Internal information

Instruction

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INSTRUCTION FOR DEVELOPMENT AND HANDLING OF THE SKB FEP DATABASE - VERSION SR-SITE

APPENDIX 1 to 1064228 – Quality assurance plan for the safety assessment SR-Site

Contents

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1. Introduction

This document contains instructions for the development and handling of the SKB FEP database in the projects SR-Can and SR-Site. The instructions were developed for and first applied in the SR-Can project. The same instructions are valid for any further development that will be undertaken in SR-Site.

The point of departure for the main part of the work guided by these instructions are the interim SR-Can version of the FEP database as reported in /SKB 2004/. Quality assurance aspects of the interim version of the SR-Can FEP database are described in Section 4.1.

The main activities that were part of the work of updating the interim version to the final SR-Can version of the SKB FEP database are listed below, with reference to other sections of this document for more information. These main activities were:
1. Handling of process related FEPs and matrix interactions (see section 4.2)
2. Handling of FEPs and matrix interactions related to initial states and external factors (see Section 4.3)
3. Establishment of the SR-Can FEP catalogue (see Section 4.4)
4. Final check of the SKB FEP database, version SR-Can (see Section 4.4)

These activities are also summarized in the SR-Can FEP report /SKB 2006/ in Section 2.3 and in Appendix 2, where the result of the final check (point 4 above) is documented.

The main activities that are part of the work of updating the SR-Can version to the SR-Site version of the FEP database are described in Section 3 where also references are given to the applicable SR-Can instructions.

More general instructions related to the development and handling of the SKB FEP database are listed in Section 5.

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 manager of the FEP database (Kristina Skagius). 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 ID1082127). The procedure for assignment of experts is also described in a separate document (SKBdoc ID1096716, in preparation).

3. SKB FEP database – version SR-Site

3.1 General

The starting point for the development of the version SR-Site of the SKB FEP database is the SR-Can version of the database together with an updated version of the NEA FEP database (version 2.1) /NEA, 2006/.

The structure and content of the FEP database, version SR-Can, is documented in the SR-Can FEP report /SKB 2006/ and the overall structure is shown in *Figure 3-1*.

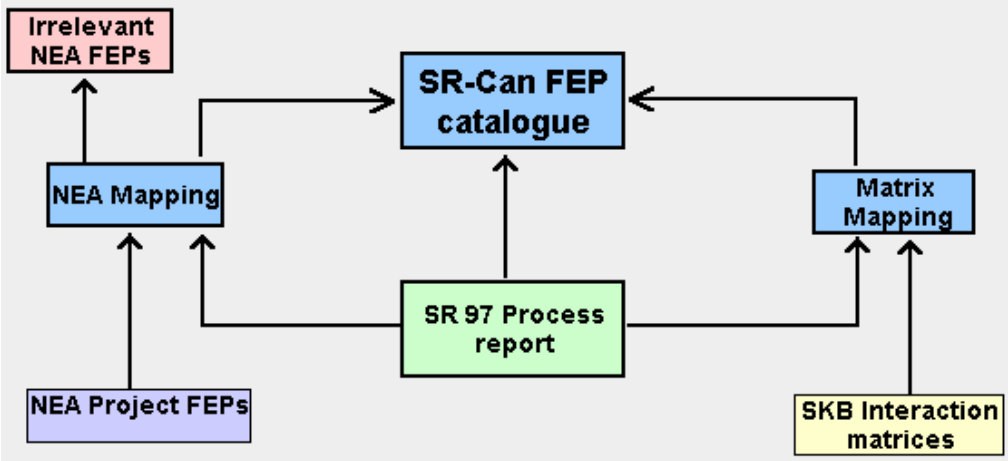

Figure 3-1. *Overall structure of the SKB FEP database version SR-Can.*

A new version of the NEA FEP database, version 2.1, was released late 2006 /NEA, 2006/. Compared with the previous version 1.2 /NEA, 1999/, this version contains two additional catalogues with project specific FEPs. These are:

- SCK.CEN Catalogue relevant to disposal in Boom Clay, 1994
- SKI Encyclopedia of FEPs for SFR and spent fuel repositories, 2002.

The objectives of the FEP processing work in SR-Site is to update the FEP database with new information from the most recent NEA FEP database and to revisit, and where needed, update the SR-Can documentation in the database. The main activities that are part of the work of updating the SR-Can version are listed below together with a reference to the sections where the activities are described. The activities are:

- Import of all NEA project FEPs that are new in the version 2.1 of the NEA FEP database (see Section 3.2)
- Screening and classification of all new NEA project FEPs (see Section 3.3)
- Further processing of NEA project FEPs (see Section 3.4)
- Establishment of the SR-Site FEP catalogue and the SKB FEP database – version SR-Site (see Section 3.5).

3.2 Import of new NEA project FEPs

The NEA Project FEPs register in the SR-Can version of the FEP database is replaced by the NEA Project FEP file in the version 2.1 of the NEA FEP database. Records are added to the NEA mapping register (see *Figure 4-1*), one for each NEA Project FEP that is new compared with version 1.2 of the NEA FEP database. This is done 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 FEP database (see also Section 4.1.1).

3.3 Screening and classification of new NEA FEPs

All new NEA Project FEPs are screened and classified following the same procedures as used in the SR-Can FEP processing work and described in Sections 4.1.2 and 4.1.3.

3.4 Further processing of NEA Project FEPs

All new NEA Project FEPs are linked to appropriate FEPs in the SR-Can FEP catalogue. NEA Project FEPs that cannot be sorted to any FEP in the SR-Can FEP catalogue are compiled in a separate list. The content of this list is discussed with the assigned experts to sort out the linking or if there is a need for adding new FEPs to the SR-Site FEP catalogue.

Tables containing all NEA FEPs sorted to each SR-Can FEP and a description of the handling of each NEA FEP in SR-Can for those NEA FEPs that were treated in SR-Can are exported from the SKB FEP database to digital word documents. These documents are delivered to the assigned experts for review and, where needed, update of the SR-Can documentation, as well as for documentation of the handling of NEA Project FEPs that are new in the version 2.1 of the NEA FEP database. In addition, the documentation of the handling of matrix interactions that are missing in the SR-Can version of the SKB FEP database is completed. In principle, these activities are following the same procedures as those defined for the SR-Can work and that are described in Sections 4.2 and 4.3.

3.5 Establishment of the SR-Site FEP catalogue and the SKB FEP database – version SR-Site

The procedures for establishing the SR-Site FEP catalogue and for producing the final version of the SKB FEP database – version SR-Site are the same as those defined for the SR-Can version of the FEP database. These procedures are described in Sections 4.4 and 4.5.

4. SKB FEP database – version SR-Can

4.1 Quality assurance of the SR-Can interim version of the FEP database

4.1.1 Import of NEA Project FEPs and SR 97 matrix interactions

The interim version of the SKB FEP database contains a register with records of all project FEPs in the International NEA FEP database (version 1.2), one record for each Project FEP. The records in this register, NEA Mapping, (see Figure 4-1) 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 in *Figure 4-1*, 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. However, it should be noted that during the work with the development of the interim version of the FEP database it was found that descriptions were missing for two of the Project FEPs in the NEA FEP database version 1.2. After confirmation from the responsible for the version 1.2 of the NEA FEP database (T. Summerling), the description of these FEPs in version 1.0

of the NEA FEP database /NEA, 1997/ was copied into the NEA Project FEPs register in the SKB FEP database.

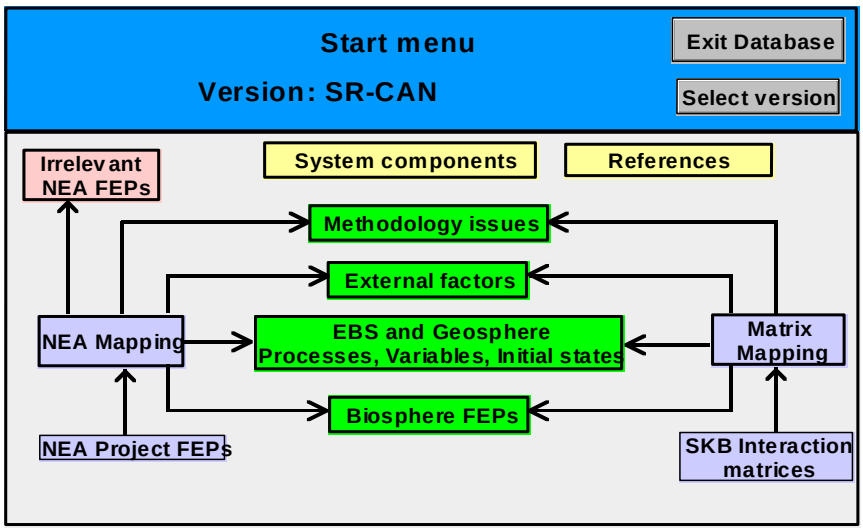

Figure 4-1. *Structure of the SR-Can interim version of the FEP database.*

The procedures for importing the information in the SR 97 Interaction matrices into the SKB FEP database were similar to those for importing the NEA Project FEPs. All records in the original database registers for the SR 97 Buffer matrix, Near-field matrix and Far-Field matrix were copied into one new SKB FEP database register named SKB Interaction matrices (see *Figure 4-1*). An additional SKB FEP register was created, Matrix mapping, by importing the Matrix name, the interaction number and interaction name from the register SKB Interaction matrices to corresponding records in the matrix mapping register. The register SKB 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 SKB Interaction matrices is allowed.

4.1.2 Screening of NEA FEPs and matrix interactions

In developing the interim version of the SKB FEP database, the relevance of each NEA Project FEP for the SKB repository system was judged following certain relevance criteria. These criteria were defined by the FEP group (Allan Hedin, Johan Andersson, Kristina Skagius). The FEP could be screened out if one of the following criteria was fulfilled:

- The FEP is not appropriate for the actual waste, canister design, 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 was 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 4.2 and 4.3).

Screening of NEA FEPs following these criteria was done by Kristina Skagius and the reason for assessing a FEP as not relevant was documented in the FEP record in the NEA Mapping register.

All NEA FEPs assessed as not relevant for the SKB 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 interim version of the SKB FEP database are therefore needed.

4.1.3 Classification of NEA FEPs and matrix interactions

In the interim version of the SKB FEP database, all NEA FEPs assessed as relevant for the SKB repository system and all matrix interactions are classified into one or more of the following categories:

- System process
- Variable/Initial state
- Biosphere
- External factor
- Methodology issues (Assessment basis/methodology comment)

The FEPs sorted to these categories were further handled by different experts in the development of the final version of the SKB FEP database according to the instructions given in Sections 4.2 and 4.3.

4.2 Handling of process-related NEA FEPs and matrix interactions

In the interim version of the SKB FEP database, all NEA Project FEPs and matrix interactions classified as related to internal processes are also linked to a certain EBS or geosphere process in the database (register EBS and geosphere processes, variables initial states in *Figure 4-1*). The processes included in the interim version of the database are in essence those included in the SR 97 Process Report, with some modifications as a result of the audit of the NEA Project FEPs and Interaction matrix documentation.

In the interim version of the SKB FEP database, NEA Project FEPs and matrix interactions classified as belonging to the Biosphere system are considered in the development of a process report for the biosphere system.

These processes and NEA Project FEPs and matrix interactions linked to the processes or to the Biosphere system are further handled by assigned experts in the procedure of developing process reports for the different system components, see separate document on instructions for developing process descriptions. 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.**
   For each system component, a list of processes and lists of NEA Project FEPs and matrix interactions are exported to digital word-documents. These documents are delivered to the assigned experts for further handling according to the instructions for developing process descriptions.
   Responsible: Kristina Skagius.

2. **Check of results of processing of FEPs and matrix interactions.**
   The experts provide documents with descriptions on 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: Kristina Skagius.

3. **Documentation in the SKB FEP database of results of processing of FEPs and matrix interactions.**

For each NEA Project FEP and Matrix interaction, the handling in SR-Can according to the documentation by the experts is documented in the SKB FEP database. In addition, the expert responsible for the documentation of handling of NEA project FEPs and matrix interactions is documented in the appropriate record in these registers as well as the date of the original document.
Responsible: Kristina Skagius.

4.3 Handling of NEA project FEPs and matrix interactions related to the Initial states of system components and to External factors

All NEA Project FEPs and matrix interactions classified as belonging to the Initial state of a system component or to External factors in the interim version of the SKB FEP database are revisited and the handling in SR-Can are 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 and matrix interactions related to the Initial states of system components are exported from the SKB FEP database to digital word-documents. These documents are delivered to the assigned experts for documentation of handling in SR-Can.
   Responsible: Kristina Skagius.

2. **Check of results of processing of FEPs and matrix interactions.**
   The experts provide documents with descriptions on 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: Kristina Skagius.

3. **Documentation in the SKB FEP database of results of processing of FEPs and matrix interactions.**
   For each NEA Project FEP and Matrix interaction, the handling in SR-Can according to the documentation by the experts is documented in the SKB FEP database. In addition, the expert responsible for the documentation of handling of NEA project FEPs and matrix interactions is documented in the appropriate record in these registers as well as the date of the original document.

4.4 Establishment of the SR-Can FEP catalogue

Based on the documented results of the experts as described above, an SR-Can FEP catalogue is developed and incorporated in the SKB FEP database. All internal processes, Initial states and External factors provided by the experts should have a corresponding record in the FEP catalogue. In addition, the records should contain references to the appropriate sections in the SR-Can reports, e.g. Process Reports.
Responsible: Kristina Skagius for providing suggestions on the structure of the FEP catalogue, the Project manager Allan Hedin for decision on the structure, Kristina Skagius for implementing the FEP catalogue in the SKB FEP database.

4.5 Final check of the SKB FEP database version SR-Can

Before delivering a final version of the SR-Can 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 1.2 of the NEA FEP database are included in the SKB FEP database,
- All matrix interactions in the SR 97 Buffer, Near-field and Far-field matrices are included in the SKB FEP database,

- All NEA Project FEPs and matrix interactions included in the SKB FEP database are flagged as Relevant or Not relevant for the SKB repository system,
- All NEA Project FEPs and matrix interactions included in the SKB FEP database and flagged as Not relevant for the SKB repository system have a motivation documented for the omission,
- All NEA Project FEPs and matrix interactions included in the SKB FEP database and flagged as Relevant for the SKB repository system have a documented description of the handling in SR-Can,
- All processes in process reports, defined categories of initial states, defined external factors, etc have a corresponding record in SKB FEP catalogue register.

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

5. General instructions for development and handling of the SKB FEP database

Some general instructions for the handling 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 modifications in structure of the database should be checked and approved by the Project Manager Allan Hedin.
- Input of information to the database shall only be made from documents provided by assigned experts, and that are signed by these experts 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. Final version is named SR-Can/SR-Site version.
- Final official version is made available as a stand alone version, i.e. write-protected and without access to layout changes.

6. References

NEA, 1977. 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 1.0 of the NEA FEP Database.

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SKB, 2004. Interim FEP report for the safety assessment SR-Can. SKB R-04-32, Svensk Kärnbränslehantering AB.

SKB, 2006. FEP report for the safety assessment SR-Can. SKB TR-06-20, Svensk Kärnbränslehantering AB.

Register of revisions

Version	Date	Content of revision	Made by	Reviewed by	Approved by
1.0	See head of first page	New document	Kristina Skagius-Elert	Christina Lilja	Allan Hedin