,5 |
| auxilliary worker | 3 |

## Final landscape

Complete demolition, definite layout of surface by bulldozer and excavator
Transport of demolished material to recycling workplace

**Calculation parameters of the technology**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of fuel-oil | 2,9 | kg/t |
| Manpower unit factor | 0,68 | man.hour/m2 |

**Working group structure**

| Profession | Number of staff |
|---|---|
| manger | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 0 |
| auxilliary worker | 2 |

**Structure of non-productive working time of working groups for demolition technologies**

| Item of non-productive working time | Ratio to productive working time |
|---|---|
| Entry to Uncontrolled Area | 3,00% |
| Work preparation in Uncontrolled Area | 2,00% |
| Work breaks in Uncontrolled Area | 6,00% |
| Moving within Uncontrolled Area | 2,00% |
| Entry to Controlled Area | 0,00% |
| Work preparation in Controlled Area | 0,00% |
| ALARA breaks | 0,00% |
| Work breaks in Controlled Area | 0,00% |
| Moving within Controlled Area | 0,00% |
| Work finishing in Controlled Area | 0,00% |
| Exit from Controlled Area | 0,00% |
| Exit from Uncontrolled Area | 3,00% |

**Set of calculation procedures for treatment technologies**

1 Post-dismantling decontamination of dismantled materials - rinsing bath
2 Post-dismantling decontamination of equipments - chemical bath
3 Post-dismantling decontamination of equipments - electrochemical bath
4 Sorting of metal materials before fragmentation (according to surface contamination)
5 Sorting of non-metal solid materials before fragmentation (according to surface contamination)
6 Fragmentation of iron materials (up to 3000 Bq/m2 contamination)
7 Fragmentation of iron metals (over 3000 Bq/m2 contamination)
8 Fragmentation of non-iron metals
9 Treatment of filters from ventilation systems
10 Low pressure compaction
11 High pressure compaction
12 Melting of metals
13 Incineration
14 Evaporation
15 Bituminization of concentrates
16 Bituminization of ionexchangers
18 Grouting of disposal containers
19 Disposal of container in surface repository
20 Disposal of container in geological repository
21 Recyclation of cables
22 Recyclation of building materials from demolition
23 Recyclation of non-radioactive metal materials from dismantling

## Treatment / conditioning technologies

### Post-dismantling decontamination of dismantled materials - rinsing bath

Bath decontamination of dismantled carbon / stainless steel in rinsing bath, including the transport before and after decontamination

**Selected calculation parameters of the technology**

| Parameter | Value | Unit |
|---|---|---|
| Capacity of eqipment (area) | 2 | m^2/h |
| Consumption unit factor of demineralised water | 0,02 | m^3/m^2 |
| Consumption unit factor of detergent (used in demineralised water volume unit) | 0,001 | m^3/m^3 |
| Average dose rate at the working place | 5 | microGy/h |
| Time unit factor of detergent renewal and decontamination line maitainance | 0,075 | h/m^2 |
| Operational unit costs (depreciation + other non-specific cost) | 9 | €/m^2 |
| Volume salinity of generated liquid radioactive waste | 5 | kg/m^3 |

**Working group structure**

| Profession | Number of personel per profession |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 2 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Post-dismantling decontamination of equipments - chemical bath

Bath decontamination of dismantled carbon / stainless steel in chemical bath (use of decontamination solution), including the

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Capacity of eqipment (area) | 8,3 | m^2/h |
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Consumption unit factor of decontamination solution | 0,0026 | m^3/m^2 |
| Consumption unit factor of demineralised water | 0,02 | m^3/m^2 |
| Operational unit costs (depreciation + other non-specific cost) | 17,4 | €/m^2 |
| Consumption unit factor of detergent (used in demineralised water volume unit) | 0,001 | m^3/m^3 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 2 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Post-dismantling decontamination of equipments - electrochemical bath

Bath decontamination of dismantled carbon / stainless steel in electrochemical bath (use of electrolyte), including the transport

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Capacity of eqipment (area) | 2 | m^2/h |
| Consumption unit factor of demineralised water | 0,05 | m^3/m^2 |
| Consumption unit factor of electrolyte | 0,06 | m^3/m^2 |
| Consumption unit factor of detergent (used in demineralised water volume unit) | 0,001 | m^3/m^3 |
| Input power | 20 | kW |
| Dose rate from decontamination line (0,5 m distance from line) | 5 | mikroGy/h |
| Operational unit costs (depreciation + other non-specific cost) | 25,7 | €/m^2 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 2 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Sorting of metal materials before fragmentation (according to surface contamination)

Hands on monitoring and sorting of individual pieces of metal material and placing into drums, including transport before and after

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Weight of steel (metal) in monitoring batch | 350 | kg/container, batch respectively |
| Time of one batch monitoring | 1 | h |
| Operational unit costs (depreciation + other non-specific cost) | 7 | €/batch |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,25 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Sorting of non-metal solid materials before fragmentation (according to surface contamination)

Hands on monitoring and sorting of individual pieces of non-metal solid material and placing into drums, including transport before

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Weight of azbestos in one monitoring batch | 350 | kg/container, batch respectively |
| Weight of concrete in one monitoring batch | 350 | kg/container, batch respectively |
| Weight of brash waste in one monitoring batch | 100 | kg/container, batch respectively |
| Weight of graphite in one monitoring batch | 100 | kg/container, batch respectively |
| Weight of plastic insulation in one monitoring batch | 150 | kg/container, batch respectively |
| Weight of glass wool in one monitoring batch | 100 | kg/container, batch respectively |
| Weight of azbestos in drum | 350 | kg/drum |
| Weight of graphite in drum | 100 | kg/drum |
| Operational unit costs (depreciation + other non-specific cost) | 7 | €/batch |
| Time of one batch monitoring | 0,25 | h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,25 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Fragmentation of iron materials (up to 3000 Bq/m2 contamination)

Hands on picking out of sorted iron material from drum, fixing of material in jaws. Remote fragmentation of iron material with hack

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 5 | kW |
| Weigh of carbon steel in the drum | 350 | kg |
| Weigh of stainless steel in the drum | 350 | kg |
| Capacity of equipment (drums) | 1 | drum/h |
| Operational unit costs (depreciation + other non-specific cost) | 0,4 | €/kg |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 0,5 |
| clerk | 0 |
| worker | 2,5 |
| auxilliary worker | 2 |

## Fragmentation of iron metals (over 3000 Bq/m2 contamination)

Remote picking out of sorted iron material from drum, fixing of material in jaws. Remote fragmentation of iron material with guillotine

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 20 | kW |
| Weigh of carbon steel in the drum | 350 | kg |
| Weigh of stainless steel in the drum | 350 | kg |
| Capacity of equipment (drums) | 0,125 | drum/h |
| Operational unit costs (depreciation + other non-specific cost) | 1,5 | €/kg |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 0,5 |
| clerk | 0 |
| worker | 2,5 |
| auxilliary worker | 2 |

## Fragmentation of non-iron metals

Hands on picking out of sorted non-iron material from drum, fixing of material in jaws. Remote fragmentation of iron material with

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 2 | kW |
| Weigh of copper in the drum | 350 | kg |
| Weigh of aluminium in the drum | 350 | kg |
| Weigh of lead in the drum | 350 | kg |
| Weigh of coloured material (except of Cu, Al a Pb) in the drum | 350 | kg |
| Capacity of equipment (drums) | 0,75 | drum/h |
| Operational unit costs (depreciation + other non-specific cost) | 0,4 | €/kg |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 0,5 |
| clerk | 0 |
| worker | 2,5 |
| auxilliary worker | 2 |

## Treatment of filters from ventilation systems

Treatment of air conditioning filters with aceton and placing into drums. Transport of materials and products before and after

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Specific mass of filters | 150 | kg/m3 |
| Number of filters in drum | 6 | pc/drum |
| Number of filters in treatment batch | 6 | pc/batch |
| Filter batch treatment duration | 240 | h/batch |
| Operational unit costs (depreciation + other non-specific cost) | 20,8 | €/batch |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 0 |

## Low pressure compaction

Compaction of low pressure compactible solid waste, directly in drum. Hands on handling with drums. Transport of materials and

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Specific mass of brash waste | 100 | kg/m^3 |
| Specific mass of low-pressure compactible waste | 100 | kg/m^3 |
| Specific mass of plastic insulation | 150 | kg/m^3 |
| Specific mass of glass wool | 80 | kg/m^3 |
| Input power | 4 | kW |
| Operational unit costs (depreciation + other non-specific cost) | 0,7 | €/m^3 |
| Capacity of eqipment (volume) | 1,6 | m^3/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,125 |
| operator | 2,5 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## High pressure compaction

Compaction of drums with fragmented solid materials and drums with low pressure compacted solid materials. Remote handling

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Input power | 48 | kW |
| Capacity of eqipment (volume) | 1,5 | m^3/h |
| Operational unit costs (depreciation + other non-specific cost) | 123 | €/drum |
| Capacity of eqipment (drums) | 3 | drum/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,125 |
| operator | 2,5 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Melting of metals

Melting of iron materials in inductive furnace and casting of ingots. Transport of materials and products before and after melting is

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Weight of carbon steel ingot | 1000 | kg/container, batch respectively |
| Weight of stainless steel ingot | 1000 | kg/container, batch respectively |
| Weight of slag in drum | 350 | kg/drum |
| Input power | 250 | kW |
| Operational unit costs (depreciation + other non-specific cost) | 1,2 | €/kg |
| Capacity of eqipment (mass) | 125 | kg/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0,5 |
| engineer | 1 |
| operator | 4 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

## Incineration

Incineration of solid combustible waste in shaft kiln with conveyor filling system. Transport of materials and products before and

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 5 | microGy/h |
| Specific mass of white protective clothing | 100 | kg/m^3 |
| Specific mass of combustible waste | 100 | kg/m^3 |
| Input power | 124 | kW |
| Consumption unit factor of fuel oil ( for one mass unit of combustible waste) | 0,01 | kg/kg |
| Operational unit costs (depreciation + other non-specific cost) | 4 | €/kg |
| Capacity of eqipment (mass) | 50 | kg/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0,5 |
| engineer | 1 |
| operator | 3,25 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Evaporation

Evaporation of liquid waste into concentrate and condensate in rotary film evaporator. Transport of materials and products before

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 2 | kW |
| Limit salinity of concentrates | 180 | kg/m3 |
| Capacity of equipment (volume of produced condensate) | 1 | m3/h |
| Consumption unit factor of steam | 2,5 | t/h |
| Operational unit costs (depreciation + other non-specific cost) | 25,4 | €/m3 |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 3 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 0 |

## Bituminization of concentrates

Mixing of concentrate and bitumen, evaporating of mixture and filling of drums with bitumen product. Transport of materials and

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 10 | kW |
| Capacity of equipment (volume of produced condensate) | 0,1 | m3/h |
| Limit salinity of bitumen | 400 | kg/m3 |
| Consumption unit factor of steam | 0,3 | t/h |
| Operational unit costs (depreciation + other non-specific cost) | 190,3 | €/m3 |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Bituminization of ionexchangers

Mixing of spent ionexchangers and bitumen, evaporating of mixture and filling of drums with bitumen product. Transport of materials

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 10 | kW |
| Capacity of equipment (volume of produced condensate) | 0,12 | m3/h |
| Consumption unit factor of steam | 2,5 | t/h |
| Operational unit costs (depreciation + other non-specific cost) | 190,3 | €/m3 |
| Dose rate from technological line (0.5 m distance from line) | 1 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2,5 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

## Cementation of ash

Mixing of cement compound and ash. Filling of drums with cement mixture. Transport of materials and products before and after

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 5,5 | kW |
| Capacity of equipment (volume) | 0,2 | m3/h |
| Inner useful volume of drum | 0,2 | m3 |
| Weight of cement product per mass unit of ash | 3 | kg/kg |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |
| Operational unit costs (depreciation + other non-specific cost) | 4 | €/m3 |
| Specific weigh of ash | 750 | kg/m3 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Grouting of disposal containers

Placing of drums, pellets from high pressure compaction, large pieces of metal materials into disposal container. Preparation of

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 3,5 | kW |
| Capacity of equipment (volume) | 0,56 | m3/h |
| Operational unit costs (depreciation + other non-specific cost) | 810 | €/container |
| Number of concetrate bituminisation product drums in container | 6 | pc/container |
| Number of ash cementation product drums in container | 6 | pc/container |
| Number of ionex changers bituminisation product drums in container | 6 | pc/container |
| Number of D23 kl air conditioning filters product drums in container | 6 | pc/container |
| Number of carbon steel product drums in container | 6 | pc/container |
| Number of stailness steel product drums in container | 6 | pc/container |
| Number of carbon ingots in container | 1 | pc/container |
| Number of stailness steel ingots in container | 1 | pc/container |
| Number of slag drums in container | 6 | pc/container |
| Number of stainless steel pellets in container | 18 | pc/container |
| Number of carbon steel pellets in container | 18 | pc/container |
| Number of copper pellets in container | 30 | pc/container |
| Number of aluminium pellets in container | 30 | pc/container |
| Number of lead pellets in container | 15 | pc/container |
| Number of coloured metal pellets in container | 30 | pc/container |
| Number of low pressure compactible pellets after supercompaction in container | 15 | pc/container |
| Number of glass wool pellets in container | 15 | pc/container |
| Carbon ingot volume | 0,5 | m3 |
| Stailness steel ingot volume | 0,5 | m3 |
| Carbon steel pellet volume | 0,07 | m3 |
| Stainless steel pellet volume | 0,07 | m3 |
| Copper pellet volume | 0,05 | m3 |
| Aliminium pellet volume | 0,05 | m3 |
| Lead pellet volume | 0,1 | m3 |
| Coloured metal pellet volume | 0,05 | m3 |
| Low pressure compactible pellet volume after supercompaction | 0,05 | m3 |
| Glass wool pellet volume | 0,05 | m3 |
| Powder cement volume per unit volume of cement mixture | 0,72 | m3/m3 |
| Specific weigh of cement powder | 1600 | kg/m3 |
| Time of arrangement of product (drum, pellet, cartrige) in container | 0,15 | h |
| Closing time of container | 0,5 | h/container |
| Dose rate from technological line (0.5 m distance from line) | 5 | mikroGy/h |
| Number of soil product drums in container | 6 | pc/container |
| Number of azbestos pellets in container | 28 | pc/container |
| Number of plastic insulation pellets in container | 28 | pc/container |
| Number of brash pellets in container | 28 | pc/container |
| Number of graphite pellets in container | 20 | pc/container |
| Number of concrete product drums in container | 6 | pc/container |
| Azbestos pellet volume | 0,05 | pc/container |
| Plastic insulation pellet volume | 0,05 | pc/container |
| Brash pellet volume | 0,05 | pc/container |
| Number of abrasion product drums in container | 6 | pc/container |
| Number of graphite pellets in container | 0,06 | pc/container |
| Consumption unit factor of water for cementation per cement powder volume | 0,64 | m3/m3 |
| Number of 6 kV aluminium cable pellets in container | 30 | pc/container |
| Number of 1 kV aluminium cable pellets in container | 30 | pc/container |
| Number of 1 kV copper cable pellets in container | 30 | pc/container |
| Number of 1 kV copper cable pellets in container | 30 | pc/container |
| Number of signal copper cable pellets in container | 30 | pc/container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,5 |
| operator | 2 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Disposal of container in surface repository

Recieving, radiation check, visual control and disposal of container at surface repository. Transport within locality is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 1 | microGy/h |
| Cost unit factor of container disposal at repository | 2480 | €/container |
| Operational unit costs (depreciation + other non-specific cost) | 8983 | €/container |
| Time from recieving to placement of container at repository | 5 | h/equipment/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 1 |

## Disposal of container in geological repository

Recieving, radiation check, visual control and disposal of container at geological repository. Transport within locality is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological line (0,5 m distance from line) | 1 | microGy/h |
| Cost unit factor of container disposal at repository | 329500 | €/container |
| Time from recieving to placement of container at repository | 5 | h/equipment/room |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,75 |
| operator | 0,125 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 1 |

## Recyclation of cables

Removing of PVC cable insulation and placing of metal material of cables into drums. Transport of materials and products before and after recyclation is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 2 | kW |
| Capacity of equipment (mass) | 30 | kg/h |
| Operational unit costs (depreciation + other non-specific cost) | 0,25 | €/kg |
| Dose rate from technological line (0.5 m distance from line) | 2 | mikroGy/h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 0,5 |
| clerk | 0 |
| worker | 2,5 |
| auxilliary worker | 2 |

## Recyclation of building materials from demolition

Transport of materials and products before and after recyclation is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Cost unit factor of iron scrap repurchasing | 50 | €/t |
| Cost unit factor of usable building material repurchasing | 2,5 | €/t |
| Cost unit factor of concrete recycling | 6,25 | €/t |
| Cost unit factor of masonry recycling | 5 | €/t |
| Cost unit factor of reinforced concrete recycling | 12,5 | €/t |
| Cost unit factor of prefabricated elements recycling | 12,5 | €/t |
| Cost unit factor of building boards recycling | 12,5 | €/t |
| Cost unit factor of stoneware recycling | 17,5 | €/t |
| Cost unit factor of porous concrete | 6,25 | €/t |
| Input power | 100 | kW |
| Capacity of equipment | 15000 | kg/hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,125 |
| operator | 1 |
| clerk | 0 |
| worker | 6 |
| auxilliary worker | 3 |

## Recyclation of non-radioactive metal materials from dismantling

Transport of materials and products before and after recyclation is included

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Input power | 2 | kW |
| Capacity of equipment | 500 | kg/hour |
| Cost unit factor of metal scrap repurchase | 125 | €/t |
| Cost unit factor of colour metals scrap repurchase | 2000 | €/t |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,125 |
| operator | 0,25 |
| clerk | 0 |
| worker | 1 |
| auxilliary worker | 3 |

**Structure of non-productive working time of working groups for stabile treatment/conditioning technologies**

| Item of non-productive working time | Ratio to productive working time |
|---|---|
| Entry to uncontrolled area | 3,00% |
| Preparation for work in uncontrolled area | 2,00% |
| Working breaks in uncontrolled area - total | 6,00% |
| Moving of personel within uncontrolled area | 2,00% |
| Entry to controlled area | 3,00% |
| Preparation for work preparation in controlled area | 3,00% |
| ALARA breaks | 6,00% |
| Working breaks in controlled area | 4,00% |
| Moving of personel within the controlled area | 4,00% |
| Finishing of work in controlled area | 3,00% |
| Exit from controlled area | 5,00% |
| Exit from uncontrolled area | 3,00% |
| Total | 44,00% |

**Set of calculation procedures for radiation monitoring**

R1 - Radiation monitoring of iron metals in drums before release into environment
R2 - Radiation monitoring of ingots before release into environment
R3 - Radiation monitoring of non-iron metals in drums before release into environment
R4 - Radiation monitoring of non-metal materials in drums before release into environment
R6 - Radiation monitoring of containers before transportation to repository

***Preparatory activities in individual rooms before starting the radiation monitoring of building surfaces:***

P5_1 - Installation of scaffolding
P5_2 - Marking and delineating of surfaces
P5_3 - Delivery of working tools and equipments to the working place
P5_4 - Instructions for the decontamination working group

***Radiation monitoring - realization***

R5 - Radiation monitoring of building surfaces

***Finishing activities in individual rooms after the radiation monitoring of building surfaces:***

F5_1 - Removal of scaffolding
F5_2 - Removal of working tools and equipments
F5_3 - Cleaning of room

## Radiation monitoring

### Radiation monitoring of iron metals in drums before release into environment

Radiation monitoring of drums by gamma scaner, including the transport before and after monitoring

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Cost unit factor of one batch monitoring (depreciations + operati | 500 | €/batch |
| Time of one batch monitoring | 0,75 | h |
| Weight of carbon steel in monitored batch | 350 | kg/container, batch respectively |
| Weight of stainless steel in monitored batch | 350 | kg/container, batch respectively |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Radiation monitoring of ingots before release into environment

Radiation monitoring of ingots by gamma scaner, including the transport before and after monitoring

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Cost unit factor of one batch monitoring (depreciations + operati | 500 | €/batch |
| Number of carbon steel ingots in monitored batch | 1 | pc/batch |
| Number of stainless steel ingots in monitored batch | 1 | pc/batch |
| Time of one batch monitoring | 2 | h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Radiation monitoring of non-iron metals in drums before release into environment

transport before and after monitoring.

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Cost unit factor of one batch monitoring (depreciations + operati | 500 | €/batch |
| Time of one batch monitoring | 0,25 | h |
| Weight of alluminium cables in monitored batch | 200 | kg/container, batch respectively |
| Weight of alluminium in monitored batch | 200 | kg/container, batch respectively |
| Weight of copper cables in monitored batch | 200 | kg/container, batch respectively |
| Weight of copper in monitored batch | 200 | kg/container, batch respectively |
| Weight of lead in monitored batch | 450 | kg/container, batch respectively |
| Weight of other metals in monitored batch | 350 | kg/container, batch respectively |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Radiation monitoring of non-metal materials in drums before release into environment

Radiation monitoring of drums by gamma scaner, including the transport before and after monitoring.

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Cost unit factor of one batch monitoring (depreciations + operati | 500 | €/batch |
| Time of one batch monitoring | 0,75 | h |
| Weight of azbestos in monitored batch | 100 | kg/container, batch respectively |
| Weight of brash waste in monitored batch | 100 | kg/container, batch respectively |
| Weight of concrete in monitored batch | 350 | kg/container, batch respectively |
| Weight of glass wool in monitored batch | 100 | kg/container, batch respectively |
| Weight of graphite in monitored batch | 100 | kg/container, batch respectively |
| Weight of plastic insulation in monitored batch | 150 | kg/container, batch respectively |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Radiation monitoring of containers before transportation to repository

Radiation monitoring of containers by dose measurement equipment

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of one container monitoring | 2,5 | €/container |
| Time of one container monitoring | 0,25 | h/container |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Preparatory activities in individual rooms before starting the radiation monitoring of building surfaces

### Installation of scaffolding

Hands on installation of scaffolding.Transport of materials to room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 1,1 | man.hour/room |
| Constant unit factor for preparatory and finishing activities | 4,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Marking and delineating of surfaces

Hands on marking of surface contaminated areas.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,18 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 3,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,5 |
| clerk | 0 |
| worker | 0,8 |
| auxilliary worker | 0 |

### Delivery of working tools and equipments to the working place

Transport of tools and equipments to room.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,1 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 2,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

### Instructions for the decontamination working group

Instucting of decontamination crew, tasks assignment.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,1 | man.hour/m2 |
| Constant unit factor for preparatory and finishing activities | 4 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 3 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Radiation monitoring

### Radiation monitoring of building surfaces

Radiation monitoring of building surfaces by dose measurement equipment

**Input technological parameters**

| Parameter | Value | Dimension |
|---|---|---|
| Consumption unit factor of labour content | 2 | m2/man hour |
| Cost unit factor of monitoring | 5 | €/m2 |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0,25 |
| operator | 1 |
| clerk | 0 |
| worker | 2 |
| auxilliary worker | 0 |

## Finishing activities in individual rooms after the radiation monitoring of building surfaces

### Removal of scaffolding

Hands on removal of scaffolding.Transport of materials from room is included.

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,9 | man.hour/room |
| Constant unit factor for preparatory and finishing activities | 3,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

### Removal of working tools and equipments

Hands on removal of working tools and equipments.Transport of equipment from room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,2 | man.hour/m2 |
| Constant unit factor | 5,5 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

### Cleaning of room

Hands on removal of working tools and equipments.Transport of equipment from room is included.

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Manpower unit factor | 0,15 | man.hour/m2 |
| Constant unit factor | 10 | man.hour |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 2 |
| clerk | 0 |
| worker | 3 |
| auxilliary worker | 0 |

**Time ratio of related non-productive parts to productive part of operation (whole work group**

| Non-productive time part | Ratio to productive time part |
|---|---|
| Entry to Uncontrolled Area | 3,00% |
| Work preparation in Uncontrolled Area | 2,00% |
| Work breaks in Uncontrolled Area | 6,00% |
| Moving within Uncontrolled Area | 2,00% |
| Entry to Controlled Area | 3,00% |
| Work preparation in Controlled Area | 3,00% |
| ALARA breaks | 6,00% |
| Work breaks in Controlled Area | 4,00% |
| Moving within Controlled Area | 4,00% |
| Work finishing in Controlled Area | 3,00% |
| Exit from Controlled Area | 5,00% |
| Exit from Uncontrolled Area | 3,00% |

**Set of calculation procedures for transports**

T1 - Transport of materials by containers to recyclation plant
T2 - Transport of materials by containers to dumping ground
T3 - Transport of ingots to recyclation plant
T4 - Transport of containers to surface repository
T5 - Transport of containers to geological repository

## Transports

### Transport of materials by containers to recyclation plant

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Time of one container (batch) transportation | 1,5 | h |
| Cost unit factor of container transport | 12,5 | €/container |
| Weight of alluminium cables in transport container | 3500 | kg/container, batch respectively |
| Weight of alluminium in transport container | 10000 | kg/container, batch respectively |
| Weight of carbon steel in transport container | 10000 | kg/container, batch respectively |
| Weight of copper cables in transport container | 10000 | kg/container, batch respectively |
| Weight of copper in transport container | 10000 | kg/container, batch respectively |
| Weight of lead in transport container | 10000 | kg/container, batch respectively |
| Weight of other metals in transport container | 10000 | kg/container, batch respectively |
| Weight of stainless steel in transport container | 10000 | kg/container, batch respectively |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,125 |
| clerk | 0 |
| worker | 1,75 |
| auxilliary worker | 1 |

### Transport of materials by containers to dumping ground

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Time of one container (batch) transportation | 1,5 | h |
| Cost unit factor of container transport | 75 | €/container |
| Weight of azbestos in transport batch | 3500 | kg/container, batch respectively |
| Weight of brash waste in transport batch | 3500 | kg/container, batch respectively |
| Weight of concrete in transport batch | 3500 | kg/container, batch respectively |
| Weight of glass wool in transport batch | 1000 | kg/container, batch respectively |
| Weight of graphite in transport batch | 1500 | kg/container, batch respectively |
| Weight of plastic insulation in transport batch | 3500 | kg/container, batch respectively |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,125 |
| clerk | 0 |
| worker | 1,75 |
| auxilliary worker | 1 |

### Transport of ingots to recyclation plant

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Time of one container (batch) transportation | 1,5 | h |
| Cost unit factor of container transport | 12,5 | €/container |
| Weight of carbon steel ingots in transport container | 10000 | kg |
| Weight of stainless steel ingots in transport container | 10000 | kg |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 0 |
| operator | 0,125 |
| clerk | 0 |
| worker | 1,75 |
| auxilliary worker | 1 |

### Transport of containers to surface repository

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological link (0.5 m distance from link) | 1 | mikroGy/h |
| Cost unit factor of container transport to repository | 175 | €/container |
| Time of one container (batch) transportation | 6 | h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 1,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 4,5 |
| auxilliary worker | 0 |

### Transport of containers to geological repository

**Input technological parameters**

| Parameter | Value | Unit |
|---|---|---|
| Dose rate from technological link (0.5 m distance from link) | 0,5 | mikroGy/h |
| Cost unit factor of container transport to repository | 175 | €/container |
| Time of one container (batch) transportation | 10 | h |

**Work group structure**

| Profession | Number of staff |
|---|---|
| manager | 0 |
| senior engineer | 0 |
| engineer | 1,5 |
| operator | 2,5 |
| clerk | 0 |
| worker | 4,5 |
| auxilliary worker | 0 |

**Time ratio of related non-productive parts to productive part of operation (whole work group)**

| Non-productive time part | Ratio to productive time part |
|---|---|
| Entry to Uncontrolled Area | 3,00% |
| Work preparation in Uncontrolled Area | 2,00% |
| Work breaks in Uncontrolled Area | 6,00% |
| Moving within Uncontrolled Area | 2,00% |
| Entry to Controlled Area | 3,00% |
| Work preparation in Controlled Area | 3,00% |
| ALARA breaks | 6,00% |
| Work breaks in Controlled Area | 4,00% |
| Moving within Controlled Area | 4,00% |
| Work finishing in Controlled Area | 3,00% |
| Exit from Controlled Area | 5,00% |
| Exit from Uncontrolled Area | 3,00% |

**Period depended activities**

| Activity according PSL structure | Name of activity | Manpower [man hours] | Working grup | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | auxiliary worker [man] | worker [man] | operator [man] | administrative worker [man] | engineer [man] | senior engineer [man] | manager [man] |
| 01.0103 | Preparation of final decommissioning plan | 18 550 | 0 | 0 | 2 | 3 | 1 | 1 | 0 |
| 01.0104 | Safety and environmental studies, nuclear safety analysis, involving | 4 800 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 01.0201 | License applications and license approvals | 3 600 | 0 | 0 | 2 | 1 | 0 | 1 | 0 |
| 01.0202 | Public consultation and public inquiry | 1 600 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 01.0301 | Radiological surveys for planning and licensing | 3 200 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 01.0401 | Hazardous material surveys and analyses | 4 500 | 0 | 2 | 2 | 1 | 1 | 0 | 0 |
| 01.0501 | Prime contranting selection | 3 000 | 0 | 0 | 1 | 1 | 2 | 1 | 0 |
| 02.0301 | Drainage and drying or blowdown of all systems not in operation | 1 650 | 1 | 2 | 1 | 0 | 1 | 0 | 0 |
| 02.0401 | Removal of system fluids (water, oils, etc.) | 2 000 | 0 | 2 | 1 | 1 | 1 | 0 | 0 |
| 02.0402 | Modification of systems for further use | 3 080 | 1 | 2 | 1 | 0,5 | 1 | 0 | 0 |
| 02.0501 | Isolation of systems out of operation | 1 485 | 0 | 2 | 1 | 0,5 | 1 | 0 | 0 |
| 02.1201 | After shutdown sampling for characterisation of equipment | 700 | 0 | 2 | 1 | 1 | 1 | 0 | 0 |
| 02.1201 | Subgrade soil sampling and monitorong wells to map contamination | 600 | 0 | 2 | 1 | 0 | 1 | 0 | 0 |
| 03.0101 | General site-dismantling equipment | 1 100 | 0 | 0 | 1 | 1 | 2 | 1 | 0 |
| 03.0201 | Equipment for personel and tooling decontamination | 500 | 0 | 0 | 1 | 0,5 | 1 | 0 | 0 |
| 03.0301 | General radiation protection equipment | 810 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 03.0401 | Equipment for the surveillance and maintemance | 600 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 04.0601 | Arrangenments in building objects for supporting D&D | 2 760 | 1 | 2 | 2 | 0 | 1 | 0 | 0 |
| 04.2101 | Characterization of radioactive materials for recycling and reuse | 3 480 | 0 | 2 | 2 | 1 | 1 | 0 | 0 |
| 04.1101 | Procurement of equipment for D&D | 4 800 | 1 | 2 | 2 | 0 | 1 | 0 | 0 |
| 04.2301 | Personnel training, training of new pesonnel | 3 200 | 0 | 0 | 1 | 2 | 1 | 0 | 0 |
| 05.0101 | Analyses for handling, packing, storing of waste | 3 500 | 0 | 1 | 2 | 1 | 1 | 0 | 0 |
| 05.0201 | Analyses for waste transports | 3 355 | 0 | 0 | 2 | 2 | 1 | 0,5 | 0 |
| 05.0301 | Special permits, packing and transport requirements | 2 340 | 0 | 0 | 2 | 1 | 1 | 0,5 | 0 |
| 06.0101 | Site security operation and surveillance | 4 725 | 0 | 0 | 2 | 1 | 1 | 0,5 | 0 |
| 06.0201 | Inspection and maintenance og buildings and systems in operation | 3 900 | 0 | 1 | 2 | 1 | 2 | 0 | 0 |
| 06.0301 | Site keeping | 9 150 | 0 | 2 | 3 | 1 | 1 | 0,5 | 0 |
| 06.0401 | Energy and water | 5 225 | 1 | 2 | 1 | 0 | 1 | 0,5 | 0 |
| 07.0201 | Final cleanup and lendscaping | 24 380 | 2 | 4 | 3 | 1 | 1,5 | 0 | 0 |
| 07.0301 | Independent compliance verification with cleanup | 5 700 | 0 | 1 | 2 | 1 | 1,5 | 0,5 | 0 |
| 08.0101 | Mobilization of construction equipment and facilities | 6 400 | 0 | 1 | 2 | 1 | 1 | 0 | 0 |
| 08.0102 | Mobilisation of personnel | 3 570 | 0 | 0 | 3 | 2 | 1 | 1 | 0 |
| 08.0104 | Construct temporary utilities | 4 750 | 0 | 2 | 1 | 0 | 1 | 1 | 0 |
| 08.0201 | Project manager and staff | 8 880 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 08.0301 | Public relations | 2 400 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 08.0403 | Decommissioning support including chemistry, decontamination | 11 400 | 1 | 2 | 1 | 0 | 1 | 1 | 0 |
| 08.0501 | Health physics | 1 050 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 08.0601 | Removal of temporary facilities | 5 400 | 1 | 2 | 1 | 0 | 1 | 1 | 0 |
| 11.0101 | Implementation of transition plan | 12 060 | 0 | 2 | 3 | 1 | 2 | 1 | 0 |

**Extend of preparation and finishing activities for dismantling**

| Floor | Room | Preparation activities for dismantling | | | | | | | | | | | | Finishing of dismantling | | | | | | | | Number of facilities [pc] | Dimension of rooms [wxlxh] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ra - survey | covering of floor | air-condition | scaffolding | electric connection | marking of cuts | delivery of tools | disconnection | preparation of tools | protective tent | instructions | containers | covering of floor | air-condition | scaffolding | electric connection | protective tent | removal of tools | containers | cleaning | | |
| +24,50 m | 2.02 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 20 | 1,5x6x2,2 |
| | 2.03 | x | | | x | x | x | x | x | x | | x | x | | | x | x | | x | x | x | 29 | 2,2x6,5x2,2 |
| | 2.04 | x | | | | | | | | | | | x | | | | | | | x | x | 5 | 2,3x5x2,2 |
| | 2.05 | x | | | | | | | | | | | | | | | | | | | | 2 | 5,4x7,5x3,2 |
| +21,50 m | 1.01 | x | | | x | x | x | x | x | x | | x | x | | | x | x | | x | x | x | 14 | 5,3x14,3x6,3 |
| | 1.02 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 14 | 1,5x3,1x3 |
| | 1.03 | x | | | | | | | | | | | | | | | | | | | x | 4 | 1,5x2,1x3 |
| | 1.04 | x | | | | | | | | | | | x | | | | | | | x | x | 5 | 4x5x3 |
| | 1.05 | x | | | x | x | x | x | x | x | | x | x | | | x | x | | x | x | x | 11 | 5x4,5x3 |
| | 1.06 | x | | | | | | | | | | | | | | | | | | | | 4 | 3,2x3x3,1 |
| | 1.07 | x | | | | | | | | | | | | | | | | | | | | 4 | 2,5x1,8x3 |
| | 1.08 | x | | | | | | | | | | | | | | | | | | | | 1 | 2,5x2x3 |
| | 1.09 | x | | | x | x | x | x | x | x | | x | x | | | x | x | | x | x | x | 11 | 3,3x3,5x3,1 |
| | 1.11 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 10 | 2,8x3x3,1 |
| | 1.12 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 77 | 10x20x10 |
| | 1.13 | x | | | | | | | | | | | | | | | | | | | | 4 | 3,8x5x1 |
| | 1.14 | x | | | | | | | | | | | | | | | | | | | | 4 | 3x3x7,5 |
| | 2.00 | | | | | | | | | | | | | | | | | | | | | 23 | |
| +17,90 m | 0.02 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 19 | 1,5x2,1x3 |
| | 0.03 | x | | | x | x | x | x | x | x | | x | x | | | x | x | | x | x | x | 10 | 1,6x1,9x3 |
| | 0.04 | x | | | | | | | | | | | x | | | | | | | x | x | 5 | 2x5,1x3,4 |
| | 0.05 | x | | | | | | | | | | | x | | | | | | | x | x | 6 | 2x3,4x3,4 |
| | 0.06 | x | | | x | | | | | | | | x | | | x | | | | x | x | 8 | 1x1,8x3,5 |
| | 0.07 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 27 | 1x8,1x3 |
| | 0.08 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 79 | 4x7x3 |
| | 0.09 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 129 | 4,9x11,8x3,6 |
| | 0.11 | x | | | | | | | | | | | | | | | | | | | | 2 | 2,2x3,7x3,1 |
| | 0.13 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 13 | 0,9x0,9x3,1 |
| | 0.14 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | 24 | 3,3x5,8x3,1 |

***LEGEND:***

**Preparation activities for dismantling**

| | |
|---|---|
| **ra - survey** | Radiological survey prior dismantling |
| **covering of floor** | Covering of floor by plastic foil |
| **air-condition** | Installation of temporary air-conditioning |
| **scaffolding** | Installation of scaffolding |
| **electric connection** | Installation of temporary electric connection |
| **marking of cuts** | Marking of cuts and surfaces |
| **delivery of tools** | Delivery of working tools and equipments |
| **disconnection** | Disconnection and revision of decommissioned technological equipment |
| **preparation of tools** | Preparation of working tools and equipments |
| **protective tent** | Installation of protective tent |
| **instructions** | Working group instructions |
| **containers** | Preparation of transport containers |

**Finishing of dismantling**

| | |
|---|---|
| **covering of floor** | Removal of plastic foil |
| **air-condition** | Removal of temporary air-conditioning |
| **scaffolding** | Dismatling and removal of scaffolding |
| **electric connection** | Removal of temporary electric connection |
| **protective tent** | Removal of protective tent |
| **removal of tools** | Removal of working tools and equipments |
| **containers** | Removal of transport containers |
| **cleaning** | Cleaning of room |

Contaminated equipment

# Annex 3

# Limits for unconditional release of materials to environment and limits for disposal of RAW of LILW repository to Mochovce Slovak Republic

## Annex 3 Radiological limits for unconditional release of materials to environment implemented in OMEGA code

Radioactive contaminated materials can be released into environment if average effective dose of individuals in critical group of population, caused by their releasing into environment, does not exceed in any year 10 μSv and also collective effective dose does not exceed 1 manSv.

The limit values are defined for release of radioactive materials into environment for individual classes of radio-toxicity of nuclides. If activity of released contaminated materials is lower as the values for releasing defined in the Table A3-1, than above presented individual and collective dose criteria are met.

**Table A3-1 Limit values for unconditional release of materials and radio-toxicity categories for individual radio-nuclides**

| Location of radioactive contamination | Radio-toxicity category | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Materials, solid materials released into environment | Releasing levels of mass activity of radioactive contamination [kBq.kg$^{-1}$] | | | | |
| | 0,3 | 3 | 30 | 300 | 3000 |
| Surfaces of materials and objects removed into ENV | Releasing levels of surface activity of surface radioactive contamination [kBq.m$^{-2}$] | | | | |
| | 3 | 30 | 300 | 3000 | 3.10$^4$ |

**Categories of radio-toxicity and assigned radio nuclides**

| Category | Radionuclide |
|---|---|
| 1 | Na-22, Na-24, Mn-54, Co-60, Zn-65, Nb-94, Ag-110, Sb-124, Cs-134, Cs-137, Eu-152, Pb-210, Ra-226, Ra-228, Th-228, Th-232, U-234, U-235, U-238, Np-237, Pu-239, Pu-240, Am-241, Cm-244 |
| 2 | Co-58, Fe-59, Sr-90, Ru-106, In-111, I-131, Ir-192, Au-198, Po-210 |
| 3 | Cr-51, Co-57, Tc-99, I-123, I-125, I-129, Ce-144, Tl-201, Pu-241 |
| 4 | C-14, P-32, Cl-36, Fe-55, Sr-89,Y-90, Tc-99, Cd-109 |
| 5 | H-3, S-35, Ca-45, Ni-63, Pm-147 |

Mass activity of materials released into environment is determined as an average value in the volume, which weight is not larger than 1000 kg, if activity is distributed evenly and which weight is not larger than 300 kg if activity is not distributed evenly.

Similarly surface activity of materials is determined as the average value at the area not larger than 10 000 cm$^2$ (evenly distributed activity) or better on the surface less than 1 000 cm$^2$ (not evenly distributed activity).

If the released material is mass contaminated and surface contaminated as well, it is necessary that both limits for unconditional release be met.

**Radiological limits for disposal of RAW at LILW Mochovce repository, as implemented in OMEGA code**

Limits are stipulated for authorized disposal package, which is the fibre reinforced concrete container (FRC). This container is made of concrete reinforced by strips of stainless steel homogenously incorporated within the container walls. It has cubical shape with side of 1,7 m, inner useful volume 3,1 $m^3$ and useful load of 10 tones (it includes treated radioactive waste and cement grout for fixing and immobilization of waste in FRC). Radiological limits are defined for volume activity of individual monitored nuclide in homogenous volume of disposal container. Based on this volume limits, weight limits are derived within OMEGA code taking into account type of waste, its maximal amount in container and its specific mass. These limits are shown on the Table A3-2. Besides these limits, another limit condition must be met, which define that the sum of ratios of individual disposed activity per nuclide to their limits must be lower maximally equal to 1:

$$\sum_i \frac{A_{i\,disposed}}{A_{i\,\lim it}} \leq 1$$

Where: $A_{i\,disposed}$ – activity of $i^{th}$ - nuclide placed in disposal container (volume or mass activity)
$A_{i\,limit}$ - limit activity of $i^{th}$ - nuclide (volume or mass activity)

Table A3-2 LILW disposal limits

| nuclides | Limit values of volume material activity for disposal in surface repository in Bq/$m^3$ | Limit values of weight material activity for disposal in surface repository in Bq/kg derived from volume limits | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | material | | | | | | | | | | |
| | | asbestos | concrete | small scrap | graphite | aluminium | else non-ferrous metals | metal | copper | lead | plastic | glass wool |
| Am-241 | 2,24E+08 | 1,29E+05 | 1,18E+05 | 2,57E+06 | 1,16E+05 | 9,51E+04 | 1,56E+05 | 1,48E+05 | 1,56E+05 | 1,54E+05 | 1,74E+06 | 1,05E+06 |
| C-14 | 1,35E+10 | 7,76E+06 | 7,10E+06 | 1,55E+08 | 6,98E+06 | 5,74E+06 | 9,40E+06 | 8,90E+06 | 9,40E+06 | 9,26E+06 | 1,05E+08 | 6,33E+07 |
| Ca-41 | 1,70E+10 | 9,76E+06 | 8,93E+06 | 1,95E+08 | 8,78E+06 | 7,22E+06 | 1,18E+07 | 1,12E+07 | 1,18E+07 | 1,17E+07 | 1,32E+08 | 7,96E+07 |
| Cs-135 | 1,43E+10 | 8,20E+06 | 7,51E+06 | 1,64E+08 | 7,38E+06 | 6,07E+06 | 9,96E+06 | 9,43E+06 | 9,96E+06 | 9,81E+06 | 1,11E+08 | 6,69E+07 |
| Cs-137 | 1,01E+13 | 5,80E+09 | 5,31E+09 | 1,16E+11 | 5,22E+09 | 4,29E+09 | 7,04E+09 | 6,66E+09 | 7,04E+09 | 6,93E+09 | 7,83E+10 | 4,73E+10 |
| I-129 | 1,91E+07 | 1,10E+04 | 1,00E+04 | 2,19E+05 | 9,87E+03 | 8,11E+03 | 1,33E+04 | 1,26E+04 | 1,33E+04 | 1,31E+04 | 1,48E+05 | 8,94E+04 |
| Mo-93 | 1,70E+10 | 9,76E+06 | 8,93E+06 | 1,95E+08 | 8,78E+06 | 7,22E+06 | 1,18E+07 | 1,12E+07 | 1,18E+07 | 1,17E+07 | 1,32E+08 | 7,96E+07 |
| Nb-94 | 4,57E+07 | 2,63E+04 | 2,41E+04 | 5,26E+05 | 2,37E+04 | 1,95E+04 | 3,18E+04 | 3,01E+04 | 3,18E+04 | 3,13E+04 | 3,55E+05 | 2,15E+05 |
| Ni-59 | 7,35E+11 | 4,22E+06 | 3,86E+06 | 8,44E+07 | 3,80E+06 | 3,12E+06 | 5,12E+08 | 4,85E+08 | 5,12E+08 | 5,04E+08 | 5,70E+07 | 3,44E+07 |
| Ni-63 | 1,14E+13 | 6,54E+09 | 5,98E+09 | 1,31E+11 | 5,88E+09 | 4,84E+09 | 7,94E+09 | 7,52E+09 | 7,94E+09 | 7,82E+09 | 8,83E+10 | 5,33E+10 |
| Pd-107 | 1,84E+12 | 1,06E+09 | 9,66E+08 | 2,11E+10 | 9,50E+08 | 7,81E+08 | 1,28E+09 | 1,21E+09 | 1,28E+09 | 1,26E+09 | 1,43E+10 | 8,61E+09 |
| Pu-238 | 4,57E+09 | 2,63E+06 | 2,41E+06 | 5,26E+07 | 2,37E+06 | 1,95E+06 | 3,18E+06 | 3,01E+06 | 3,18E+06 | 3,13E+06 | 3,55E+07 | 2,15E+07 |
| Pu-239 | 8,24E+07 | 4,72E+04 | 4,32E+04 | 9,44E+05 | 4,25E+04 | 3,49E+04 | 5,74E+04 | 5,43E+04 | 5,74E+04 | 5,65E+04 | 6,38E+05 | 3,85E+05 |
| Se-79 | 3,44E+10 | 1,98E+07 | 1,81E+07 | 3,96E+08 | 1,78E+07 | 1,47E+07 | 2,40E+07 | 2,27E+07 | 2,40E+07 | 2,36E+07 | 2,68E+08 | 1,62E+08 |
| Sm-151 | 1,14E+14 | 6,54E+10 | 5,98E+10 | 1,31E+12 | 5,88E+10 | 4,84E+10 | 7,94E+10 | 7,52E+10 | 7,94E+10 | 7,82E+10 | 8,83E+11 | 5,33E+11 |
| Sn-126 | 2,93E+07 | 1,68E+04 | 1,54E+04 | 3,36E+05 | 1,51E+04 | 1,24E+04 | 2,04E+04 | 1,93E+04 | 2,04E+04 | 2,01E+04 | 2,27E+05 | 1,37E+05 |
| Sr-90 | 1,90E+13 | 1,09E+10 | 9,98E+09 | 2,18E+11 | 9,82E+09 | 8,07E+09 | 1,32E+10 | 1,25E+10 | 1,32E+10 | 1,30E+10 | 1,47E+11 | 8,90E+10 |
| Tc-99 | 4,48E+09 | 2,57E+06 | 2,36E+06 | 5,15E+07 | 2,32E+06 | 1,90E+06 | 3,12E+06 | 2,95E+06 | 3,12E+06 | 3,07E+06 | 3,48E+07 | 2,10E+07 |
| Zr-93 | 2,28E+11 | 1,31E+08 | 1,20E+08 | 2,62E+09 | 1,18E+08 | 9,68E+07 | 1,59E+08 | 1,50E+08 | 1,59E+08 | 1,56E+08 | 1,77E+09 | 1,07E+09 |

# Annex 4

# Lists of calculated decommissioning activities and results of calculation, according the PSL structure

Lists of calculated decommissioning activities and results of calculation, according the PSL structure

| Decommissioning activity | PSL Category | Scenario S1 Manpower [man-hours] | Scenario S2 Manpower [man-hours] | Scenario S3 Manpower [man-hours] | Scenario S4 Manpower [man-hours] |
|---|---|---|---|---|---|
| | | 233 659,86 | 231 520,12 | 233 528,24 | 230 369,19 |
| Preparation of final decommissioning plan | 01.0103 | 18 550,00 | 18 550,00 | 18 550,00 | 18 550,00 |
| Safety and environmental studies, nuclear safety analysis, involving | 01.0104 | 4 800,00 | 4 800,00 | 4 800,00 | 4 800,00 |
| License applications and license approvals | 01.0201 | 3 600,00 | 3 600,00 | 3 600,00 | 3 600,00 |
| Public consultation and public inquiry | 01.0202 | 1 600,00 | 1 600,00 | 1 600,00 | 1 600,00 |
| Radiological surveys for planning and licensing | 01.0301 | 3 200,00 | 3 200,00 | 3 200,00 | 3 200,00 |
| Hazardous material surveys and analyses | 01.0401 | 4 500,00 | 4 500,00 | 4 500,00 | 4 500,00 |
| Prime contranting selection | 01.0501 | 3 000,00 | 3 000,00 | 3 000,00 | 3 000,00 |
| Drainage and drying or blowdown of all systems not in operation | 02.0301 | 1 650,00 | 1 650,00 | 1 650,00 | 1 650,00 |
| Removal of system fluids (water, oils, etc.) | 02.0401 | 2 000,00 | 2 000,00 | 2 000,00 | 2 000,00 |
| Modification of systems for further use | 02.0402 | 3 080,00 | 3 080,00 | 3 080,00 | 3 080,00 |
| Isolation of systems out of operation | 02.0501 | 1 485,00 | 1 485,00 | 1 485,00 | 1 485,00 |
| After shutdown sampling for characterisation of equipment | 02.1201 | 700,00 | 700,00 | 700,00 | 700,00 |
| Subgrade soil sampling and monitorong wells to map contamination | 02.1201 | 600,00 | 600,00 | 600,00 | 600,00 |
| General site-dismantling equipment | 03.0101 | 1 100,00 | 1 100,00 | 1 100,00 | 1 100,00 |
| Equipment for personel and tooling decontamination | 03.0201 | 500,00 | 500,00 | 500,00 | 500,00 |
| General radiation protection equipment | 03.0301 | 810,00 | 810,00 | 810,00 | 810,00 |
| Equipment for the surveillance and maintemance | 03.0401 | 600,00 | 600,00 | 600,00 | 600,00 |
| Arrangenments in building objects for supporting D&D | 04.0601 | 2 750,00 | 2 750,00 | 2 750,00 | 2 750,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Covering of floor by protective foil | 04.1001 | 270,00 | 270,00 | 270,00 | 270,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Installation of temporary air-conditioning | 04.1001 | 144,00 | 144,00 | 144,00 | 144,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Marking of cuts and areas | 04.1001 | 202,50 | 202,50 | 202,50 | 202,50 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Delivery of working tools and equipment | 04.1001 | 90,00 | 90,00 | 90,00 | 90,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Preparation of transport containers | 04.1001 | 157,50 | 157,50 | 157,50 | 157,50 |
| Dismantling - Removal of fuel handling equipment - Dismantling of fuel handling equipment | 04.1001 | 628,85 | 628,85 | 628,85 | 628,85 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of protective foils | 04.1001 | 225,00 | 225,00 | 225,00 | 225,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of temporary air-conditioning | 04.1001 | 126,00 | 126,00 | 126,00 | 126,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of working tools and equipment | 04.1001 | 153,00 | 153,00 | 153,00 | 153,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of transport containers | 04.1001 | 67,50 | 67,50 | 67,50 | 67,50 |
| Dismantling - Removal of fuel handling equipment - Finishing - Cleaning of room | 04.1001 | 126,00 | 126,00 | 126,00 | 126,00 |
| Procurement of equipment for D&D | 04.1102 | 2 760,00 | 2 760,00 | 2 760,00 | 2 760,00 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Survey of radiological situation | 04.1302 | 207,96 | 207,96 | 207,96 | 207,96 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Covering of floor by protective foil | 04.1302 | 303,53 | 303,53 | 303,53 | 303,53 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary air-conditioning | 04.1302 | 176,40 | 176,40 | 176,40 | 176,40 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of scaffolding | 04.1302 | 310,05 | 310,05 | 310,05 | 310,05 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary electric and other media connections | 04.1302 | 110,25 | 110,25 | 110,25 | 110,25 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Marking of cuts and areas | 04.1302 | 179,01 | 179,01 | 179,01 | 179,01 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Delivery of working tools and equipment | 04.1302 | 184,46 | 184,46 | 184,46 | 184,46 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Disconnection and revision of dismantled technological equipment | 04.1302 | 161,05 | 161,05 | 161,05 | 161,05 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of working tools and equipment | 04.1302 | 269,70 | 269,70 | 269,70 | 269,70 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of protective tent | 04.1302 | 177,16 | 177,16 | 177,16 | 177,16 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Working group instructions | 04.1302 | 180,32 | 180,32 | 180,32 | 180,32 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of transport containers | 04.1302 | 12,01 | 12,01 | 12,01 | 12,01 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Dismantling | 04.1302 | 1 534,85 | 1 534,85 | 1 534,85 | 1 534,85 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective foils | 04.1302 | 195,04 | 195,04 | 195,04 | 195,04 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary air-conditioning | 04.1302 | 124,95 | 124,95 | 124,95 | 124,95 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of scaffolding | 04.1302 | 224,69 | 224,69 | 224,69 | 224,69 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary electric and other media connections | 04.1302 | 198,45 | 198,45 | 198,45 | 198,45 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective tent | 04.1302 | 142,12 | 142,12 | 142,12 | 142,12 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of working tools and equipment | 04.1302 | 134,91 | 134,91 | 134,91 | 134,91 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of transport containers | 04.1302 | 60,35 | 60,35 | 60,35 | 60,35 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Cleaning of room | 04.1302 | 185,89 | 185,89 | 185,89 | 185,89 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Covering of floor by protective foil | 04.1501 | 252,39 | 252,39 | 252,39 | 252,39 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of scaffolding | 04.1501 | 232,07 | 232,07 | 232,07 | 232,07 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary electric and other media connections | 04.1501 | 80,85 | 80,85 | 80,85 | 80,85 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary air-conditioning | 04.1501 | 123,48 | 123,48 | 123,48 | 123,48 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of working tools and equipment | 04.1501 | 155,00 | 155,00 | 155,00 | 155,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Dismantling | 04.1501 | 713,59 | 713,59 | 713,59 | 713,59 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of protective foils | 04.1501 | 72,54 | 72,54 | 72,54 | 72,54 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary air-conditioning | 04.1501 | 49,98 | 49,98 | 49,98 | 49,98 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of scaffolding | 04.1501 | 61,88 | 61,88 | 61,88 | 61,88 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary electric and other media connections | 04.1501 | 66,15 | 66,15 | 66,15 | 66,15 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of working tools and equipment | 04.1501 | 38,61 | 38,61 | 38,61 | 38,61 |

| Decommissioning activity | PSL Category | Scenario S1 Manpower [man-hours] | Scenario S2 Manpower [man-hours] | Scenario S3 Manpower [man-hours] | Scenario S4 Manpower [man-hours] |
|---|---|---|---|---|---|
| | | 233 659,86 | 231 520,12 | 233 528,24 | 230 369,19 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Cleaning of room | 04.1501 | 81,08 | 81,08 | 81,08 | 81,08 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 317,52 | 317,52 | 317,52 | 317,52 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 55,70 | 55,70 | 55,70 | 55,70 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 132,30 | 132,30 | 132,30 | 132,30 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of scaffolding | 04.1801 | 20,51 | 20,51 | 20,51 | 20,51 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of protective tent | 04.1801 | 257,46 | 257,46 | 257,46 | 257,46 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 153,47 | 153,47 | 153,47 | 153,47 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 105,84 | 105,84 | 105,84 | 105,84 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 226,50 | 226,50 | 226,50 | 226,50 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Working group instructions | 04.1801 | 183,90 | 183,90 | 183,90 | 183,90 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of transport containers for RAW | 04.1801 | 262,21 | 262,21 | 262,21 | 262,21 |
| Dismantling - Building decontamination - Mechanical decontamination - Mechanical decontamination | 04.1801 | 2 315,37 | 2 315,37 | 2 315,37 | 2 315,37 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 140,24 | 140,24 | 140,24 | 140,24 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of protective tent | 04.1801 | 214,86 | 214,86 | 214,86 | 214,86 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of scaffolding | 04.1801 | 17,38 | 17,38 | 17,38 | 17,38 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Cleaning of room | 04.1801 | 310,12 | 310,12 | 310,12 | 310,12 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 92,61 | 92,61 | 92,61 | 92,61 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 92,61 | 92,61 | 92,61 | 92,61 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of transport containers for RAW | 04.1801 | 786,62 | 786,62 | 786,62 | 786,62 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 282,24 | 282,24 | 282,24 | 105,84 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 415,61 | 415,61 | 415,61 | 133,59 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 117,60 | 117,60 | 117,60 | 44,10 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of protective tent | 04.1801 | 237,50 | 237,50 | 237,50 | 74,45 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 140,54 | 140,54 | 140,54 | 45,74 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 94,08 | 94,08 | 94,08 | 29,40 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 210,39 | 210,39 | 210,39 | 58,19 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Working group instructions | 04.1801 | 169,64 | 169,64 | 169,64 | 47,86 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of transport containers for liquid RAW | 04.1801 | 27,74 | 27,74 | 27,74 | 6,59 |
| Dismantling - Building decontamination - Chemical decontamination - Chemical decontamination | 04.1801 | 239,73 | 239,73 | 239,73 | 239,73 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 128,78 | 128,78 | 128,78 | 128,78 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of protective tent | 04.1801 | 196,75 | 196,75 | 196,75 | 196,75 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Cleaning of room | 04.1801 | 281,42 | 281,42 | 281,42 | 281,42 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 82,32 | 82,32 | 82,32 | 82,32 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 82,32 | 82,32 | 82,32 | 82,32 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of transport containers for liquid RAW | 04.1801 | 83,20 | 83,20 | 83,20 | 83,20 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Covering of floor by protective foil | 04.1802 | 270,00 | 270,00 | 270,00 | 270,00 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of working tools and equipment | 04.1802 | 144,00 | 144,00 | 144,00 | 144,00 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of transport containers for liquid RAW | 04.1802 | 202,50 | 202,50 | 202,50 | 202,50 |
| Dismantling - Removal of embedded pipes in buildings - Removal of embedded pipes in buildings | 04.1802 | 301,29 | 301,29 | 301,29 | 301,29 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of working tools and equipment | 04.1802 | 225,00 | 225,00 | 225,00 | 225,00 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of protective foil | 04.1802 | 112,50 | 112,50 | 112,50 | 112,50 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of transport containers for RAW | 04.1802 | 135,00 | 135,00 | 135,00 | 135,00 |
| Dismantling - Final radioactivity survey - Preparatory - Identification of areas for radiation monitoring | 04.2001 | 373,75 | 373,75 | 373,75 | 373,75 |
| Dismantling - Final radioactivity survey - Preparatory - Installation of scaffolding | 04.2001 | 138,24 | 138,24 | 138,24 | 138,24 |
| Dismantling - Final radioactivity survey - Preparatory - Preparation of working tools and equipment for monitoring | 04.2001 | 189,16 | 189,16 | 189,16 | 189,16 |
| Dismantling - Final radioactivity survey - Preparatory - Working group instructions | 04.2001 | 294,53 | 294,53 | 294,53 | 294,53 |
| Dismantling - Final radioactivity survey - Preparatory - Other Preparatory | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Final radioactivity survey - Realisation of radiation monitoring | 04.2001 | 2 857,56 | 2 857,56 | 2 857,56 | 2 857,56 |
| Dismantling - Final radioactivity survey - Finishing - Removal of scaffolding | 04.2001 | 115,21 | 115,21 | 115,21 | 115,21 |
| Dismantling - Final radioactivity survey - Finishing - Removal of working tools and equipment | 04.2001 | 266,60 | 266,60 | 266,60 | 266,60 |
| Dismantling - Final radioactivity survey - Finishing - Cleaning of room | 04.2001 | 379,40 | 379,40 | 379,40 | 379,40 |
| Dismantling - Final radioactivity survey - Finishing - Other Finishing | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Characterization of radioactive materials for recycling and reuse | 04.2101 | 3 480,00 | 3 480,00 | 3 480,00 | 3 480,00 |
| Dismantling - Decontamination for recycling and reuse - Sorting of metal materials before fragmentation (according to surface contamination) | 04.2201 | 440,36 | 440,36 | 440,36 | 440,36 |
| Dismantling - Decontamination for recycling and reuse - Sorting of non-metal solid materials before fragmentation (according to surface contamination) | 04.2201 | 15,36 | 15,36 | 15,36 | 15,36 |
| Dismantling - Decontamination for recycling and reuse - Sorting of cables | 04.2201 | 1,15 | 1,15 | 1,15 | 1,15 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of steel | 04.2201 | 56,23 | 31,41 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of steel | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Recyclation of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of non-iron metals | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of iron metals in drums before release into environment | 04.2201 | 366,00 | 366,00 | 354,38 | 354,38 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of ingots before release into environment | 04.2201 | 158,06 | 0,00 | 151,01 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-iron metals in drums before release into environment | 04.2201 | 6,50 | 6,50 | 6,50 | 6,50 |

| Decommissioning activity | PSL Category | Scenario S1 Manpower [man-hours] | Scenario S2 Manpower [man-hours] | Scenario S3 Manpower [man-hours] | Scenario S4 Manpower [man-hours] |
|---|---|---|---|---|---|
| | | 233 659,86 | 231 520,12 | 233 528,24 | 230 369,19 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-metal materials in drums before release into environment | 04.2201 | 40,66 | 40,66 | 40,66 | 40,66 |
| Dismantling - Activities after post-dismantling decontamination - Transport of post-dismantling decontaminated steel fragments into enviroment | 04.2201 | 161,09 | 161,09 | 160,21 | 160,21 |
| Dismantling - Activities after post-dismantling decontamination - Transport of ingots after melting into enviroment | 04.2201 | 12,77 | 0,00 | 12,20 | 0,00 |
| Personnel training, training of new pesonnel | 04.2301 | 3 200,00 | 3 200,00 | 3 200,00 | 3 200,00 |
| Analyses for handling, packing, storing of waste | 05.0101 | 3 500,00 | 3 500,00 | 3 500,00 | 3 500,00 |
| Analyses for waste transports | 05.0201 | 3 355,00 | 3 355,00 | 3 355,00 | 3 355,00 |
| Special permits, packing and transport requirements | 05.0301 | 2 340,00 | 2 340,00 | 2 340,00 | 2 340,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron materials (up to 3000 Bq/m2 contamination) | 05.1201 | 1 737,36 | 1 737,36 | 1 737,36 | 1 737,36 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron metals (over 3000 Bq/m2 contamination) | 05.1201 | 1 381,70 | 1 381,70 | 1 381,70 | 1 381,70 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of non-iron metals | 05.1201 | 37,94 | 37,94 | 37,94 | 37,94 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Low pressure compaction | 05.1201 | 4,28 | 4,22 | 4,27 | 4,22 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - High pressure compaction | 05.1201 | 2,73 | 91,28 | 12,11 | 96,71 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Melting of metals | 05.1201 | 2 528,93 | 0,00 | 2 416,11 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Evaporation | 05.1201 | 14,47 | 8,08 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of concentrates | 05.1201 | 6,08 | 3,40 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of ionexchangers | 05.1201 | 0,11 | 0,06 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Incineration | 05.1201 | 62,00 | 49,20 | 61,17 | 49,06 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of ash | 05.1201 | 0,84 | 0,67 | 0,83 | 0,67 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of cables | 05.1201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of RAW into drums | 05.1201 | 12,27 | 12,27 | 13,00 | 13,00 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of non-radioactive metal materials from dismantling | 05.1202 | 497,54 | 497,54 | 497,54 | 497,54 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of cables | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of others wastes from dismantling | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for survey repository | 05.1301 | 545,79 | 678,27 | 563,41 | 690,56 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to survey repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,20 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for deep geological repository | 05.1301 | 0,20 | 0,20 | 0,20 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to deep geological repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into survey repository | 05.1401 | 43,60 | 54,19 | 45,01 | 55,17 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into survey repository | 05.1401 | 1 046,45 | 1 300,44 | 1 080,23 | 1 324,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into deep geological repository | 05.1401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into deep geological repository | 05.1401 | 0,34 | 0,34 | 0,34 | 0,34 |
| Waste processing, storage and disposal - Transport of non-radioactive decommissioning waste - Transport non-radioactive waste to dumping ground | 05.1402 | 102,12 | 102,12 | 102,12 | 102,12 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into survey repository | 05.1603 | 500,14 | 621,53 | 516,29 | 632,79 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into deep geological repository repository | 05.1603 | 0,10 | 0,10 | 0,10 | 0,10 |
| Site security operation and surveillance | 06.0101 | 4 725,00 | 4 725,00 | 4 725,00 | 4 725,00 |
| Inspection and maintenance og buildings and systems in operation | 06.0201 | 3 900,00 | 3 900,00 | 3 900,00 | 3 900,00 |
| Site keeping | 06.0301 | 9 150,00 | 9 150,00 | 9 150,00 | 9 150,00 |
| Energy and water | 06.0401 | 5 225,00 | 5 225,00 | 5 225,00 | 5 225,00 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Demolation of buildings | 07.0102 | 20 867,24 | 20 867,24 | 20 867,24 | 20 867,24 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Recyclation of building materials | 07.0102 | 1 576,87 | 1 576,87 | 1 576,87 | 1 576,87 |
| Final cleanup and lendscaping | 07.0201 | 2 231,66 | 2 231,66 | 2 231,66 | 2 231,66 |
| Independent compliance verification with cleanup | 07.0301 | 5 700,00 | 5 700,00 | 5 700,00 | 5 700,00 |
| Mobilization of construction equipment and facilities | 08.0101 | 6 400,00 | 6 400,00 | 6 400,00 | 6 400,00 |
| Mobilisation of personnel | 08.0102 | 3 570,00 | 3 570,00 | 3 570,00 | 3 570,00 |
| Construct temporary utilities | 08.0104 | 4 750,00 | 4 750,00 | 4 750,00 | 4 750,00 |
| Project manager and staff | 08.0201 | 26 640,00 | 26 640,00 | 26 640,00 | 26 640,00 |
| Public relations | 08.0301 | 2 400,00 | 2 400,00 | 2 400,00 | 2 400,00 |
| Decommissioning support including chemistry, decontamination | 08.0403 | 11 400,00 | 11 400,00 | 11 400,00 | 11 400,00 |
| Health physics | 08.0501 | 1 050,00 | 1 050,00 | 1 050,00 | 1 050,00 |
| Removal of temporary facilities | 08.0601 | 5 400,00 | 5 400,00 | 5 400,00 | 5 400,00 |
| Implementation of transition plan | 11.0101 | 12 060,00 | 12 060,00 | 12 060,00 | 12 060,00 |

Lists of calculated decommissioning activities and results of calculation, according the PSL structure

| Decommissioning activity | PSL Category | Scenario S1 Exposure [man-microSv] | Scenario S2 Exposure [man-microSv] | Scenario S3 Exposure [man-microSv] | Scenario S4 Exposure [man-microSv] |
|---|---|---|---|---|---|
| | | 74 547,94 | 69 671,56 | 74 267,69 | 68 790,15 |
| Preparation of final decommissioning plan | 01.0103 | 0,00 | 0,00 | 0,00 | 0,00 |
| Safety and environmental studies, nuclear safety analysis, involving | 01.0104 | 0,00 | 0,00 | 0,00 | 0,00 |
| License applications and license approvals | 01.0201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Public consultation and public inquiry | 01.0202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Radiological surveys for planning and licensing | 01.0301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Hazardous material surveys and analyses | 01.0401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Prime contranting selection | 01.0501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Drainage and drying or blowdown of all systems not in operation | 02.0301 | 2 508,00 | 2 508,00 | 2 508,00 | 2 508,00 |
| Removal of system fluids (water, oils, etc.) | 02.0401 | 2 640,00 | 2 640,00 | 2 640,00 | 2 640,00 |
| Modification of systems for further use | 02.0402 | 4 368,00 | 4 368,00 | 4 368,00 | 4 368,00 |
| Isolation of systems out of operation | 02.0501 | 0,00 | 0,00 | 0,00 | 0,00 |
| After shutdown sampling for characterisation of equipment | 02.1201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Subgrade soil sampling and monitorong wells to map contamination | 02.1201 | 0,00 | 0,00 | 0,00 | 0,00 |
| General site-dismantling equipment | 03.0101 | 1 540,00 | 1 540,00 | 1 540,00 | 1 540,00 |
| Equipment for personel and tooling decontamination | 03.0201 | 560,00 | 560,00 | 560,00 | 560,00 |
| General radiation protection equipment | 03.0301 | 918,00 | 918,00 | 918,00 | 918,00 |
| Equipment for the surveillance and maintemance | 03.0401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Arrangenments in building objects for supporting D&D | 04.0601 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Covering of floor by protective foil | 04.1001 | 420,00 | 420,00 | 420,00 | 420,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Installation of temporary air-conditioning | 04.1001 | 214,40 | 214,40 | 214,40 | 214,40 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Marking of cuts and areas | 04.1001 | 315,00 | 315,00 | 315,00 | 315,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Delivery of working tools and equipment | 04.1001 | 140,00 | 140,00 | 140,00 | 140,00 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Preparation of transport containers | 04.1001 | 245,00 | 245,00 | 245,00 | 245,00 |
| Dismantling - Removal of fuel handling equipment - Dismantling of fuel handling equipment | 04.1001 | 527,99 | 527,99 | 527,91 | 527,84 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of protective foils | 04.1001 | 350,00 | 350,00 | 350,00 | 350,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of temporary air-conditioning | 04.1001 | 196,00 | 196,00 | 196,00 | 196,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of working tools and equipment | 04.1001 | 238,00 | 238,00 | 238,00 | 238,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of transport containers | 04.1001 | 105,00 | 105,00 | 105,00 | 105,00 |
| Dismantling - Removal of fuel handling equipment - Finishing - Cleaning of room | 04.1001 | 196,00 | 196,00 | 196,00 | 196,00 |
| Procurement of equipment for D&D | 04.1102 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Survey of radiological situation | 04.1302 | 278,99 | 278,99 | 278,91 | 278,99 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Covering of floor by protective foil | 04.1302 | 315,63 | 315,63 | 315,60 | 315,63 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary air-conditioning | 04.1302 | 188,67 | 188,67 | 188,65 | 188,67 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of scaffolding | 04.1302 | 319,93 | 319,93 | 319,89 | 319,93 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary electric and other media connections | 04.1302 | 114,64 | 114,64 | 114,63 | 114,64 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Marking of cuts and areas | 04.1302 | 174,79 | 174,79 | 174,77 | 174,79 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Delivery of working tools and equipment | 04.1302 | 187,37 | 187,37 | 187,35 | 187,37 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Disconnection and revision of dismantled technological equipment | 04.1302 | 163,34 | 163,34 | 163,32 | 163,34 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of working tools and equipment | 04.1302 | 271,55 | 271,55 | 271,53 | 271,55 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of protective tent | 04.1302 | 183,58 | 183,58 | 183,56 | 183,58 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Working group instructions | 04.1302 | 182,73 | 182,73 | 182,71 | 182,73 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of transport containers | 04.1302 | 11,61 | 11,61 | 11,61 | 11,61 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Dismantling | 04.1302 | 14 700,17 | 14 700,17 | 14 695,23 | 14 690,29 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective foils | 04.1302 | 145,55 | 145,55 | 145,55 | 145,55 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary air-conditioning | 04.1302 | 93,50 | 93,50 | 93,49 | 93,50 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of scaffolding | 04.1302 | 167,26 | 167,26 | 167,25 | 167,26 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary electric and other media connections | 04.1302 | 147,90 | 147,90 | 147,90 | 147,90 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective tent | 04.1302 | 105,95 | 105,95 | 105,95 | 105,95 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of working tools and equipment | 04.1302 | 100,23 | 100,23 | 100,23 | 100,23 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of transport containers | 04.1302 | 44,54 | 44,54 | 44,54 | 44,54 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Cleaning of room | 04.1302 | 138,19 | 138,19 | 138,19 | 138,19 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Covering of floor by protective foil | 04.1501 | 260,45 | 260,45 | 260,42 | 260,45 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of scaffolding | 04.1501 | 236,36 | 236,36 | 236,34 | 236,36 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary electric and other media connections | 04.1501 | 83,85 | 83,85 | 83,84 | 83,85 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary air-conditioning | 04.1501 | 131,28 | 131,28 | 131,27 | 131,28 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of working tools and equipment | 04.1501 | 156,77 | 156,77 | 156,75 | 156,77 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Dismantling | 04.1501 | 540,53 | 540,53 | 540,46 | 540,40 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of protective foils | 04.1501 | 54,93 | 54,93 | 54,92 | 54,93 |

| Decommissioning activity | PSL Category | Scenario S1 Exposure [man-microSv] | Scenario S2 Exposure [man-microSv] | Scenario S3 Exposure [man-microSv] | Scenario S4 Exposure [man-microSv] |
|---|---|---|---|---|---|
| | | 74 547,94 | 69 671,56 | 74 267,69 | 68 790,15 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary air-conditioning | 04.1501 | 37,84 | 37,84 | 37,84 | 37,84 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of scaffolding | 04.1501 | 46,85 | 46,85 | 46,85 | 46,85 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary electric and other media connections | 04.1501 | 50,09 | 50,09 | 50,09 | 50,09 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of working tools and equipment | 04.1501 | 29,24 | 29,24 | 29,23 | 29,24 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Cleaning of room | 04.1501 | 61,39 | 61,39 | 61,39 | 61,39 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 255,31 | 255,31 | 255,30 | 255,31 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 40,93 | 40,93 | 40,93 | 40,93 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 106,38 | 106,38 | 106,38 | 106,38 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of scaffolding | 04.1801 | 15,07 | 15,07 | 15,07 | 15,07 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of protective tent | 04.1801 | 191,16 | 191,16 | 191,15 | 191,16 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 113,98 | 113,98 | 113,98 | 113,98 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 78,70 | 78,70 | 78,70 | 78,70 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 168,12 | 168,12 | 168,12 | 168,12 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Working group instructions | 04.1801 | 136,54 | 136,54 | 136,54 | 136,54 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of transport containers for RAW | 04.1801 | 210,47 | 210,47 | 210,47 | 210,47 |
| Dismantling - Building decontamination - Mechanical decontamination - Mechanical decontamination | 04.1801 | 1 964,16 | 1 964,16 | 1 964,16 | 1 964,16 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 99,93 | 99,93 | 99,93 | 99,93 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of protective tent | 04.1801 | 153,10 | 153,10 | 153,10 | 153,10 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of scaffolding | 04.1801 | 12,38 | 12,38 | 12,38 | 12,38 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Cleaning of room | 04.1801 | 220,98 | 220,98 | 220,98 | 220,98 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 65,99 | 65,99 | 65,99 | 65,99 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 65,99 | 65,99 | 65,99 | 65,99 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of transport containers for RAW | 04.1801 | 620,78 | 620,78 | 620,78 | 620,78 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 227,09 | 227,09 | 227,08 | 85,79 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 308,92 | 308,92 | 308,92 | 101,15 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 94,62 | 94,62 | 94,62 | 35,75 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of protective tent | 04.1801 | 176,49 | 176,49 | 176,48 | 56,37 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 104,47 | 104,47 | 104,47 | 34,64 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 70,06 | 70,06 | 70,05 | 22,26 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 156,28 | 156,28 | 156,28 | 44,06 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Working group instructions | 04.1801 | 126,06 | 126,06 | 126,06 | 36,24 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of transport containers for liquid RAW | 04.1801 | 20,56 | 20,56 | 20,56 | 4,99 |
| Dismantling - Building decontamination - Chemical decontamination - Chemical decontamination | 04.1801 | 205,64 | 205,64 | 205,64 | 205,64 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 91,76 | 91,76 | 91,76 | 91,76 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of protective tent | 04.1801 | 140,20 | 140,20 | 140,20 | 140,20 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Cleaning of room | 04.1801 | 200,53 | 200,53 | 200,53 | 200,53 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 58,66 | 58,66 | 58,66 | 58,66 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 58,66 | 58,66 | 58,66 | 58,66 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of transport containers for liquid RAW | 04.1801 | 59,29 | 59,29 | 59,29 | 59,29 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Covering of floor by protective foil | 04.1802 | 402,00 | 402,00 | 402,00 | 402,00 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of working tools and equipment | 04.1802 | 204,80 | 204,80 | 204,80 | 204,80 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of transport containers for liquid RAW | 04.1802 | 301,50 | 301,50 | 301,50 | 301,50 |
| Dismantling - Removal of embedded pipes in buildings - Removal of embedded pipes in buildings | 04.1802 | 417,76 | 417,76 | 417,67 | 417,58 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of working tools and equipment | 04.1802 | 335,00 | 335,00 | 335,00 | 335,00 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of protective foil | 04.1802 | 120,00 | 120,00 | 120,00 | 120,00 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of transport containers for RAW | 04.1802 | 201,00 | 201,00 | 201,00 | 201,00 |
| Dismantling - Final radioactivity survey - Preparatory - Identification of areas for radiation monitoring | 04.2001 | 321,01 | 321,01 | 321,01 | 321,01 |
| Dismantling - Final radioactivity survey - Preparatory - Installation of scaffolding | 04.2001 | 118,73 | 118,73 | 118,73 | 118,73 |
| Dismantling - Final radioactivity survey - Preparatory - Preparation of working tools and equipment for monitoring | 04.2001 | 162,47 | 162,47 | 162,47 | 162,47 |
| Dismantling - Final radioactivity survey - Preparatory - Working group instructions | 04.2001 | 252,97 | 252,97 | 252,97 | 252,97 |
| Dismantling - Final radioactivity survey - Preparatory - Other Preparatory | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Final radioactivity survey - Realisation of radiation monitoring | 04.2001 | 898,05 | 898,05 | 898,05 | 898,05 |
| Dismantling - Final radioactivity survey - Finishing - Removal of scaffolding | 04.2001 | 98,95 | 98,95 | 98,95 | 98,95 |
| Dismantling - Final radioactivity survey - Finishing - Removal of working tools and equipment | 04.2001 | 228,98 | 228,98 | 228,98 | 228,98 |
| Dismantling - Final radioactivity survey - Finishing - Cleaning of room | 04.2001 | 325,86 | 325,86 | 325,86 | 325,86 |
| Dismantling - Final radioactivity survey - Finishing - Other Finishing | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Characterization of radioactive materials for recycling and reuse | 04.2101 | 5 336,00 | 5 336,00 | 5 336,00 | 5 336,00 |
| Dismantling - Decontamination for recycling and reuse - Sorting of metal materials before fragmentation (according to surface contamination) | 04.2201 | 1 275,34 | 1 275,34 | 1 275,34 | 1 275,34 |
| Dismantling - Decontamination for recycling and reuse - Sorting of non-metal solid materials before fragmentation (according to surface contamination) | 04.2201 | 46,62 | 46,62 | 46,62 | 46,62 |
| Dismantling - Decontamination for recycling and reuse - Sorting of cables | 04.2201 | 1,57 | 1,57 | 1,57 | 1,57 |

| Decommissioning activity | PSL Category | Scenario S1 Exposure [man-microSv] | Scenario S2 Exposure [man-microSv] | Scenario S3 Exposure [man-microSv] | Scenario S4 Exposure [man-microSv] |
|---|---|---|---|---|---|
| | | 74 547,94 | 69 671,56 | 74 267,69 | 68 790,15 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of steel | 04.2201 | 85,20 | 47,60 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of steel | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Recyclation of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of non-iron metals | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of iron metals in drums before release into environment | 04.2201 | 312,10 | 312,10 | 302,19 | 302,19 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of ingots before release into environment | 04.2201 | 134,78 | 0,00 | 128,77 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-iron metals in drums before release into environment | 04.2201 | 5,55 | 5,55 | 5,55 | 5,55 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-metal materials in drums before release into environment | 04.2201 | 34,67 | 34,67 | 34,67 | 34,67 |
| Dismantling - Activities after post-dismantling decontamination - Transport of post-dismantling decontaminated steel fragments into enviroment | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Activities after post-dismantling decontamination - Transport of ingots after melting into enviroment | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Personnel training, training of new pesonnel | 04.2301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Analyses for handling, packing, storing of waste | 05.0101 | 0,00 | 0,00 | 0,00 | 0,00 |
| Analyses for waste transports | 05.0201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Special permits, packing and transport requirements | 05.0301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron materials (up to 3000 Bq/m2 contamination) | 05.1201 | 4 619,87 | 4 619,87 | 4 619,87 | 4 619,87 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron metals (over 3000 Bq/m2 contamination) | 05.1201 | 3 253,15 | 3 253,15 | 3 253,14 | 3 253,13 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of non-iron metals | 05.1201 | 100,92 | 100,92 | 100,92 | 100,92 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Low pressure compaction | 05.1201 | 7,15 | 7,05 | 7,14 | 7,05 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - High pressure compaction | 05.1201 | 5,32 | 173,88 | 23,27 | 181,96 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Melting of metals | 05.1201 | 5 460,03 | 0,00 | 5 216,45 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Evaporation | 05.1201 | 24,32 | 13,58 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of concentrates | 05.1201 | 6,10 | 3,41 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of ionexchangers | 05.1201 | 0,10 | 0,05 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Incineration | 05.1201 | 97,17 | 77,10 | 95,87 | 76,89 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of ash | 05.1201 | 1,55 | 1,23 | 1,53 | 1,23 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of cables | 05.1201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of RAW into drums | 05.1201 | 22,89 | 22,89 | 24,22 | 24,22 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of non-radioactive metal materials from dismantling | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of cables | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of others wastes from dismantling | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for survey repository | 05.1301 | 1 197,66 | 1 488,34 | 1 236,32 | 1 515,31 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to survey repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,44 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for deep geological repository | 05.1301 | 0,44 | 0,44 | 0,44 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to deep geological repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into survey repository | 05.1401 | 38,36 | 47,40 | 39,56 | 48,23 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into survey repository | 05.1401 | 897,66 | 1 115,53 | 926,63 | 1 135,74 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into deep geological repository | 05.1401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into deep geological repository | 05.1401 | 0,27 | 0,27 | 0,27 | 0,27 |
| Waste processing, storage and disposal - Transport of non-radioactive decommissioning waste - Transport non-radioactive waste to dumping ground | 05.1402 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into survey repository | 05.1603 | 427,72 | 531,54 | 441,53 | 541,17 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into deep geological repository repository | 05.1603 | 0,08 | 0,08 | 0,08 | 0,08 |
| Site security operation and surveillance | 06.0101 | 0,00 | 0,00 | 0,00 | 0,00 |
| Inspection and maintenance og buildings and systems in operation | 06.0201 | 4 940,00 | 4 940,00 | 4 940,00 | 4 940,00 |
| Site keeping | 06.0301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Energy and water | 06.0401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Demolation of buildings | 07.0102 | 0,00 | 0,00 | 0,00 | 0,00 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Recyclation of building materials | 07.0102 | 0,00 | 0,00 | 0,00 | 0,00 |
| Final cleanup and lendscaping | 07.0201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Independent compliance verification with cleanup | 07.0301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Mobilization of construction equipment and facilities | 08.0101 | 0,00 | 0,00 | 0,00 | 0,00 |
| Mobilisation of personnel | 08.0102 | 0,00 | 0,00 | 0,00 | 0,00 |
| Construct temporary utilities | 08.0104 | 0,00 | 0,00 | 0,00 | 0,00 |
| Project manager and staff | 08.0201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Public relations | 08.0301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Decommissioning support including chemistry, decontamination | 08.0403 | 0,00 | 0,00 | 0,00 | 0,00 |
| Health physics | 08.0501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Removal of temporary facilities | 08.0601 | 0,00 | 0,00 | 0,00 | 0,00 |
| Implementation of transition plan | 11.0101 | 0,00 | 0,00 | 0,00 | 0,00 |

Lists of calculated decommissioning activities and results of calculation, according the PSL structure

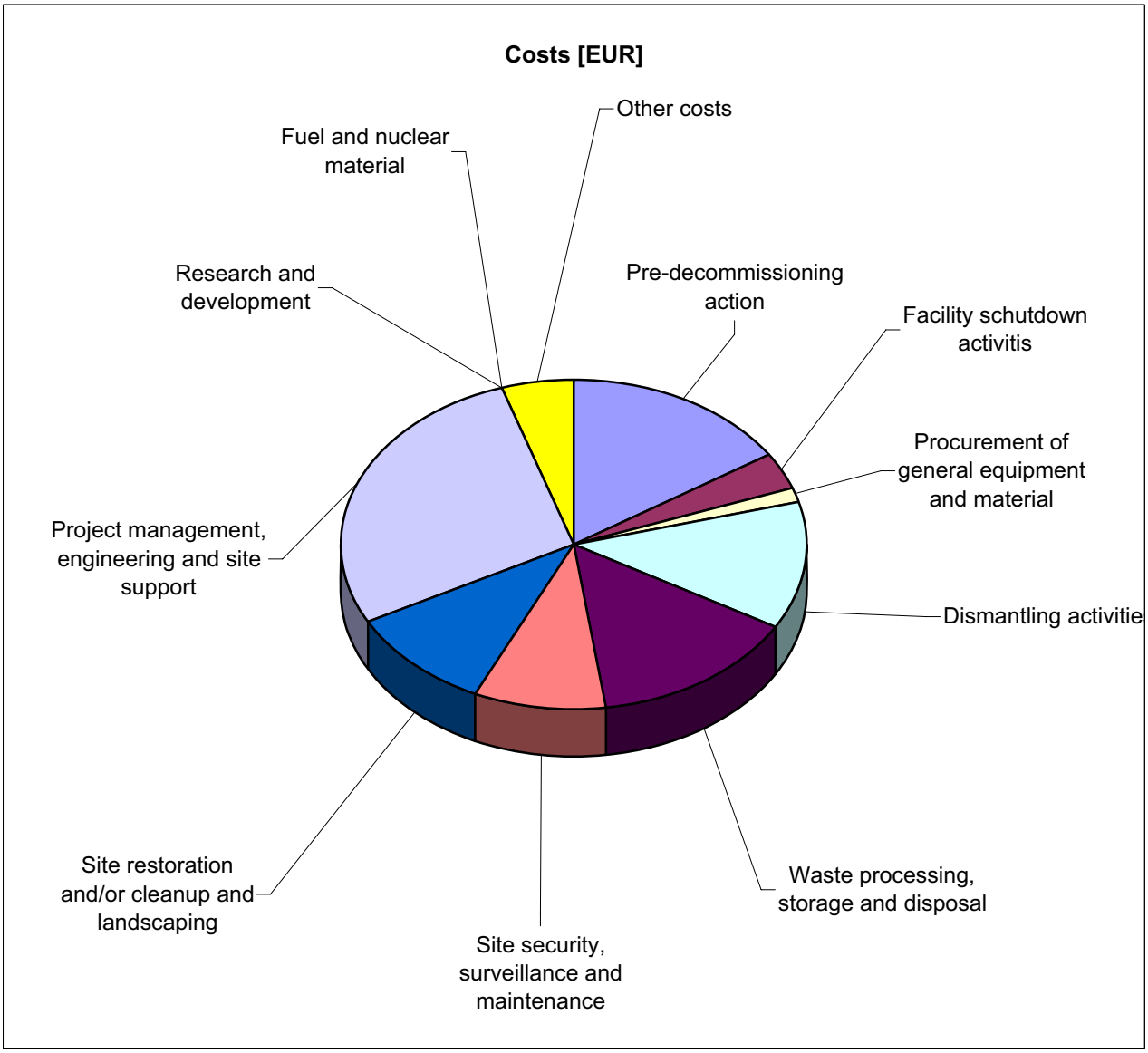
| Decommissioning activity | PSL Category | Scenario S1 Costs [EUR] | Scenario S2 Costs [EUR] | Scenario S3 Costs [EUR] | Scenario S4 Costs [EUR] |
|---|---|---|---|---|---|
| | | 4 313 871,44 | 4 319 124,45 | 4 317 178,47 | 4 310 707,06 |
| Preparation of final decommissioning plan | 01.0103 | 318 841,53 | 318 841,53 | 318 841,53 | 318 841,53 |
| Safety and environmental studies, nuclear safety analysis, involving | 01.0104 | 82 864,67 | 82 864,67 | 82 864,67 | 82 864,67 |
| License applications and license approvals | 01.0201 | 63 972,22 | 63 972,22 | 63 972,22 | 63 972,22 |
| Public consultation and public inquiry | 01.0202 | 28 236,56 | 28 236,56 | 28 236,56 | 28 236,56 |
| Radiological surveys for planning and licensing | 01.0301 | 61 735,17 | 61 735,17 | 61 735,17 | 61 735,17 |
| Hazardous material surveys and analyses | 01.0401 | 73 921,32 | 73 921,32 | 73 921,32 | 73 921,32 |
| Prime contranting selection | 01.0501 | 58 819,07 | 58 819,07 | 58 819,07 | 58 819,07 |
| Drainage and drying or blowdown of all systems not in operation | 02.0301 | 25 220,59 | 25 220,59 | 25 220,59 | 25 220,59 |
| Removal of system fluids (water, oils, etc.) | 02.0401 | 33 592,50 | 33 592,50 | 33 592,50 | 33 592,50 |
| Modification of systems for further use | 02.0402 | 47 335,10 | 47 335,10 | 47 335,10 | 47 335,10 |
| Isolation of systems out of operation | 02.0501 | 24 285,83 | 24 285,83 | 24 285,83 | 24 285,83 |
| After shutdown sampling for characterisation of equipment | 02.1201 | 11 222,07 | 11 222,07 | 11 222,07 | 11 222,07 |
| Subgrade soil sampling and monitorong wells to map contamination | 02.1201 | 10 054,37 | 10 054,37 | 10 054,37 | 10 054,37 |
| General site-dismantling equipment | 03.0101 | 21 553,68 | 21 553,68 | 21 553,68 | 21 553,68 |
| Equipment for personel and tooling decontamination | 03.0201 | 9 657,49 | 9 657,49 | 9 657,49 | 9 657,49 |
| General radiation protection equipment | 03.0301 | 14 421,19 | 14 421,19 | 14 421,19 | 14 421,19 |
| Equipment for the surveillance and maintemance | 03.0401 | 10 256,93 | 10 256,93 | 10 256,93 | 10 256,93 |
| Arrangenments in building objects for supporting D&D | 04.0601 | 45 324,54 | 45 324,54 | 45 324,54 | 45 324,54 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Covering of floor by protective foil | 04.1001 | 3 982,55 | 3 982,55 | 3 982,55 | 3 982,55 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Installation of temporary air-conditioning | 04.1001 | 2 219,66 | 2 219,66 | 2 219,66 | 2 219,66 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Marking of cuts and areas | 04.1001 | 3 123,03 | 3 123,03 | 3 123,03 | 3 123,03 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Delivery of working tools and equipment | 04.1001 | 1 327,52 | 1 327,52 | 1 327,52 | 1 327,52 |
| Dismantling - Removal of fuel handling equipment - Preparatory - Preparation of transport containers | 04.1001 | 2 429,03 | 2 429,03 | 2 429,03 | 2 429,03 |
| Dismantling - Removal of fuel handling equipment - Dismantling of fuel handling equipment | 04.1001 | 7 755,58 | 7 755,58 | 7 755,58 | 7 755,58 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of protective foils | 04.1001 | 3 091,91 | 3 091,91 | 3 091,91 | 3 091,91 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of temporary air-conditioning | 04.1001 | 1 731,47 | 1 731,47 | 1 731,47 | 1 731,47 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of working tools and equipment | 04.1001 | 2 102,50 | 2 102,50 | 2 102,50 | 2 102,50 |
| Dismantling - Removal of fuel handling equipment - Finishing - Removal of transport containers | 04.1001 | 927,57 | 927,57 | 927,57 | 927,57 |
| Dismantling - Removal of fuel handling equipment - Finishing - Cleaning of room | 04.1001 | 1 731,47 | 1 731,47 | 1 731,47 | 1 731,47 |
| Procurement of equipment for D&D | 04.1102 | 43 198,84 | 43 198,84 | 43 198,84 | 43 198,84 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Survey of radiological situation | 04.1302 | 2 850,32 | 2 850,32 | 2 850,32 | 2 850,32 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Covering of floor by protective foil | 04.1302 | 3 507,73 | 3 507,73 | 3 507,73 | 3 507,73 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary air-conditioning | 04.1302 | 2 026,59 | 2 026,59 | 2 026,59 | 2 026,59 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of scaffolding | 04.1302 | 3 628,67 | 3 628,67 | 3 628,67 | 3 628,67 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of temporary electric and other media connections | 04.1302 | 1 266,62 | 1 266,62 | 1 266,62 | 1 266,62 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Marking of cuts and areas | 04.1302 | 2 277,71 | 2 277,71 | 2 277,71 | 2 277,71 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Delivery of working tools and equipment | 04.1302 | 2 119,22 | 2 119,22 | 2 119,22 | 2 119,22 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Disconnection and revision of dismantled technological equipment | 04.1302 | 1 850,24 | 1 850,24 | 1 850,24 | 1 850,24 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of working tools and equipment | 04.1302 | 3 098,49 | 3 098,49 | 3 098,49 | 3 098,49 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Installation of protective tent | 04.1302 | 2 035,37 | 2 035,37 | 2 035,37 | 2 035,37 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Working group instructions | 04.1302 | 2 071,56 | 2 071,56 | 2 071,56 | 2 071,56 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Preparatory - Preparation of transport containers | 04.1302 | 137,99 | 137,99 | 137,99 | 137,99 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Dismantling | 04.1302 | 17 614,35 | 17 614,35 | 17 614,35 | 17 614,35 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective foils | 04.1302 | 2 240,73 | 2 240,73 | 2 240,73 | 2 240,73 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary air-conditioning | 04.1302 | 1 435,50 | 1 435,50 | 1 435,50 | 1 435,50 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of scaffolding | 04.1302 | 2 581,31 | 2 581,31 | 2 581,31 | 2 581,31 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of temporary electric and other media connections | 04.1302 | 2 279,91 | 2 279,91 | 2 279,91 | 2 279,91 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of protective tent | 04.1302 | 1 632,75 | 1 632,75 | 1 632,75 | 1 632,75 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of working tools and equipment | 04.1302 | 1 549,92 | 1 549,92 | 1 549,92 | 1 549,92 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Removal of transport containers | 04.1302 | 693,39 | 693,39 | 693,39 | 693,39 |
| Dismantling - Dismanling and removal of contaminated equipment in non-reactor nuclear facilities - Finishing - Cleaning of room | 04.1302 | 2 135,56 | 2 135,56 | 2 135,56 | 2 135,56 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Covering of floor by protective foil | 04.1501 | 2 919,15 | 2 919,15 | 2 919,15 | 2 919,15 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of scaffolding | 04.1501 | 2 725,28 | 2 725,28 | 2 725,28 | 2 725,28 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary electric and other media connections | 04.1501 | 928,85 | 928,85 | 928,85 | 928,85 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Installation of temporary air-conditioning | 04.1501 | 1 418,61 | 1 418,61 | 1 418,61 | 1 418,61 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of working tools and equipment | 04.1501 | 1 780,77 | 1 780,77 | 1 780,77 | 1 780,77 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Preparatory - Preparation of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Dismantling | 04.1501 | 8 806,55 | 8 806,55 | 8 806,55 | 8 806,55 |

| Decommissioning activity | PSL Category | Scenario S1 Costs [EUR] | Scenario S2 Costs [EUR] | Scenario S3 Costs [EUR] | Scenario S4 Costs [EUR] |
|---|---|---|---|---|---|
| | | 4 313 871,44 | 4 319 124,45 | 4 317 178,47 | 4 310 707,06 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of protective foils | 04.1501 | 833,36 | 833,36 | 833,36 | 833,36 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary air-conditioning | 04.1501 | 574,20 | 574,20 | 574,20 | 574,20 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of scaffolding | 04.1501 | 710,86 | 710,86 | 710,86 | 710,86 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of temporary electric and other media connections | 04.1501 | 759,97 | 759,97 | 759,97 | 759,97 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of working tools and equipment | 04.1501 | 443,57 | 443,57 | 443,57 | 443,57 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Removal of transport containers | 04.1501 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Removal of other material/equipment from containment structure or removal of entire contaminated structures - Finishing - Cleaning of room | 04.1501 | 931,50 | 931,50 | 931,50 | 931,50 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 3 865,56 | 3 865,56 | 3 865,56 | 3 865,56 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 641,53 | 641,53 | 641,53 | 641,53 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 1 610,68 | 1 610,68 | 1 610,68 | 1 610,68 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of scaffolding | 04.1801 | 6 404,10 | 6 404,10 | 6 404,10 | 6 404,10 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Installation of protective tent | 04.1801 | 2 957,88 | 2 957,88 | 2 957,88 | 2 957,88 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 1 763,17 | 1 763,17 | 1 763,17 | 1 763,17 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 1 215,95 | 1 215,95 | 1 215,95 | 1 215,95 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 2 602,21 | 2 602,21 | 2 602,21 | 2 602,21 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Working group instructions | 04.1801 | 2 112,78 | 2 112,78 | 2 112,78 | 2 112,78 |
| Dismantling - Building decontamination - Mechanical decontamination - Preparatory - Preparation of transport containers for RAW | 04.1801 | 3 192,15 | 3 192,15 | 3 192,15 | 3 192,15 |
| Dismantling - Building decontamination - Mechanical decontamination - Mechanical decontamination | 04.1801 | 26 990,04 | 26 990,04 | 26 990,04 | 26 990,04 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 1 611,17 | 1 611,17 | 1 611,17 | 1 611,17 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of protective tent | 04.1801 | 2 468,43 | 2 468,43 | 2 468,43 | 2 468,43 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of scaffolding | 04.1801 | 199,62 | 199,62 | 199,62 | 199,62 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Cleaning of room | 04.1801 | 3 562,79 | 3 562,79 | 3 562,79 | 3 562,79 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 1 063,96 | 1 063,96 | 1 063,96 | 1 063,96 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 1 063,96 | 1 063,96 | 1 063,96 | 1 063,96 |
| Dismantling - Building decontamination - Mechanical decontamination - Finishing - Removal of transport containers for RAW | 04.1801 | 9 576,45 | 9 576,45 | 9 576,45 | 9 576,45 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary air-conditioning | 04.1801 | 3 436,06 | 3 436,06 | 3 436,06 | 1 288,52 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Covering of floor by protective foil | 04.1801 | 4 798,71 | 4 798,71 | 4 798,71 | 1 540,89 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of temporary electric and other media connections jkhkfhakhkahgfkahkagh | 04.1801 | 1 431,72 | 1 431,72 | 1 431,72 | 536,89 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Installation of protective tent | 04.1801 | 2 728,54 | 2 728,54 | 2 728,54 | 855,35 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Marking of areas for decontamination | 04.1801 | 1 614,55 | 1 614,55 | 1 614,55 | 525,53 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Delivery of working tools and equipment | 04.1801 | 1 080,85 | 1 080,85 | 1 080,85 | 337,76 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of working tools and equipment | 04.1801 | 2 417,12 | 2 417,12 | 2 417,12 | 668,46 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Working group instructions | 04.1801 | 1 948,96 | 1 948,96 | 1 948,96 | 549,81 |
| Dismantling - Building decontamination - Chemical decontamination - Preparatory - Preparation of transport containers for liquid RAW | 04.1801 | 318,63 | 318,63 | 318,63 | 75,67 |
| Dismantling - Building decontamination - Chemical decontamination - Chemical decontamination | 04.1801 | 2 660,11 | 2 660,11 | 2 660,11 | 2 660,11 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of working tools and equipment | 04.1801 | 1 479,45 | 1 479,45 | 1 479,45 | 1 479,45 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of protective tent | 04.1801 | 2 260,37 | 2 260,37 | 2 260,37 | 2 260,37 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Cleaning of room | 04.1801 | 3 233,13 | 3 233,13 | 3 233,13 | 3 233,13 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary electric and other media connections | 04.1801 | 945,74 | 945,74 | 945,74 | 945,74 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of temporary air-conditioning | 04.1801 | 945,74 | 945,74 | 945,74 | 945,74 |
| Dismantling - Building decontamination - Chemical decontamination - Finishing - Removal of transport containers for liquid RAW | 04.1801 | 955,90 | 955,90 | 955,90 | 955,90 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Covering of floor by protective foil | 04.1802 | 3 980,37 | 3 980,37 | 3 980,37 | 3 980,37 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of working tools and equipment | 04.1802 | 1 977,66 | 1 977,66 | 1 977,66 | 1 977,66 |
| Dismantling - Removal of embedded pipes in buildings - Preparatory - Preparation of transport containers for liquid RAW | 04.1802 | 2 985,28 | 2 985,28 | 2 985,28 | 2 985,28 |
| Dismantling - Removal of embedded pipes in buildings - Removal of embedded pipes in buildings | 04.1802 | 3 410,33 | 3 410,33 | 3 410,33 | 3 410,33 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of working tools and equipment | 04.1802 | 3 090,10 | 3 090,10 | 3 090,10 | 3 090,10 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of protective foil | 04.1802 | 1 545,05 | 1 545,05 | 1 545,05 | 1 545,05 |
| Dismantling - Removal of embedded pipes in buildings - Finishing - Removal of transport containers for RAW | 04.1802 | 1 854,06 | 1 854,06 | 1 854,06 | 1 854,06 |
| Dismantling - Final radioactivity survey - Preparatory - Identification of areas for radiation monitoring | 04.2001 | 4 126,83 | 4 126,83 | 4 126,83 | 4 126,83 |
| Dismantling - Final radioactivity survey - Preparatory - Installation of scaffolding | 04.2001 | 1 634,03 | 1 634,03 | 1 634,03 | 1 634,03 |
| Dismantling - Final radioactivity survey - Preparatory - Preparation of working tools and equipment for monitoring | 04.2001 | 2 088,64 | 2 088,64 | 2 088,64 | 2 088,64 |
| Dismantling - Final radioactivity survey - Preparatory - Working group instructions | 04.2001 | 3 252,11 | 3 252,11 | 3 252,11 | 3 252,11 |
| Dismantling - Final radioactivity survey - Preparatory - Other Preparatory | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Final radioactivity survey - Realisation of radiation monitoring | 04.2001 | 61 568,02 | 61 568,02 | 61 568,02 | 61 568,02 |
| Dismantling - Final radioactivity survey - Finishing - Removal of scaffolding | 04.2001 | 1 272,07 | 1 272,07 | 1 272,07 | 1 272,07 |
| Dismantling - Final radioactivity survey - Finishing - Removal of working tools and equipment | 04.2001 | 2 943,72 | 2 943,72 | 2 943,72 | 2 943,72 |
| Dismantling - Final radioactivity survey - Finishing - Cleaning of room | 04.2001 | 4 189,20 | 4 189,20 | 4 189,20 | 4 189,20 |
| Dismantling - Final radioactivity survey - Finishing - Other Finishing | 04.2001 | 0,00 | 0,00 | 0,00 | 0,00 |
| Characterization of radioactive materials for recycling and reuse | 04.2101 | 57 811,48 | 57 811,48 | 57 811,48 | 57 811,48 |
| Dismantling - Decontamination for recycling and reuse - Sorting of metal materials before fragmentation (according to surface contamination) | 04.2201 | 6 176,97 | 6 176,97 | 6 176,97 | 6 176,97 |

| Decommissioning activity | PSL Category | Scenario S1 Costs [EUR] | Scenario S2 Costs [EUR] | Scenario S3 Costs [EUR] | Scenario S4 Costs [EUR] |
|---|---|---|---|---|---|
| | | 4 313 871,44 | 4 319 124,45 | 4 317 178,47 | 4 310 707,06 |
| Dismantling - Decontamination for recycling and reuse - Sorting of non-metal solid materials before fragmentation (according to surface contamination) | 04.2201 | 289,25 | 289,25 | 289,25 | 289,25 |
| Dismantling - Decontamination for recycling and reuse - Sorting of cables | 04.2201 | 87,67 | 87,67 | 87,67 | 87,67 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of steel | 04.2201 | 3 155,38 | 1 762,74 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of steel | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Post-dismantling decontamination of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Recyclation of cables | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Dry post-dismantling decontamination of non-iron metals | 04.2201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of iron metals in drums before release into environment | 04.2201 | 6 944,64 | 6 944,64 | 6 724,16 | 6 724,16 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of ingots before release into environment | 04.2201 | 2 661,31 | 0,00 | 2 542,59 | 0,00 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-iron metals in drums before release into environment | 04.2201 | 167,87 | 167,87 | 167,87 | 167,87 |
| Dismantling - Decontamination for recycling and reuse - Radiation monitoring of non-metal materials in drums before release into environment | 04.2201 | 771,42 | 771,42 | 771,42 | 771,42 |
| Dismantling - Activities after post-dismantling decontamination - Transport of post-dismantling decontaminated steel fragments into enviroment | 04.2201 | 2 075,47 | 2 075,47 | 2 064,19 | 2 064,19 |
| Dismantling - Activities after post-dismantling decontamination - Transport of ingots after melting into enviroment | 04.2201 | 164,47 | 0,00 | 157,13 | 0,00 |
| Personnel training, training of new pesonnel | 04.2301 | 55 323,14 | 55 323,14 | 55 323,14 | 55 323,14 |
| Analyses for handling, packing, storing of waste | 05.0101 | 59 488,20 | 59 488,20 | 59 488,20 | 59 488,20 |
| Analyses for waste transports | 05.0201 | 58 475,23 | 58 475,23 | 58 475,23 | 58 475,23 |
| Special permits, packing and transport requirements | 05.0301 | 43 020,92 | 43 020,92 | 43 020,92 | 43 020,92 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron materials (up to 3000 Bq/m2 contamination) | 05.1201 | 62 857,43 | 62 857,43 | 62 857,43 | 62 857,43 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of iron metals (over 3000 Bq/m2 contamination) | 05.1201 | 23 121,51 | 23 121,51 | 23 121,51 | 23 121,51 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of non-iron metals | 05.1201 | 1 134,68 | 1 134,68 | 1 134,68 | 1 134,68 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Low pressure compaction | 05.1201 | 116,41 | 114,79 | 116,22 | 114,72 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - High pressure compaction | 05.1201 | 347,58 | 11 608,80 | 1 540,92 | 12 302,19 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Melting of metals | 05.1201 | 72 303,28 | 0,00 | 69 077,74 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Evaporation | 05.1201 | 503,08 | 281,10 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of concentrates | 05.1201 | 101,48 | 56,75 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Bituminization of ionexchangers | 05.1201 | 5,52 | 3,11 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Incineration | 05.1201 | 2 199,86 | 1 745,65 | 2 170,44 | 1 740,87 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of ash | 05.1201 | 16,41 | 13,02 | 16,19 | 12,98 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Fragmentation of cables | 05.1201 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of radioactive decommissioning waste - Cementation of RAW into drums | 05.1201 | 306,22 | 306,22 | 324,25 | 324,25 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of non-radioactive metal materials from dismantling | 05.1202 | 4 846,94 | 4 846,94 | 4 846,94 | 4 846,94 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of cables | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Processing of non-radioactive decommissioning waste - Recyclation of others wastes from dismantling | 05.1202 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for survey repository | 05.1301 | 85 362,79 | 106 102,52 | 88 120,44 | 108 025,60 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to survey repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Grouting of disposal container for deep geological repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Packaging of radioactive decommissioning waste - Manipulation with disposal container prior transport to deep geological repository | 05.1301 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into survey repository | 05.1401 | 720,52 | 895,39 | 743,78 | 911,61 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into survey repository | 05.1401 | 17 507,34 | 21 755,35 | 18 072,31 | 22 149,41 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Radiation monitoring of disposal container before transport into deep geological repository | 05.1401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of radioactive decommissioning waste - Transport of disposal container into deep geological repository | 05.1401 | 0,00 | 0,00 | 0,00 | 0,00 |
| Waste processing, storage and disposal - Transport of non-radioactive decommissioning waste - Transport non-radioactive waste to dumping ground | 05.1402 | 2 846,41 | 2 846,41 | 2 846,41 | 2 846,41 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into survey repository | 05.1603 | 190 941,76 | 237 020,95 | 197 070,18 | 241 295,40 |
| Waste processing, storage and disposal - Disposal of radioactive decommissioning waste on disposal site - Dispose of disposal container into deep geological repository repository | 05.1603 | 0,00 | 0,00 | 0,00 | 0,00 |
| Site security operation and surveillance | 06.0101 | 86 869,17 | 86 869,17 | 86 869,17 | 86 869,17 |
| Inspection and maintenance og buildings and systems in operation | 06.0201 | 68 807,74 | 68 807,74 | 68 807,74 | 68 807,74 |
| Site keeping | 06.0301 | 152 828,03 | 152 828,03 | 152 828,03 | 152 828,03 |
| Energy and water | 06.0401 | 85 366,47 | 85 366,47 | 85 366,47 | 85 366,47 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Demolation of buildings | 07.0102 | 295 742,12 | 295 742,12 | 295 742,12 | 295 742,12 |
| Site restoration and/or cleanup and landscaping - Dismantling of the structure - Recyclation of building materials | 07.0102 | 17 798,27 | 17 798,27 | 17 798,27 | 17 798,27 |
| Final cleanup and lendscaping | 07.0201 | 27 104,05 | 27 104,05 | 27 104,05 | 27 104,05 |
| Independent compliance verification with cleanup | 07.0301 | 100 974,38 | 100 974,38 | 100 974,38 | 100 974,38 |
| Mobilization of construction equipment and facilities | 08.0101 | 108 778,42 | 108 778,42 | 108 778,42 | 108 778,42 |
| Mobilisation of personnel | 08.0102 | 64 052,51 | 64 052,51 | 64 052,51 | 64 052,51 |
| Construct temporary utilities | 08.0104 | 88 074,69 | 88 074,69 | 88 074,69 | 88 074,69 |
| Project manager and staff | 08.0201 | 595 611,13 | 595 611,13 | 595 611,13 | 595 611,13 |
| Public relations | 08.0301 | 42 842,71 | 42 842,71 | 42 842,71 | 42 842,71 |
| Decommissioning support including chemistry, decontamination | 08.0403 | 192 256,17 | 192 256,17 | 192 256,17 | 192 256,17 |
| Health physics | 08.0501 | 19 608,90 | 19 608,90 | 19 608,90 | 19 608,90 |
| Removal of temporary facilities | 08.0601 | 92 429,96 | 92 429,96 | 92 429,96 | 92 429,96 |
| Implementation of transition plan | 11.0101 | 210 996,02 | 210 996,02 | 210 996,02 | 210 996,02 |

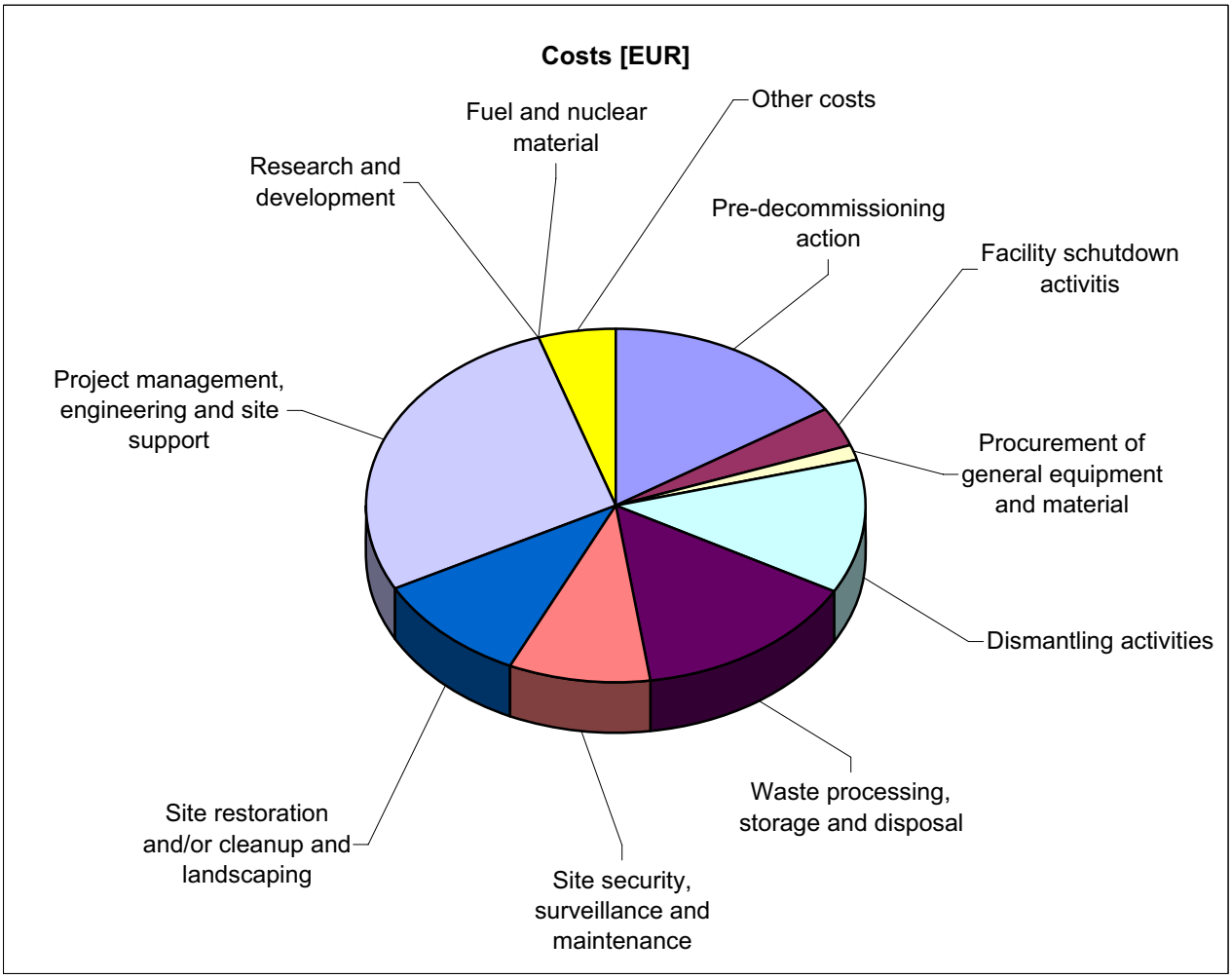
Annex 4-4-1 PSL structure of calculated decommissioning activities – Summary - Scenario S1

| Názov činnosti | Označenie | Manpower [man-hours] | Exposure [man-microSv] | Costs [EUR] |
|---|---|---|---|---|
| | | 233 660 | 74 548 | 4 313 871 |
| Pre-decommissioning action | 01 | 39 250 | 0 | 688 391 |
| Facility schutdown activitis | 02 | 9 515 | 9 516 | 151 710 |
| Procurement of general equipment and material | 03 | 3 010 | 3 018 | 55 889 |
| Dismantling activities | 04 | 37 119 | 40 913 | 541 517 |
| Waste processing, storage and disposal | 05 | 17 720 | 16 161 | 626 224 |
| Site security, surveillance and maintenance | 06 | 23 000 | 4 940 | 393 871 |
| Site restoration and/or cleanup and landscaping | 07 | 30 376 | 0 | 441 619 |
| Project management, engineering and site support | 08 | 61 610 | 0 | 1 203 654 |
| Research and development | 09 | 0 | 0 | 0 |
| Fuel and nuclear material | 10 | 0 | 0 | 0 |
| Other costs | 11 | 12 060 | 0 | 210 996 |



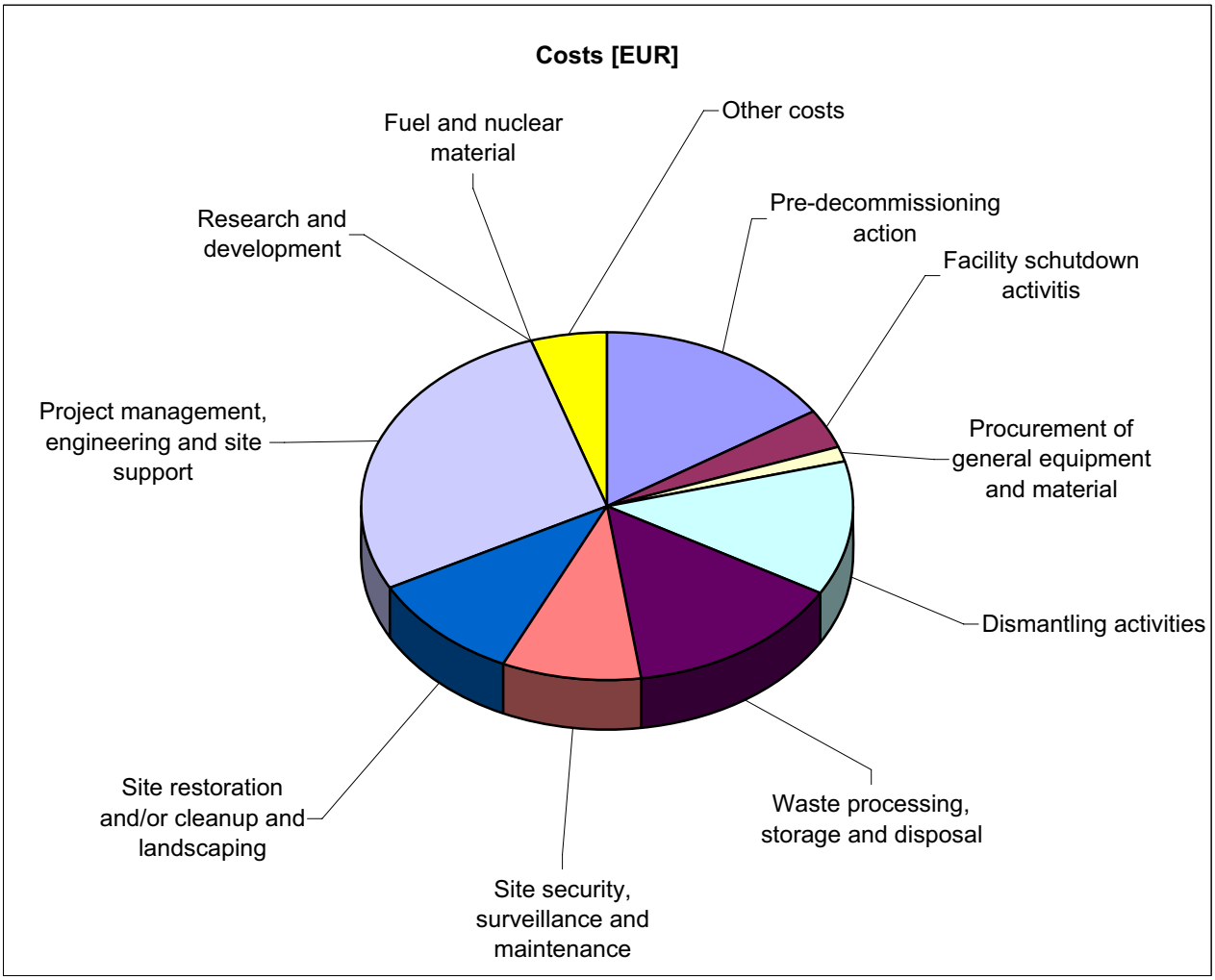
Annex 4-4-2 PSL structure of calculated decommissioning activities – Summary - Scenario S2

| Názov činnosti | Označenie | Manpower [man-hours] | Exposure [man-microSv] | Costs [EUR] |
|---|---|---|---|---|
| | | 231 520 | 69 672 | 4 320 218 |
| Pre-decommissioning action | 01 | 39 250 | 0 | 688 391 |
| Facility schutdown activitis | 02 | 9 515 | 9 516 | 151 710 |
| Procurement of general equipment and material | 03 | 3 010 | 3 018 | 55 889 |
| Dismantling activities | 04 | 36 923 | 40 741 | 537 298 |
| Waste processing, storage and disposal | 05 | 15 776 | 11 457 | 636 788 |
| Site security, surveillance and maintenance | 06 | 23 000 | 4 940 | 393 871 |
| Site restoration and/or cleanup and landscaping | 07 | 30 376 | 0 | 441 619 |
| Project management, engineering and site support | 08 | 61 610 | 0 | 1 203 654 |
| Research and development | 09 | 0 | 0 | 0 |
| Fuel and nuclear material | 10 | 0 | 0 | 0 |
| Other costs | 11 | 12 060 | 0 | 210 996 |



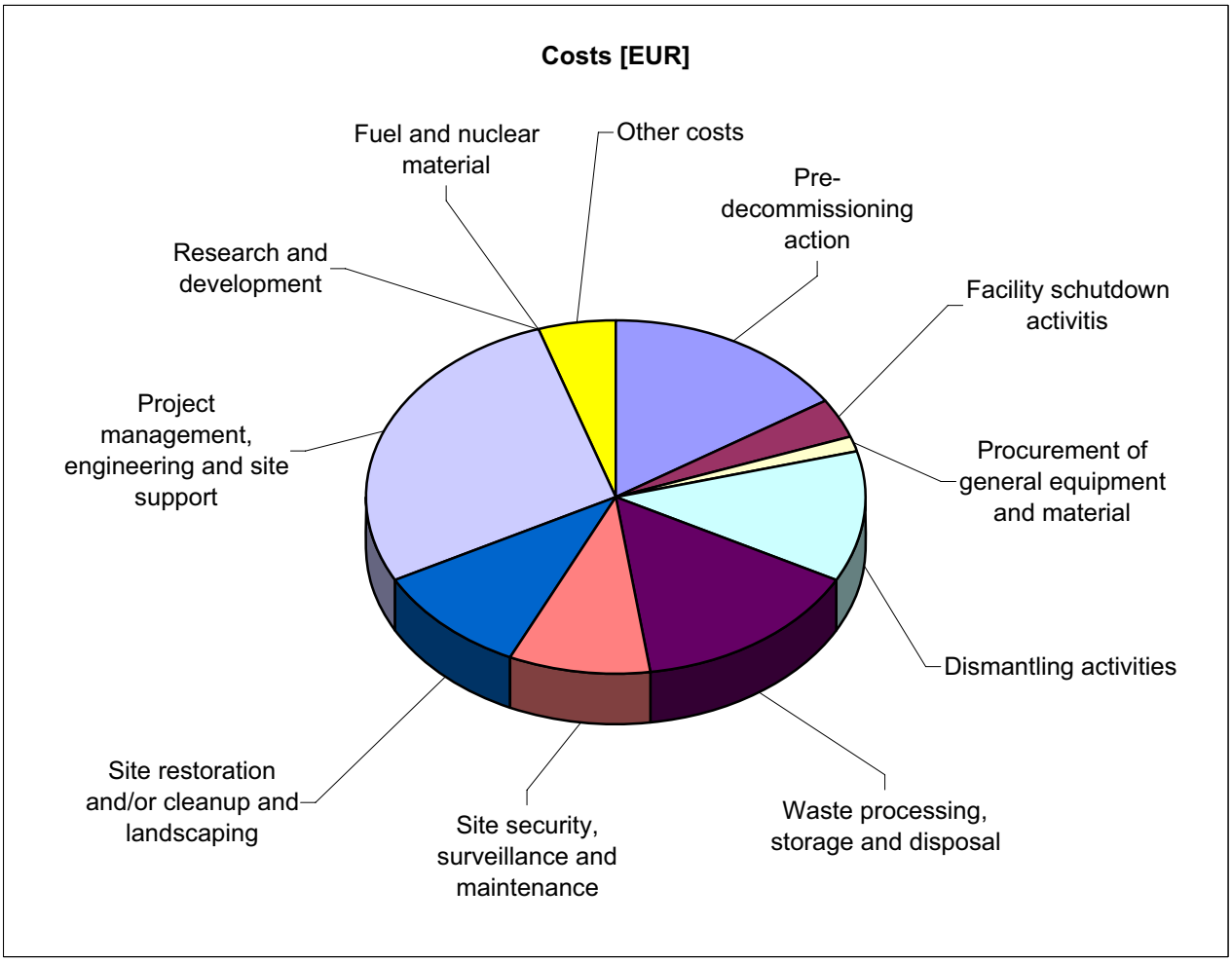
Annex 4-4-3 PSL structure of calculated decommissioning activities – Summary - Scenario S3

| Názov činnosti | Označenie | Manpower [man-hours] | Exposure [man-microSv] | Costs [EUR] |
|---|---|---|---|---|
| | | 233 528 | 74 268 | 4 317 178 |
| Pre-decommissioning action | 01 | 39 250 | 0 | 688 391 |
| Facility schutdown activitis | 02 | 9 515 | 9 516 | 151 710 |
| Procurement of general equipment and material | 03 | 3 010 | 3 018 | 55 889 |
| Dismantling activities | 04 | 37 043 | 40 806 | 538 004 |
| Waste processing, storage and disposal | 05 | 17 665 | 15 987 | 633 044 |
| Site security, surveillance and maintenance | 06 | 23 000 | 4 940 | 393 871 |
| Site restoration and/or cleanup and landscaping | 07 | 30 376 | 0 | 441 619 |
| Project management, engineering and site support | 08 | 61 610 | 0 | 1 203 654 |
| Research and development | 09 | 0 | 0 | 0 |
| Fuel and nuclear material | 10 | 0 | 0 | 0 |
| Other costs | 11 | 12 060 | 0 | 210 996 |



Annex 4-4-4 PSL structure of calculated decommissioning activities – Summary - Scenario S4

| Názov činnosti | Označenie | Manpower [man-hours] | Exposure [man-microSv] | Costs [EUR] |
|---|---|---|---|---|
| | | 230 369 | 68 790 | 4 311 801 |
| Pre-decommissioning action | 01 | 39 250 | 0 | 688 391 |
| Facility schutdown activitis | 02 | 9 515 | 9 516 | 151 710 |
| Procurement of general equipment and material | 03 | 3 010 | 3 018 | 55 889 |
| Dismantling activities | 04 | 35 730 | 39 810 | 521 908 |
| Waste processing, storage and disposal | 05 | 15 818 | 11 507 | 643 762 |
| Site security, surveillance and maintenance | 06 | 23 000 | 4 940 | 393 871 |
| Site restoration and/or cleanup and landscaping | 07 | 30 376 | 0 | 441 619 |
| Project management, engineering and site support | 08 | 61 610 | 0 | 1 203 654 |
| Research and development | 09 | 0 | 0 | 0 |
| Fuel and nuclear material | 10 | 0 | 0 | 0 |
| Other costs | 11 | 12 060 | 0 | 210 996 |



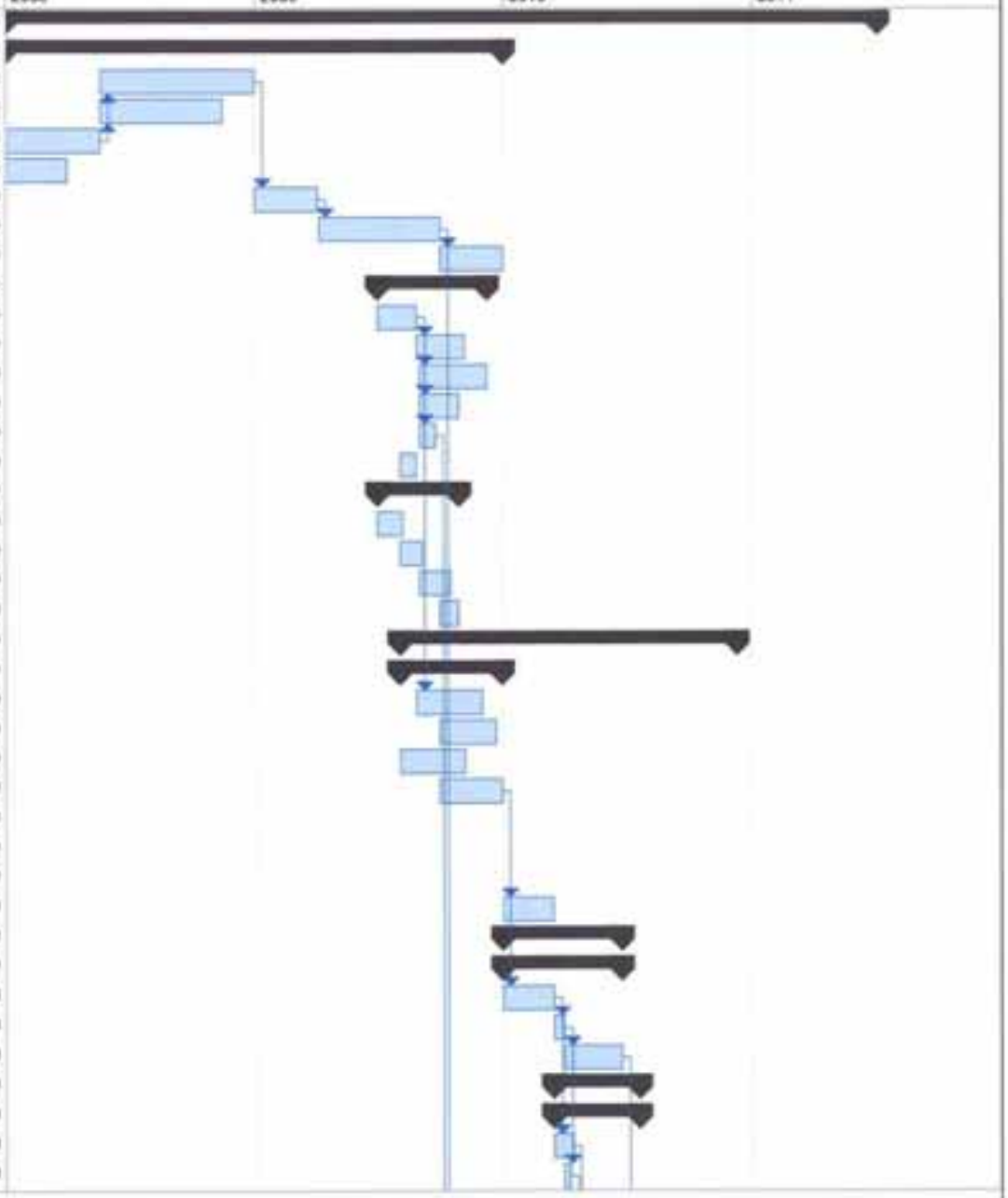
# Annex 5

# Tentative decommissioning work breakdown structure

**OMEGA**

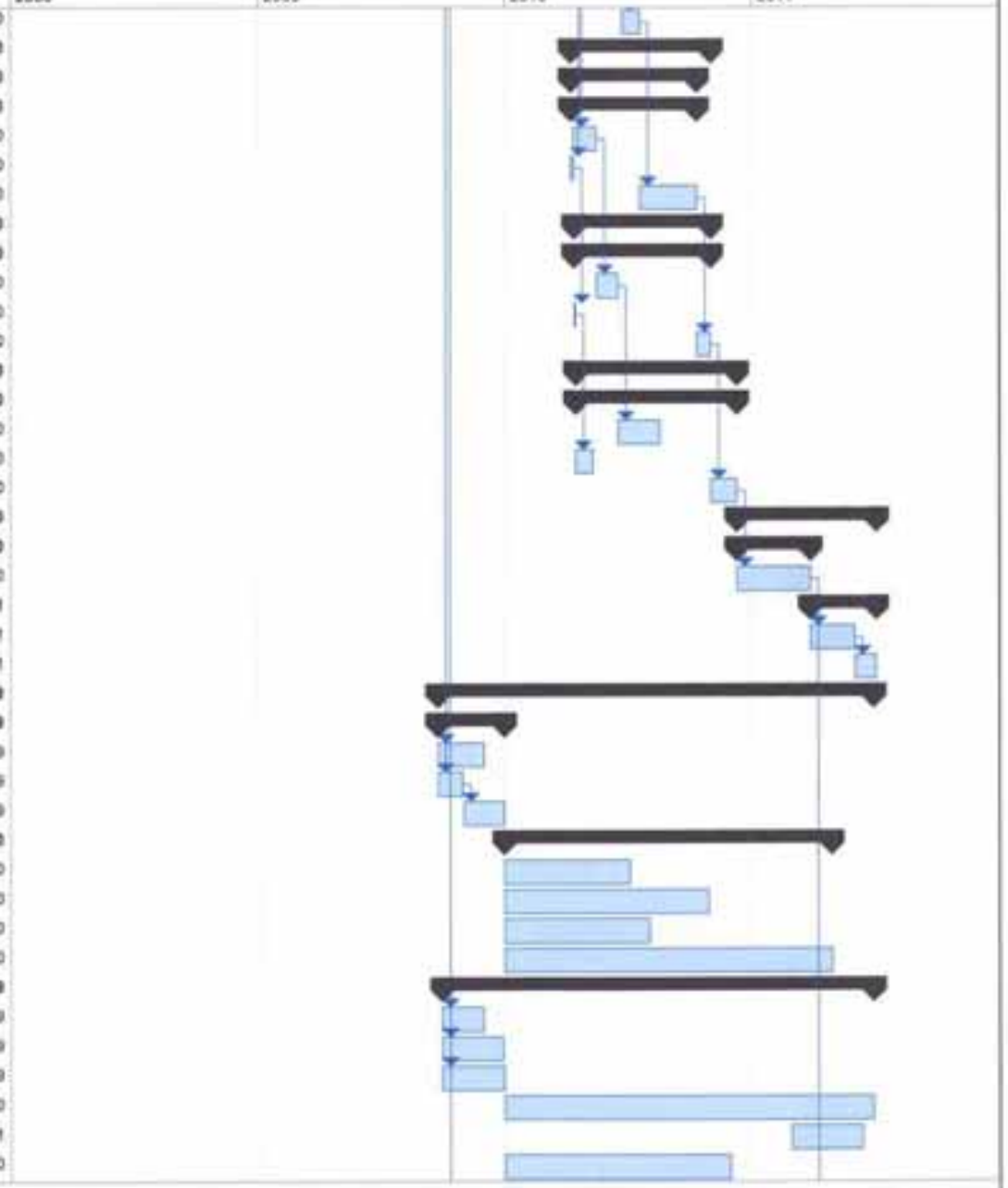
# *Tentative decommissioning work breakdown structure*

| ID | Activity | Duration | Start |
|---|---|---|---|
| 1 | **Tentative work breakdown structure for FA decommissioning** | **915 days** | **Tue 1.1.08** |
| 2 | **Preparatory activities** | **523 days** | **Tue 1.1.08** |
| 3 | Preparation of final decommissioning plan | 1296 hrs | Tue 20.5.08 |
| 4 | Safety and environmental studies | 1032 hrs | Tue 20.5.08 |
| 5 | Radiological surveys for planning and licensing | 800 hrs | Tue 1.1.08 |
| 6 | Hazardous material surveys and analyses | 520 hrs | Tue 1.1.08 |
| 7 | Public consultation and public inquiry | 536 hrs | Thu 1.1.09 |
| 8 | License applications and license approvals | 1024 hrs | Mon 6.4.09 |
| 9 | Prime contranting | 528 hrs | Thu 1.10.09 |
| 10 | **Shutdown activities** | **114 days** | **Wed 1.7.09** |
| 11 | Drainage, drying, blowdown of systems not in operation | 330 hrs | Wed 1.7.09 |
| 12 | Removal of system fluids (water, oils, etc.) | 400 hrs | Thu 27.8.09 |
| 13 | Modification of systems for further use during decommissioning | 560 hrs | Tue 1.9.09 |
| 14 | Isolation of systems out of operation | 330 hrs | Tue 1.9.09 |
| 15 | After shutdown sampling for characterisation of equipment | 140 hrs | Tue 1.9.09 |
| 16 | Subgrade soil sampling and monitorong to map contamination | 150 hrs | Mon 3.8.09 |
| 17 | **Procurement of equipment** | **84,75 days** | **Wed 1.7.09** |
| 18 | General site-dismantling equipment | 220 hrs | Wed 1.7.09 |
| 19 | Equipment for personel and tooling decontamination | 200 hrs | Mon 3.8.09 |
| 20 | General radiation protection equipment | 270 hrs | Tue 1.9.09 |
| 21 | Equipment for the surveillance and maintenance | 150 hrs | Thu 1.10.09 |
| 22 | **Dismantling and decontamination of FA facility** | **354,57 days** | **Mon 3.8.09** |
| 23 | **D&D support** | **108 days** | **Mon 3.8.09** |
| 24 | Arrangenments in building objects for supporting D&D | 550 hrs | Thu 27.8.09 |
| 25 | Procurement of equipment for D&D | 460 hrs | Thu 1.10.09 |
| 26 | Characterization of radioactive materials for recycling and n | 556 hrs | Mon 3.8.09 |
| 27 | Personnel training, training of new personnel | 520 hrs | Thu 1.10.09 |
| 28 | **Pre-dismantling decontamination** | **0 days** | **Mon 10.5.10** |
| 29 | **Decontamination by autonomous circuits** | **0 days** | **Mon 10.5.10** |
| 34 | **Non-circuit decontamination** | **0 days** | **Mon 10.5.10** |
| 39 | Dismantling of fuel handling machine | 409,81 hrs | Fri 1.1.10 |
| 40 | **Dismantling of general equipment** | **124,82 days** | **Fri 1.1.10** |
| 41 | **Objekt FA facility (FA Facility Building)** | **124,82 days** | **Fri 1.1.10** |
| 42 | Podlažie Cellar +17,90 +18,50 | 423,03 hrs | Fri 1.1.10 |
| 43 | Podlažie First floor +24,50 | 86,29 hrs | Tue 16.3.10 |
| 44 | Podlažie Ground floor +21,50 | 489,2 hrs | Wed 31.3.10 |
| 45 | **Dismantling of support systems** | **90,06 days** | **Tue 16.3.10** |
| 46 | **Objekt FA facility (FA Facility Building)** | **90,06 days** | **Tue 16.3.10** |
| 47 | Podlažie Cellar +17,90 +18,50 | 159,93 hrs | Tue 16.3.10 |
| 48 | Podlažie First floor +24,50 | 52,69 hrs | Wed 31.3.10 |



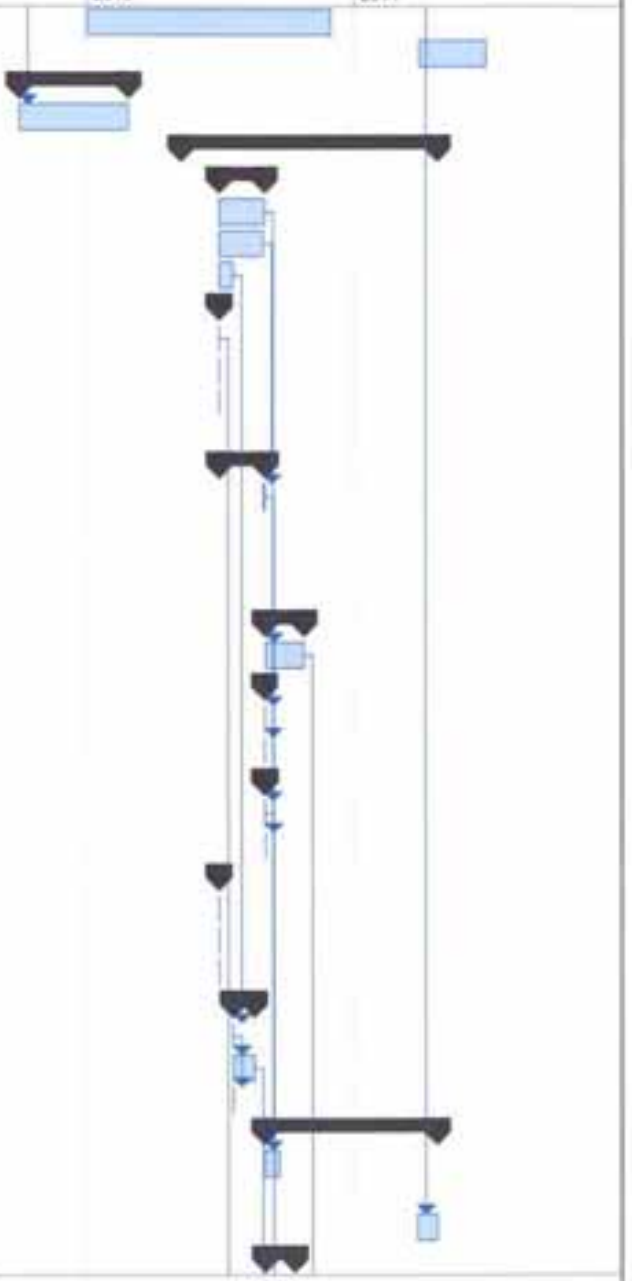
# Tentative decommissioning work breakdown structure

| ID | Activity | Duration | Start |
|---|---|---|---|
| 49 | Podlažie Ground floor +21,50 | 144,98 hrs | Thu 24.6.10 |
| 50 | **Decontamination of building surfaces** | **147,01 days** | **Fri 9.4.10** |
| 51 | **Mechanical decontamination** | **132,74 days** | **Fri 9.4.10** |
| 52 | **Objekt FA facility (FA Facility Building)** | **132,74 days** | **Fri 9.4.10** |
| 53 | Podlažie Cellar +17,90 +18,50 | 191,74 hrs | Tue 13.4.10 |
| 54 | Podlažie First floor +24,50 | 22,52 hrs | Fri 9.4.10 |
| 55 | Podlažie Ground floor +21,50 | 480,46 hrs | Tue 20.7.10 |
| 56 | **Chemical decontamination** | **144,2 days** | **Wed 14.4.10** |
| 57 | **Objekt FA facility (FA Facility Building)** | **144,2 days** | **Wed 14.4.10** |
| 58 | Podlažie Cellar +17,90 +18,50 | 189,12 hrs | Mon 17.5.10 |
| 59 | Podlažie First floor +24,50 | 23,33 hrs | Wed 14.4.10 |
| 60 | Podlažie Ground floor +21,50 | 114,13 hrs | Tue 12.10.10 |
| 61 | **Radiation monitoring of building surfaces** | **169,59 days** | **Fri 16.4.10** |
| 62 | **Objekt FA facility (FA Facility Building)** | **169,59 days** | **Fri 16.4.10** |
| 63 | Podlažie Cellar +17,90 +18,50 | 340,68 hrs | Fri 18.6.10 |
| 64 | Podlažie First floor +24,50 | 137,88 hrs | Fri 16.4.10 |
| 65 | Podlažie Ground floor +21,50 | 226,47 hrs | Tue 2.11.10 |
| 66 | **Site management** | **146,43 days** | **Fri 10.12.10** |
| 67 | **Demolition of building objects** | **76,64 days** | **Fri 10.12.10** |
| 68 | Podlažie | 613,15 hrs | Fri 10.12.10 |
| 69 | **Site cleanup** | **69,79 days** | **Tue 29.3.11** |
| 70 | Final cleanup and landscaping | 382,29 hrs | Tue 29.3.11 |
| 71 | Independent compliance verification with cleanup | 176 hrs | Fri 3.6.11 |
| 72 | **Supporting activities** | **460,5 days** | **Thu 24.9.09** |
| 73 | **Waste support activities** | **70,5 days** | **Thu 24.9.09** |
| 74 | Analyses for handling, packing, storing of waste | 386 hrs | Thu 24.9.09 |
| 75 | Analyses for waste transports | 212 hrs | Thu 24.9.09 |
| 76 | Special permits, packing and transport requirements | 352 hrs | Mon 2.11.09 |
| 77 | **Surveillance and maintenace** | **346 days** | **Fri 1.1.10** |
| 78 | Site security operation and surveillance | 1050 hrs | Fri 1.1.10 |
| 79 | Inspection and maintenance og buildings and systems in op | 1728 hrs | Fri 1.1.10 |
| 80 | Site keeping | 1220 hrs | Fri 1.1.10 |
| 81 | Energy and water | 2768 hrs | Fri 1.1.10 |
| 82 | **Management and technical support** | **456 days** | **Thu 1.10.09** |
| 83 | Mobilization of construction equipment and facilities | 344 hrs | Thu 1.10.09 |
| 84 | Mobilisation of personnel | 510 hrs | Thu 1.10.09 |
| 85 | Construct temporary utilities | 528 hrs | Thu 1.10.09 |
| 86 | Project manager and staff | 3120 hrs | Fri 1.1.10 |
| 87 | Public relations | 600 hrs | Tue 1.3.11 |
| 88 | Decommissioning support including chemistry, decontaminu | 1900 hrs | Fri 1.1.10 |



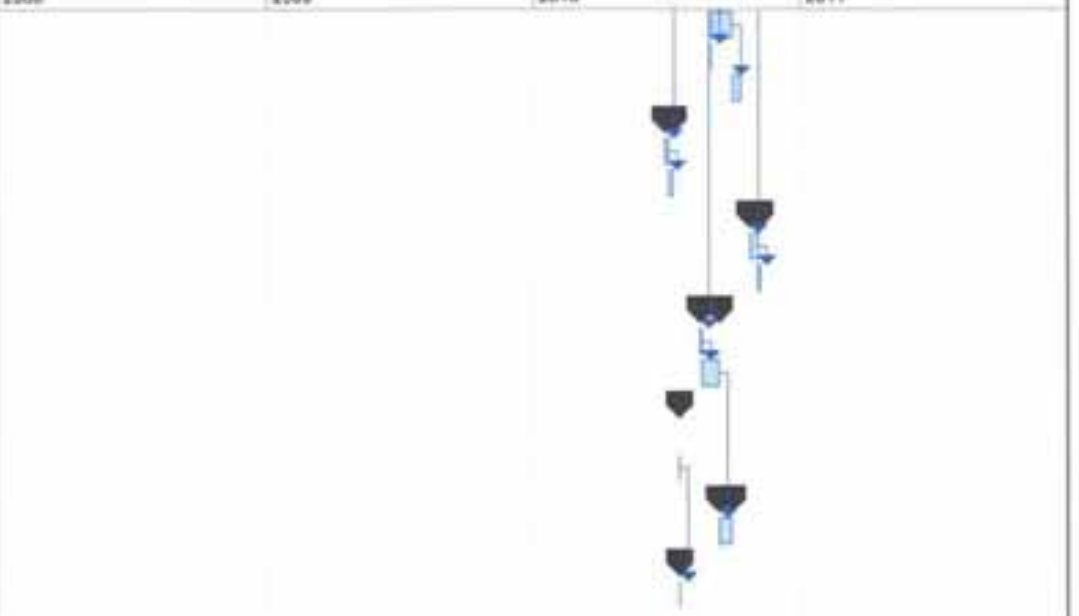
# Tentative decommissioning work breakdown structure

| ID | Activity | Duration | Start |
|---|---|---|---|
| 89 | Health physics support | 1904 hrs | Fri 1.1.10 |
| 90 | Removal of temporary facilities and cleanup | 520 hrs | Fri 1.4.11 |
| 91 | **Other supporting activities** | **107 days** | **Thu 1.10.09** |
| 92 | Implementation of transition plan | 856 hrs | Thu 1.10.09 |
| 93 | **Waste management** | **250,68 days** | **Mon 10.5.10** |
| 94 | **Sorting of metals** | **44,04 days** | **Thu 1.7.10** |
| 95 | Sorting of Fe-metals after dismantling | 352,29 hrs | Thu 1.7.10 |
| 96 | Fragmentation of Fe-metals lower then 3 kBq/cm2 | 339 hrs | Thu 1.7.10 |
| 97 | Fragmentation of Fe-metals over 3 kBq/cm2 | 106,28 hrs | Thu 1.7.10 |
| 98 | **Sorting of non-metals, color metas and cables** | **0,93 days** | **Thu 1.7.10** |
| 99 | Sorting of non metals after dismantling | 6,82 hrs | Thu 1.7.10 |
| 100 | Sorting of cables after dismantling | 0,92 hrs | Thu 1.7.10 |
| 101 | Sorting of color metals after dismantling | 7,4 hrs | Thu 1.7.10 |
| 102 | Fragmentation of cables | 0 hrs | Thu 1.7.10 |
| 103 | **Post-dismantling decontamination** | **45,13 days** | **Thu 1.7.10** |
| 104 | Chemical bath decontamination | 22,95 hrs | Mon 30.8.10 |
| 105 | Decontamination of color metals | 0 hrs | Mon 30.8.10 |
| 106 | Decontamination of cables - chemical | 0 hrs | Thu 1.7.10 |
| 107 | Decontamination of cables - mechanical | 0 hrs | Thu 1.7.10 |
| 108 | **Metling** | **37,19 days** | **Thu 2.9.10** |
| 109 | Melting of Fe-metals | 297,52 hrs | Thu 2.9.10 |
| 110 | **Supercompacting** | **0,17 days** | **Wed 1.9.10** |
| 111 | Low-pressure compacting | 1,37 hrs | Wed 1.9.10 |
| 112 | High-pressure compacting | 1,09 hrs | Wed 1.9.10 |
| 113 | **Incineration** | **1,03 days** | **Wed 1.9.10** |
| 114 | Incineration | 8 hrs | Wed 1.9.10 |
| 115 | Ash treatment | 0,25 hrs | Thu 2.9.10 |
| 116 | **Liquid waste treatment** | **0,5 days** | **Thu 1.7.10** |
| 117 | Evaporation | 3,99 hrs | Thu 1.7.10 |
| 118 | Bituminisation of concentrates | 0,93 hrs | Thu 1.7.10 |
| 119 | Bituminisation of ionexes | 0,02 hrs | Thu 1.7.10 |
| 120 | **Packaging of waste** | **20,97 days** | **Tue 20.7.10** |
| 121 | Cementation into drums | 3,64 hrs | Tue 20.7.10 |
| 122 | Cementation into final packages for surface disposal | 164,15 hrs | Tue 20.7.10 |
| 123 | Cementation into final packages for geological disposal | 0,06 hrs | Tue 20.7.10 |
| 124 | **Management of non-contaminated waste** | **168,65 days** | **Wed 1.9.10** |
| 125 | Recyclation of metals | 113,72 hrs | Wed 1.9.10 |
| 126 | Recyclation of other materials | 0 hrs | Wed 1.9.10 |
| 127 | Recyclation of civil construction materials | 155,74 hrs | Tue 29.3.11 |
| 128 | **Radiation monitoring and transport of metals into environm** | **28,63 days** | **Thu 2.9.10** |



# Tentative decommissioning work breakdown structure

| ID | Activity | Duration | Start |
|---|---|---|---|
| 129 | Radiation monitoring of steels before releasing into envoron | 172,24 hrs | Thu 2.9.10 |
| 130 | Radiation monitoring of color metals before releasing into e | 3,06 hrs | Thu 2.9.10 |
| 131 | Transport of steels and color metals for reuse | 56,03 hrs | Fri 1.10.10 |
| 132 | **Radiation monitoring and transport of non-metals into envir** | **6,83 days** | **Thu 1.7.10** |
| 133 | Radiation monitoring of non-metals before releasing into en | 19,13 hrs | Thu 1.7.10 |
| 134 | Transport of non-metals to standard repositories | 35,52 hrs | Tue 6.7.10 |
| 135 | **Radiation monitoring and transport of ingots from melting i** | **9,85 days** | **Mon 25.10.10** |
| 136 | Radiation monitoring of ingots | 74,38 hrs | Mon 25.10.10 |
| 137 | Transport of ingots for reuse | 4,44 hrs | Fri 5.11.10 |
| 138 | **Radiation monitoring and transport of final packages into su** | **17,96 days** | **Wed 18.8.10** |
| 139 | Radiation monitoring of final packages for surface disposal | 20,52 hrs | Wed 18.8.10 |
| 140 | Transport of final packages for surface disposal | 123,11 hrs | Fri 20.8.10 |
| 141 | **Radiation monitoring and transport of final packages into de** | **0,01 days** | **Tue 20.7.10** |
| 142 | Radiation monitoring of final packages for geological dispos | 0 hrs | Tue 20.7.10 |
| 143 | Traneport of final packages for geological disposal | 0,04 hrs | Tue 20.7.10 |
| 144 | **Disposal of final packages in surface repository** | **12,82 days** | **Mon 13.9.10** |
| 145 | Disposal of final packages in surface disposal | 102,59 hrs | Mon 13.9.10 |
| 146 | **Disposal of final packages in deep geological repository** | **0 days** | **Tue 20.7.10** |
| 147 | Disposal of final packages in geological disposal | 0,02 hrs | Tue 20.7.10 |
| 148 | **Contaminated soils** | **0 days** | **Mon 10.5.10** |
| 149 | Sorting of contaminated soils | 0 hrs | Mon 10.5.10 |
| 150 | Storing of contaminated soils | 0 hrs | Mon 10.5.10 |



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