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# SDU-503 - Instruction for development and handling of the SKB FEP database - version SR-PSU

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# 1 Introduction

This document contains instructions for the development and handling of the SKB FEP database in the project SR-PSU. The instruction is based on instructions developed for the SR-Site project (SKBdoc 1082126).

The starting point for the development of the SR-PSU version of the SKB FEP database is the SR-Site version of the database (including the NEA FEP database version 2.1 (NEA 2006)) and the interaction matrices for SFR 1 (SKB 2001, SKB 2008). The database was created with the database software FileMaker Pro, (version 5.5), which is the same database software as was used to set up the NEA FEP database (NEA 2006) and the Interaction matrices for SFR (SKB 2001, SKB 2008). The structure and content of the FEP database, version SR-Site, is documented in the SR-Site FEP report (SKB 2010) and the overall structure is shown in Figure 1. The preliminary structure of the SR-PSU part of the FEP database version SR-PSU is shown in Figure 2.

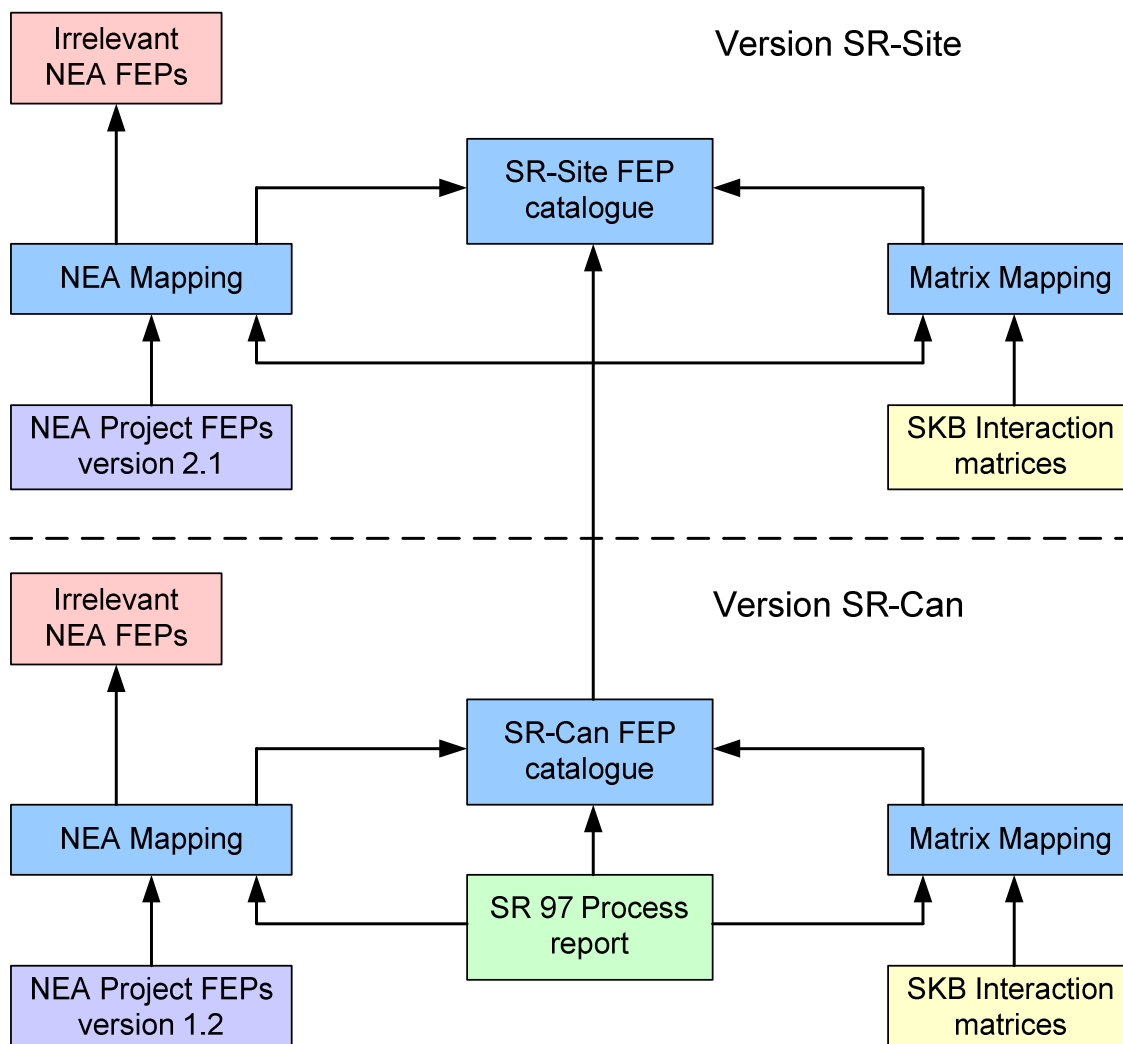


Figure 1. Overall structure of the SKB FEP database version SR-Site (SKB 2010).

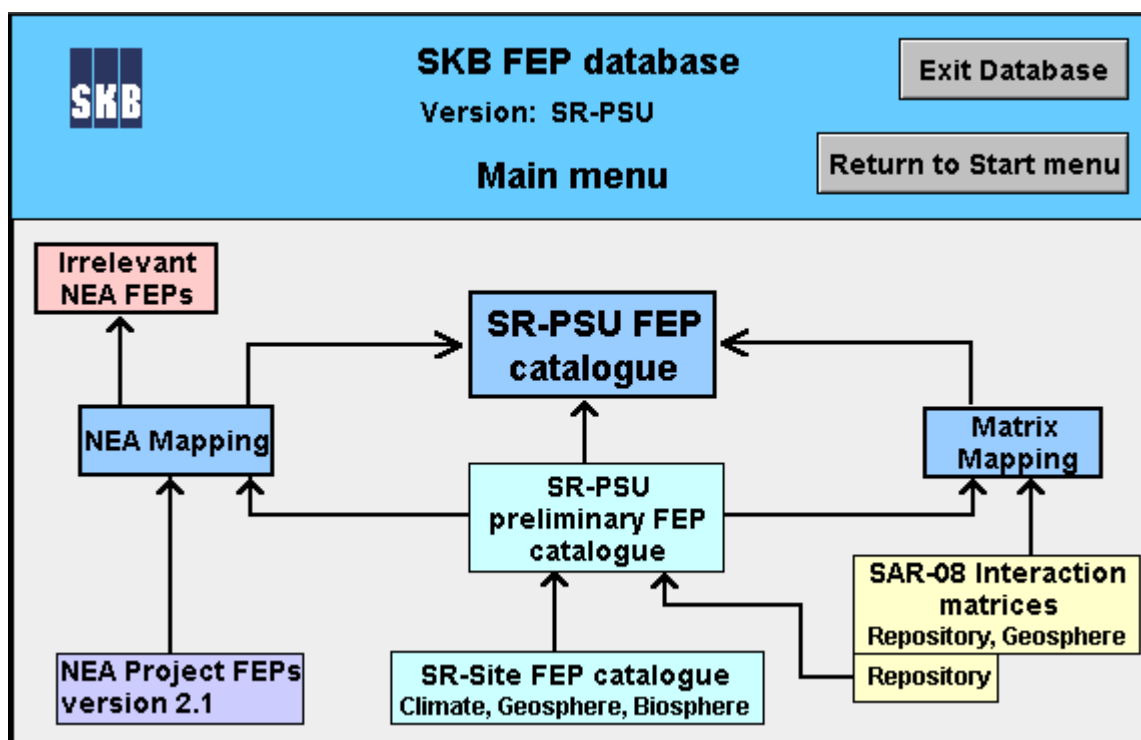


Figure 2. Preliminary structure of the SR-PSU part of the SKB FEP database version SR-PSU.

## 2 Objective and scope

The SKB FEP database is in itself regarded as a quality assurance instrument in that it is used as a tool for documentation of the outcome of different steps in the FEP processing procedure as the work proceeds. The main objective of the instructions in this document is to ensure that the FEP database contains the documentation necessary to demonstrate:

- that all factors relevant for long-term safety occurring in the international NEA FEP database and in earlier version of SKB databases (interaction matrix documentations) have been considered in the assessment
- that the exclusion of any of these factors is well motivated by an identifiable expert, and
- that the handling of included factors are well motivated by identifiable experts.

The instructions in this document focus on activities related to the development and management of the SKB FEP database and are directed to the SR-PSU FEP team. Defined procedures for the FEP processing to be carried out by assigned experts are described in a separate document with instructions for developing process descriptions (SKBdoc 1196630). This further processing is reported in the “Associated topic reports” that includes the Waste process report, Barrier process report, Geosphere process report, Biosphere process report, Climate report, Initial state report and the Future human actions report.

## 3 Establishment of the SR-PSU FEP catalogue

Based on the existing FEP catalogues for SR-Site and the interaction matrices for the repository SFR 1 a suggestion on the structure and content of the SR-PSU FEP catalogue is made. The structure and/or content are possible to adjust in agreement between the responsible for the associated topic reports and the SR-PSU FEP team.

The SR-PSU FEP catalogue is incorporated in the SR-PSU part of the SKB FEP database. All internal processes, initial states and external factors should have a corresponding record in the FEP catalogue.

In addition, the records should contain references to the appropriate sections in the SR-PSU reports, e.g. Process Reports.

**Responsible:** SR-PSU FEP team for providing suggestions on the structure and content of the FEP catalogue and for implementing the FEP catalogue in the SKB FEP database.

## 4 Handling of NEA FEPs

### 4.1 Record with NEA Project FEPs

The SR-PSU part of the SKB FEP database includes a register with records of all project FEPs in the International NEA FEP database (version 2.1), one record for each Project FEP. The records in this register, NEA Mapping, were created by exporting the Project FEP number, the Project FEP name and the International FEP number from the digital version of the NEA FEP database (register PROFEP) to corresponding records in the NEA Mapping register in the SKB database. In addition, the SKB FEP database contains a copy of the register PROFEP in the NEA database. This copy of the PROFEP register, NEA Project FEPs, is in the SKB FEP database only used to display the description of the NEA Project FEPs. This is done in the register NEA Mapping, by displaying the NEA FEP description field of the records in the register NEA Project FEPs. No documentation or modifications are allowed in the records in the register NEA Project FEPs.

### 4.2 Screening of NEA FEPs

In developing the SR-PSU part of the SKB FEP database, the relevance of each NEA Project FEP for the SFR repository system is judged following certain relevance criteria. These criteria were defined by the SR-PSU FEP team. The FEP could be screened out if one of the following criteria was fulfilled:

- The FEP is not appropriate for the actual waste, waste packaging, repository design, geological or geographical setting.
- The FEP is defined by a heading without any description of what is meant by the heading, but from the interpretation of the heading it is judged that the FEP is covered by other NEA Project FEPs.
- The FEP is very general and covered by other more specific NEA Project FEPs.

It should also be noted that the general strategy in the screening of FEP relevance is to judge FEPs as relevant rather than to screen them out at this stage, unless it is clearly obvious that they are irrelevant. By this approach, the decision regarding the FEP relevance and motivations for the decision was left to the different experts that are involved in the further processing of the audit results (see Sections 4.4 and 4.5).

Screening of NEA FEPs following these criteria is done by the SR-PSU FEP team and the reason for assessing a FEP as not relevant is documented in the FEP record in the NEA Mapping register. All NEA FEPs assessed as not relevant for the SFR repository system and the arguments behind the omission are displayed in the register "Irrelevant NEA FEPs" and thus accessible for external review. No further QA actions regarding the handling of this group of NEA FEPs in the SKB FEP database are therefore needed.

### 4.3 Classification of NEA FEPs

All NEA FEPs assessed as relevant for the SFR repository system are classified into one or more of the following categories:

- Internal processes
- Variable/Initial state
- Biosphere

- External factors
- Methodology issues (Assessment basis/methodology comment)

The FEPs sorted to these categories are further handled by the responsible for the associated topic reports in the development of the final version of the SKB FEP database according to the instructions given in Sections 4.4 - 4.6.

#### **4.4 NEA project FEPs related to Internal processes and Biosphere**

NEA Project FEPs classified as internal processes are also linked to one or several processes defined for the different repository system components and the geosphere in the FEP catalogue. These NEA Project FEPs and NEA Project FEPs classified to the Biosphere system are further handled by the responsible for the process reports as part of the procedure of developing process reports for the different system components, see separate document on instructions for developing process descriptions (SKBdoc 1196630). Actions related to the export of information to, and imports of information from, this activity are listed below.

##### **1. Export of information from interim version of the database**

For each system component, a list of processes and lists of NEA Project FEPs linked to each process are exported to digital word-documents. These documents are delivered to the responsible for the process reports for further handling according to the instructions for developing process descriptions.

**Responsible:** SR-PSU FEP team.

##### **2. Check of results of processing of FEPs**

The responsible for the process reports provide documents describing if NEA Project FEPs are handled or not, and in the latter case, reasons for not handled. The completeness of this documentation is checked.

**Responsible:** SR-PSU FEP team.

##### **3. Documentation in the SKB FEP database of results of processing of FEPs**

For each NEA Project FEP, the handling in SR-PSU according to the documentation delivered by the responsible for the process reports is documented in the SKB FEP database. In addition, the responsible for the documentation of handling of NEA project FEPs is documented in the appropriate record in these registers as well as the date of the original document.

**Responsible:** SR-PSU FEP team.

#### **4.5 NEA project FEPs related to the Initial states of system components and to External factors**

All NEA Project FEPs classified as belonging to the Initial state of a system component or to External factors are revisited and the handling in SR-PSU is documented. Actions related to the export of information to, and import of information from, this activity are listed below.

##### **1. Export of information from interim version of the database.**

Lists of NEA Project FEPs associated to the Initial states of the SR-PSU system components and to External factors are exported from the SKB FEP database to digital word-documents. These documents are delivered to the assigned responsible for the Initial state report, Climate report and FHA-report in SR-PSU.

**Responsible:** SR-PSU FEP team.

##### **2. Check of results of processing of FEPs**

The responsible for the Initial state report, the Climate report and the FHA-report provide documents describing if NEA Project FEPs are handled or not, and in the latter case, reasons for not handled. The completeness of this documentation should be checked.

**Responsible:** SR-PSU FEP team.

### 3. Documentation in the SKB FEP database of results of processing of FEPs

For each NEA Project FEP, the handling in SR-PSU according to the documentation delivered by the responsible for the Initial state report, Climate report and FHA-report is documented in the SKB FEP database. In addition, the responsible for the documentation of handling of NEA project FEPs is documented in the appropriate record in these registers as well as the date of the original document.

**Responsible:** SR-PSU FEP team.

## 4.6 NEA project FEPs related to Methodology issues

NEA project FEPs related to Methodology issues are delivered to the responsible for the SR-PSU Main report for further treatment.

## 5 Handling of matrix interactions

In the SAFE/SAR-08 projects three interaction matrices were handled: one repository/near-field matrix, one geosphere matrix, and one biosphere matrix. The biosphere matrix has been further developed within the SR-Can and SR-Site projects. The biosphere matrix was also used to set up the SR-Site FEP catalogue (SKB 2010) that is used as a basis for the preliminary SR-PSU FEP catalogue. Hence, only the matrices for the repository and the geosphere need to be revisited.

### 5.1 Import of matrix interactions

The procedures for importing the information in the SFR 1 Interaction matrices into the SKB FEP database are similar to those for importing the NEA Project FEPs.

- 1) All records in the original database registers from SAFE (SKB 2001) for the SFR 1 Repository matrix and Geosphere matrix are copied into one new SKB FEP database register named SAR-08 Interaction matrices (see Figure 2).
- 2) The information is updated with the modifications made in SAR-08 (SKB 2008).
- 3) An additional SKB FEP register is created, Matrix mapping, by importing the Matrix name, the interaction number and interaction name from the register SAR-08 Interaction matrices to corresponding records in the matrix mapping register. The register SAR-08 Interaction matrices is only used to display the definitions of the interactions, which is done via the register Matrix mapping. No documentation or modification of the content in the register SAR-08 Interaction matrices is allowed.

### 5.2 Classification of matrix interactions

All SFR matrix interactions are classified in the same way as the NEA FEPs, see Section 4.2. Since only the matrices for the repository and the geosphere are revisited, this classification will only use part of the classification system. The matrix interactions are in general related to internal processes and Variable/Initial state, only.

### 5.3 Handling of classified matrix interactions

The handling of the classified matrix interactions are done in the same way as for the NEA FEPs, see Section 4.4 and 4.5. Lists of matrix interactions linked to the internal processes and Variables/Initial states in the SR-PSU FEP catalogue are exported from the SKB FEP database to digital word-documents. These documents are treated by the SR-PSU FEP team, but if ambiguities are identified, the responsible for the associated topic reports are consulted.

## 6 Final check of the SKB FEP database version SR-PSU

Before delivering a final version of the SR-PSU FEP database, the content of the database is checked. For this purpose, a checklist is developed to ensure e.g. that:

- All NEA Project FEPs in version 2.1 of the NEA FEP database are included in the SR-PSU part of the SKB FEP database.
- All matrix interactions in the Repository, Geosphere and Biosphere matrices from SAR-08 are included in the SKB FEP database,
- All NEA Project FEPs and matrix interactions included in the SR-PSU part of the SKB FEP database are flagged as Relevant or Not relevant for the SFR repository system,
- All NEA Project FEPs and matrix interactions included in the SR-PSU part of the SKB FEP database and flagged as Not relevant for the SFR repository system have a motivation documented for the omission,
- All NEA Project FEPs and matrix interactions included in the SR-PSU part of the SKB FEP database and flagged as Relevant for the SFR repository system have a documented description of the handling in PSU,
- All processes in process reports, defined categories of initial states, defined external factors, etc have a corresponding record in the SR-PSU FEP catalogue register.

The checklist and the outcome of the check should be included as an appendix in the PSU FEP report.

## 7 General instructions for development and handling of the SKB FEP database

Some general instructions for the handling of the SR-PSU part of the SKB FEP database are listed below:

- Just one person is allowed to make modifications to the structure and content of the database. For the moment this person is Kristina Skagius.
- Suggested major modifications in structure of the database should be checked and approved by the Project Manager.
- Input of information to the database shall only be made from documents provided by responsible for associated topic reports, and that are signed and dated.
- An informal log should be active during development to keep track of actions needed and made.
- The handling of versions of the database is informal during the development. Dated copies will be saved at regular intervals during the work. The final version is named the SR-PSU version.
- Final official version is made available as a stand alone version, i.e. write-protected and without access to layout changes.

## 8 References

**NEA, 2006.** Safety assessment of radioactive waste repositories – An international database of features, events and processes. A report on of the NEA working group on development of a Database of Features, Events and Processes Relevant to the Assessment of Post-closure Safety of Radioactive Waste Repositories. Nuclear Agency of the Organisation for Economic Cooperation and Development (OECD/NEA), Paris. Electronic version 2.1 of the NEA FEP Database developed on behalf of the Nuclear Energy Agency by Safety Assessment Management Ltd.

**SKB, 2001.** Project SAFE. Scenario and system analysis. SKB R-01-13, Svensk Kärnbränslehantering AB.

**SKB, 2008.** Project SFR 1 SAR-08. Update of priority of FEPs from Project SAFE, SKB R-08-12, Svensk kärnbränslehantering AB.

**SKB, 2010.** FEP report for the safety assessment SR-Site. SKB TR-10-45, Svensk Kärnbränslehantering AB.

**SKBdoc 1082126.** INSTRUCTION FOR DEVELOPMENT AND HANDLING OF THE SKB FEP DATABASE - VERSION SR-SITE.

**SKBdoc 1196630.** SDU-502 Instruction for developing process descriptions in SR-PSU.

## Register of revisions

Version	Date	Content of revision	Carried out by	Reviewed by	Approved by
1.0	2012-05-22	Created document	See heading	See heading	See heading
2.0	2015-07-03	Minor editorial changes and adjustments to actual approach.	See heading	See heading	See heading