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Simplified cost calculation

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1. Principles of the simplified costing approach

Main features of the simplified costing approach

- Used at preliminary costing stages

- Limited extent of input data. The facility inventory data are grouped. The extent of decommissioning categories is reduced (10 – 30).

-Extent of unit factors is limited to the extent of decommissioning categories and the extent of professions considered for personnel

- PSL structure can be used as the check list. The decommissioning activities are recommended to be organised according the PSL standardized list. The cost elements are calculated at the level lowest identified activity

- Cost elements are calculated according the chapter 12 of the PSL

- Manpower and labour cost unit factors calculation approach is used for labour cost

- Process cost are calculated using the cost factor approach
1. Principles of the simplified costing approach

- Principal scheme of simplified decommissioning costing approach

- Facility inventory data
  - Reduced extent of categories for costing, grouped inventory data

- Local calculation data
  - Working group data, collateral cost data

- Breakdown of decommissioning activities
  - (Base for calculation structure, recommended to be organized according the PSL)

- Calculation of costs elements for each elementary activity
  - (Bottom-up principle)

- Calculation parameters
  - (Unit factors, constants, ...)

- Calculation procedures
  - Hands on activities, period dependent activities, collateral cost

- Total calculated cost
  - (Recommended to be formatted in PSL structure)
1. Principles of the simplified costing approach

- **Inventory dependent activities**

**Cost drivers:**
- manpower unit factor for the category of input variable
- quantity of input variable
- personnel involved and their cost unit factors
- expenses cost unit factor
- investment cost unit factor

**Labor cost unit factors per profession**

**Overheads cost unit factors per profession**

**Personnel cost and overheads cost per profession of the working group, based on manpower components**

**Number of members for each profession**

**Manpower of the activity, including increase factors and non productive components**

**Elementary decommissioning activity**

**Media – electricity, water, gas, etc.**

**Materials and other consumables**

**Process cost per category of items of systems and structures, based on unit factors related to categories**

**Equipment cost**

**Spare parts for equipment used for the activity**
1. Principles of the simplified costing approach

- **Period dependent activities**

  Cost drivers:
  - **duration**
  - personnel involved,
  - their cost unit factors
  - period specific cost if identified

- **Collateral cost**

  Cost drivers:
  - **Fixed items introduced to cost calculation structure (investment, expenses)**

  Flowchart:
  - Labor cost unit factors per profession
  - Overheads cost unit factors per profession
  - Personnel cost and overheads cost per profession of the working group, based on manpower components
  - Number of members for each profession
  - Duration of the activity, defined by the user
  - Elementary decommissioning activity
  - Fixed cost (investment, expenses), defined by the user
  - Activity cost, not related to personnel
  - Period specific cost (investment, expenses), defined by the user
  - Duration of the activity, defined by the user
2. Preparation of the calculation structure

Procedure for preparation calculation structure for simplified decommissioning costing:

1) Identification of inventory items for the project
   - Developing the list of inventory items for the project based on documentation available, on-site inspection, interview of personnel
   - Identification of material properties, dimensions
   - Identification of radiological properties
   - Developing the list decommissioning categories based on the identified inventories

2) Identification of decommissioning activities for the project
   - Developing the list of decommissioning activities for the project
   - Identification of type of the decommissioning activities (inventory dependent, period dependent, auxiliary activities with fixed manpower, collateral costs)

3) Techniques for the inventory dependent activities
   - The techniques are defined for each decommissioning category
   - Definition of working groups for techniques
   - Developing the manpower unit factors for individual techniques
   - Developing the cost unit factors for techniques as expenses and investment cost unit factors
2. Preparation of the calculation structure

Procedure for preparation calculation structure for simplified decommissioning costing, cont.:

4) Definition of working groups for decommissioning activities
   - For inventory dependent activities the working groups are taken from the list of techniques
   - For period dependent activities are the working groups defined individually for each activity

5) Definition of duration of period dependent activities
   - The duration of activities related to development of documentation is defined based on experience
   - The duration of activities related to phases of decommissioning project is defined based on duration of phases (mostly defined as critical path)

6) Allocation of inventory input data and calculation data for inventory dependent activities
   - Allocation of inventory data to individual calculation items
   - Allocation of unit factors to individual calculation items
2. Preparation of the calculation structure

Procedure for preparation calculation structure for simplified decommissioning costing, cont.:

7) Constraints for inventory dependent activities, non productive working time components
   - Identification of working constraints for individual activities
   - Allocation of relevant increase factors for individual activities
   - Allocation of coefficients for non productive working time components

8) Allocation of contingency specific for individual calculation items
   - Definition of contingency range for each calculation item
3. Calculation procedure

Procedure for calculation of cost in simplified decommissioning costing:

1) Calculation of manpower for individual activities
   - Manpower for inventory dependent activities is calculated based on input variables and manpower unit factors
   - Calculated basic manpower is increased for increase factors and for non-productive working time components
   - Total manpower is distributed to professions of the working group
   - Manpower for period dependent activities is calculated as product of duration and total number of members of the working group and is distributed to individual members of the working group

2) Calculation of labour cost
   - Labour cost are calculated according the single labour cost unit factor and manpower component for each profession

3) Calculation of overheads related to personnel
   - Overheads are calculated according the single overheads cost unit factor and manpower component for each profession
Procedure for calculation of cost for inventory dependent activities

- **Source of data**
  - Facility inventory database
  - Calculation steps
  - Database of unit factors
  - Local data for calculation (keyboard data)
  - Data calculated in previous calculation steps

**Calculation sequence**

1. **Input variable, mass, area, ...** [var]
2. Decommissioning category of the calculation item
3. Calculation item located within CA [YES-NO]
4. Working constrain factor 1
5. Working constrain factor 2
6. Working constrain factor N
7. Calculation of duration of the activity
8. Total number of workers per calculation item
9. Total basic manpower per calculation item [man.hours]
10. Unit factor for technology [man.hours/var]
11. Total manpower extended for non-productive working time components [man.hours]
12. Items of non-productive working time components for CA and outside of CA [%]
13. Increase factors for individual working constraints [%]
14. Composition of the working group [N₁, N₂, ...Nₙ]
15. Compositor of the working group per professions [%]
16. Distribution of total manpower per individual professions of the working group
17. Manpower for profession 1 [hours]
18. Manpower for profession 2 [hours]
19. Manpower for profession N [hours]

CA – controlled area
var – input variable
3. Procedure

- Procedure for calculation of labour cost
  - The same procedure is used for calculation of overheads expenses based on manpower components and overheads cost ratios for professions

**Source of data**
- Facility inventory database
- Database of unit factors
- Local data for calculation (keyboard data)
- Data calculated in previous calculation steps

**Sequence of calculation**

**Results**
- Total labour cost [CUR]
- Overall labour rates per profession [CUR/hour]
- Manpower per profession [hours]

**Total labour cost per calculation item – sum per all professions**

**CUR** - currency
3. Calculation procedure

Procedure for calculation of cost in simplified decommissioning costing:

4) Calculation of investment cost and expenses for inventory dependent activities
   - Calculation of investment cost based on investment cost unit factors and input variables
   - Calculation of expenses based on expenses cost unit factors and input variables

5) Calculation of investment cost and expenses for period dependent activities and for collateral cost items
   - Fixed cost items are introduced into the calculation structure as fixed values
   - Period specific items are calculated based on duration and period specific cost factor

6) Calculation of contingency
   - Contingency is calculated as single item per calculation item based on sum of labour cost, investment cost and expenses and the percentage of contingency defined for the calculation item

7) Formatting of data
   - The calculated cost are presented according the structure of the chapter 12 of the PSL structure
3. Procedure

- Procedure for calculation of investment cost
- The same procedure is applied for calculation of expenses

**Source of input data**
- Facility inventory database
- Calculation step
- Database of unit factors
- Local data for calculation (keyboard data)
- Data calculated in previous calculation steps

**Calculation sequence**
- Value of input variable [var] mass, area, ...
- Calculation of investment cost [CUR]
- Investment cost unit factors [CUR/var]
- Sum of all items of investment
- Investment dependent on duration
- Period specific investment
- Fixed value investment
- Fixed value of investment
- Calculated duration of the activity

**Results**

**Value of input variable**
- [var] mass, area, ...

**Calculation of investment cost**
- Investment cost unit factors [CUR/var]

**Sum of all items of investment**
- Investment dependent on duration
- Period specific investment
- Fixed value investment

**Investment cost unit factors**
- Fixed value of investment
- Calculated duration of the activity

**Database of unit factors**
- Local data for calculation (keyboard data)
- Data calculated in previous calculation steps

**Facility inventory database**
- Calculation step
- Value of input variable [var] mass, area, ...

**Local data for calculation**
- Database of unit factors
- Data calculated in previous calculation steps

**Data calculated in previous calculation steps**
- Database of unit factors
- Local data for calculation (keyboard data)
- Data calculated in previous calculation steps

**Procedural steps**

- Calculation of investment cost
- Sum of all items of investment
- Investment dependent on duration
- Period specific investment
- Fixed value investment
- Calculated duration of the activity
3. Procedure

- Procedure for calculation of contingency

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<thead>
<tr>
<th>Source of data</th>
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<tbody>
<tr>
<td>Facility inventory database</td>
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<td>Calculation step</td>
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<th>Sequence of calculation</th>
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<td>Contingency ratio specific for calculation item [%]</td>
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<table>
<thead>
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<th>Results</th>
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<tbody>
<tr>
<td>Total contingency per calculation item</td>
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<tr>
<td>Sum of labour cost, investment and expenses</td>
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<tr>
<td>CUR - currency</td>
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