LLW Repository Ltd

LLWR Environmental Safety Case

User Guide for the LLWR FEPs and Uncertainty Tracking System: Version 1

A report prepared by the National Nuclear Laboratory Ltd. for and on behalf of the Low Level Waste Repository Site Licence Company.

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National Nuclear Laboratory

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Candida Lean and Chris Lennon, April 2010

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EXECUTIVE SUMMARY

The Low Level Waste Repository (LLWR) near the village of Drigg is the UK's principal facility for the disposal of solid low level radioactive waste (LLW). The LLWR Site License Company (SLC), LLW Repository Ltd., is currently undertaking a programme of work leading to the production of an Environmental Safety Case by May 2011 (2011 ESC). The 2011 ESC will be submitted to the Environment Agency in order to satisfy Requirement 6 of Schedule 9 of the LLWR's current Authorisation.

Demonstration of appropriate treatment and management of Features, Events and Processes (FEPs) and uncertainties within the 2011 ESC will be vital to the robustness of the 2011 LLWR safety assessment and the overall acceptability of the ESC. A transparent system for documenting and justifying the treatment of identified FEPs and associated uncertainties is essential for demonstrating that assessment models are appropriate and fit for purpose by ensuring that all relevant factors have been considered in their development. Furthermore, there is a regulatory requirement to demonstrate that all uncertainties that have a significant effect on the ESC have been documented and adequately managed.

NNL have developed, in conjunction with staff from the LLWR, a Microsoft Excel™ spreadsheet based tracking system for the management of FEPs and associated uncertainties. The benefits of such a system lie in the ability to rapidly and transparently identify both the means by which a specific FEP has been considered within the 2011 ESC and to track the key FEPs associated with each model (at a detailed and at an assessment level). The system also provides a means by which uncertainties can be documented and tracked, which will allow the LLWR to develop a register of significant uncertainties and a strategy for managing significant uncertainties, as required in the Guidance on Requirements for Authorisation.

This report is the user guide for version 1.0 of the FEP and uncertainty tracking system, and has been written to inform both those who wish to review and update information held in the system and those who wish to make structural changes (e.g. adding or deleting a table or adding a new field to existing tables).

Passwords are required for adding/editing data within the system and for making structural changes to the system. These are held by the LLWR ESC Project document controller.

VERIFICATION STATEMENT

This document has been verified and is fit for purpose. An auditable record has been made of the verification process. The scope of the verification was to confirm that : -

- The document meets the requirements as defined in the task specification/scope statement
- The constraints are valid
- The assumptions are reasonable
- The document demonstrates that the project is using the latest company approved data
- The document is internally self consistent

HISTORY SHEET

Issue Number	Date	Comments
Issue 0.1	03/02/2010	NNL approved
Issue 1.0	19/04/2010	Updated in line with comments from Trevor Sumerling of the LLWR

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1. Introduction

The Low Level Waste Repository (LLWR) near the village of Drigg is the UK's principal facility for the disposal of solid low level radioactive waste (LLW). The LLWR Site License Company (SLC), LLW Repository Ltd., is currently undertaking a programme of work leading to the production of an Environmental Safety Case by May 2011 (2011 ESC). The 2011 ESC will be submitted to the Environment Agency in order to satisfy Requirement 6 of Schedule 9 of the LLWR's current Authorisation.

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NNL have developed, in conjunction with staff from the LLWR, a Microsoft Excel™ spreadsheet based tracking system for the management of FEPs and associated uncertainties. The benefits of such a system lie in the ability to rapidly and transparently identify both the means by which a specific FEP has been considered within the 2011 ESC and to track the key FEPs associated with each model (at a detailed and at an assessment level). The system also provides a means by which uncertainties can be documented and tracked, which will allow the LLWR to develop a register of significant uncertainties and a strategy for managing significant uncertainties, as required in the Guidance on Requirements for Authorisation (GRA) (Environment Agency *et al*., 2009).

Development of the FEPs and uncertainty tracking system and the 2011 ESC FEP list is described in Lean and Willans (2010).

This document is the user guide to Version 1.0 of the FEPs and uncertainty tracking system. It has been prepared considering the following types of user:

1. The browser or reviewer who wishes to understand what has been done (overall or in some specific area) as documented in the tracking system (including the LLWR peer review team and the Environment Agency).

2. The LLWR ESC team who may want to review what is being done (overall or in some specific area) to decide if some changes are needed either to the tracking system or the assessment models and cases.

3. Expert topic groups or contractors working on a particular model, or its use, who could be charged as part of their work with reviewing and updating sections of the FEP and uncertainty tracking system consistent with their latest understanding and treatments.

4. A FEP and uncertainty tracking system maintenance/development contractor who might be carrying out work to upgrade the system, adding fields or functionality, and would need to have a deeper level of understanding of underlying structure / macros etc.

The user guide is structured as follows:

- Section 2 provides details on the layout and contents of the system;

- Section 3 provides guidance on how to review and edit the FEP information contained in the system; and
- Section 4 details the steps required to make structural changes to the system.

2. Guidance on Using the FEP and Uncertainty Tracking System

This section outlines the software needed to run the FEP and uncertainty tracking system and familiarises users with the key worksheets that will be encountered when using the system.

2.1. Software compatibility and security issues

The FEP and uncertainty tracking system was developed in Microsoft Excel 2002 SP-2 under Windows XP and has been fully tested, verified and validated on this platform.

Due to the variability in Microsoft Visual Basic for Applications (VBA) released with alternative versions of Excel, the FEP and uncertainty tracking system may not be fully functional under other Excel versions.

In order for the FEP and uncertainty tracking system to function, macros must be enabled. The first time the FEP and uncertainty tracking system is run it may be necessary to ensure that macro security is not set to 'high' thus disabling all Visual Basic (VB) script. If the VB scripts have been automatically disabled, it will be necessary to close the FEP and Uncertainty tool. Prior to re-opening the tool, the following steps need to be undertaken:

1. open Excel and select tools…options from the menu; and
2. select the security tab and depress the 'macro security' button and ensure that the security level is set to medium. This allows the user the option to disable or enable macros when an Excel file containing VB script is opened.

This procedure may be required to be repeated for each different computer used.

It is important to note that use of the forms to view and edit FEP data requires worksheets to become unprotected during use and protected after use. If the user has other spreadsheets open and views these spreadsheets whilst the form is open, there is the possibility that the worksheet viewed may become password protected. It is therefore advised not to view other spreadsheets whilst the forms are in use. However, if you find that these worksheets have become locked you can find the appropriate password in the Annex of this report.

2.2. Status of Version 1.0

The FEP and uncertainty tracking system version 1.0 is based on a waste and site management scenario consistent with present day practice and covers the four pathways being considered within the 2011 ESC (groundwater pathway, gas pathway, coastal erosion and human intrusion). The FEPs are divided at the highest level into three groups:

- FEPs that are common to all pathways;
- pathway-specific FEPs; and

- FEPs that are not included in the assessment models for each pathway. These FEPs may be considered qualitatively or quantitatively and reasons set out for exclusion from the assessment models.

Pathway-specific FEPs are divided according to the pathway(s) they relate to. Within each pathway, the FEPs are then divided according to major conceptual model domains (e.g. near field, geosphere and biosphere for the groundwater pathway) and further divided in line with the models being considered (e.g. near field FEPs are sub-divided for the trenches, vaults and site engineering).

2.3. Worksheets in the FEP and uncertainty tracking system

The FEP and uncertainty tracking system contains 29 worksheets that assist in the management of the 2011 ESC FEP list and the uncertainty tracker. These are listed in Table 1.

Table 1: Worksheets included in the FEP and uncertainty tracking system

Worksheet name	Function
FRONT SHEET	Provides evidence of validation of the spreadsheet against the NNL QA system
Readme	Provides high level user guidance on the spreadsheet
MAIN	Allows the user to show and navigate to the selected worksheets
Uncertainty Tracker	Allows the user to view and track key uncertainties
Common	FEPs that are common to all pathways
GW_NF_Trench	Groundwater pathway: Near field trenches
GW_NF_Vault	Groundwater pathway: Near field vaults
GW_NF_SiteEng	Groundwater pathway: Near field site engineering
GW_GEO_ConMig	Groundwater pathway: Geosphere
GW_BIO_CoastR	Groundwater pathway: Biosphere coastal release
GW_BIO_NearSurfRFE	Groundwater pathway: Biosphere release to estuary
GW_BIO_NearSurfRFL	Groundwater pathway: Biosphere release to lagoon
GW_BIO_NearSurfRS	Groundwater pathway: Biosphere release to streams
GW_BIO_WellWAbs	Groundwater pathway: Biosphere well water abstraction
GAS_C14_SRM	Gas pathway: Carbon-14, source/release/migration
GAS_C14_Exp	Gas pathway: Carbon-14, exposure
GAS_Rn_Rel	Gas pathway: Radon, source/release
GAS_Rn_Mig	Gas pathway: Radon, migration
GAS_Rn_Bio	Gas pathway: Radon model, biosphere/exposure
CE_Erosion	Coastal erosion pathway: Erosion and dispersion of waste
CE_Biosphere	Coastal erosion pathway: Biosphere/exposure
HI_General	Human Intrusion: General
HI_Cases	Human Intrusion: Cases
HI_ExpGrps	Human Intrusion: Exposed groups or individuals
Misc_Other	Miscellaneous other FEPs
Tracked Changes	Contains all changes associated with each FEP that have been made since release by NNL

Worksheet name	Function
References	Contains a list of all references made in the 19 worksheets containing FEPs
Lookup Lists	A hidden worksheet containing lists used in the Forms to assist in navigation and populating the drop-down menus.
PCSC Mapping	A copy of the audit of the 2002 PCSC FEP list against the 2011 ESC FEP list.

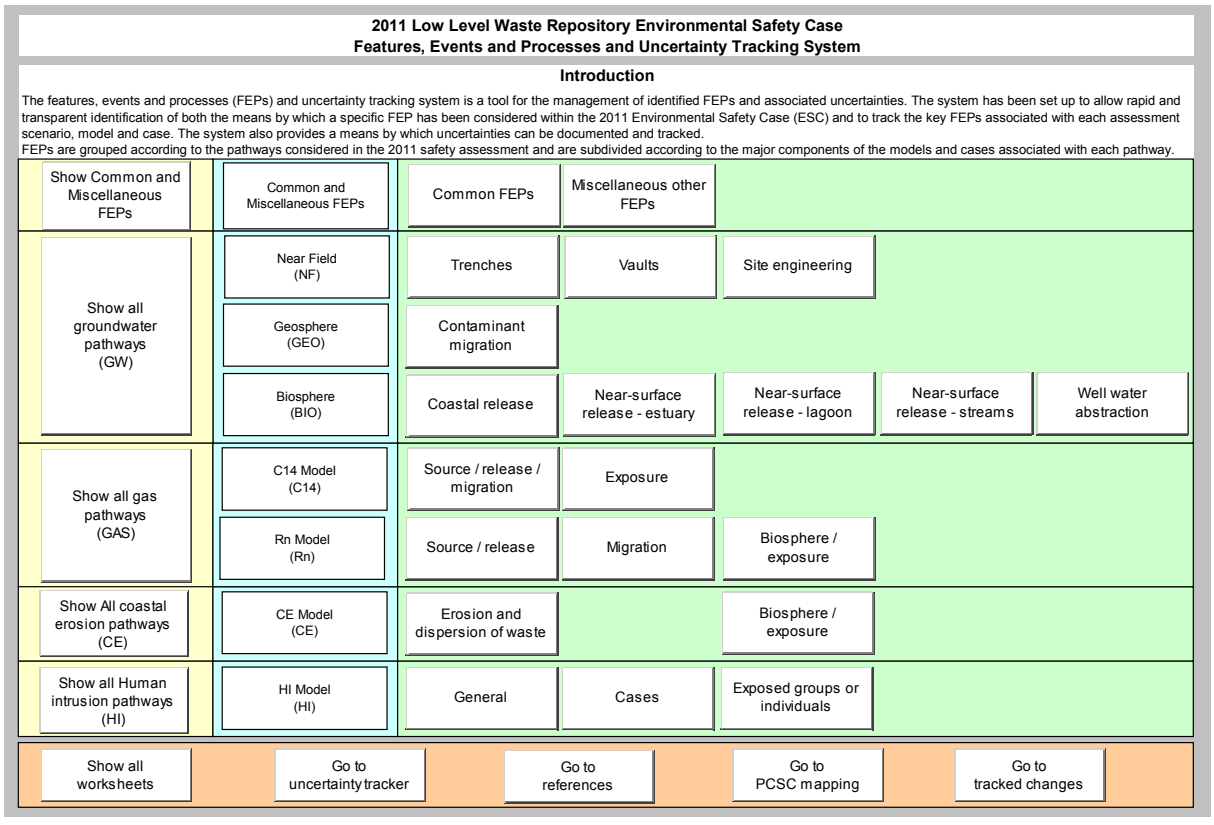
2.4. Description of the opening worksheets

The first worksheet of the FEP and uncertainty tracking system tool contains the title of the tool with authorship, verification and approval together with a history sheet record of design stages. The tool has been extensively verified and checked prior to approval in accordance with NNL quality assurance procedures.

The second worksheet contains 'read me' information and provides details of the content of each of the worksheets in the FEP and uncertainty tracking system and guidance on its use and population (in accordance with this document).

After the opening worksheets, the tool contains a worksheet entitled 'MAIN' that contains the high level user interface for the FEP and uncertainty tracking system, which is illustrated in Figure 1. This user-friendly front page enables the user to quickly search for information relating to specific parts of the 2011 safety assessment.

Figure 1: Interface for the FEP and uncertainty tracking system



A separate worksheet within the FEP and uncertainty tracking system is used to store information relating to each of the pathways and major conceptual model domains.

Command buttons in the 'MAIN' worksheet allow the user to quickly navigate to information on FEPs relating to specific pathways or conceptual model domains. The interface has been colour-coordinated in order to assist navigation, as follows:

- yellow panel – pathways;
- blue panel – models; and
- green panel – conceptual model domains associated with the pathways and models.

Specific information can also be reached via tabs at the bottom of the spreadsheet; due to the large number of separate worksheets, the user can choose to make these worksheets hidden to improve readability via the yellow 'show' and 'hide' command buttons found in the 'MAIN' worksheet.

The user interface also has a bottom panel of command buttons (orange panel) which allows the user to access more specific information. This includes:

- the function to show or hide all worksheets;
- the uncertainty tracker, which allows listing of FEPs according to expert judgement on the importance of the uncertainty in the FEP and its impact on sub-system performance and also on the means by which the FEP and uncertainty is treated in the 2011 ESC;
- a list of all reference material used in the population of the FEP and uncertainty tracking system;
- the audit of the 2002 LLWR FEP list with the 2011 ESC FEP list; and
- a record of original data entries that have been subsequently updated, in order to maintain an audit trail.

In order to aid navigation around the system, all worksheets have a command button entitled 'Return to MAIN' on the top left corner. This returns the user to the 'MAIN' worksheet whilst hiding the worksheet left behind.

It is recommended that, as far as possible, the navigational command buttons are used to minimise the number of worksheets on view at any time.

3. Data Entry

This section details the information contained within the FEP and uncertainty tracking system and the data entry process.

3.1. Information held in the FEP and uncertainty tracking system

A summary of the data fields included within the FEP and uncertainty tracking system for each FEP is given in Table 2.

Table 2: Data fields in the FEP and uncertainty tracking system

Field	Explanation / comment	Field content
FEP id	Unique letter code associated with the pathway in which the FEP resides and a sequential number.	Letter and number code
FEP category	Also incorporated in FEP id code, but useful for clarity within each worksheet.	Text field
FEP name	Self-explanatory.	Text field
FEP description	Topic area expert description of the relevance and realisation of the FEP within the LLWR system; based on scientific understanding.	Text field
Uncertainty description	Consideration of the scientific and data uncertainties around this FEP.	Text field
FEP and uncertainty judgement	Topic area expert's judgment on the "local" importance of the uncertainty, coded as High, Medium or Low. (This indicates how important it will be to represent the uncertainty.)	*Drop-down box – 3 options:* High = significant uncertainty or variability and impact on sub-system performance Medium = some uncertainty or variability and some impact Low = either little/no uncertainty or little/no impact on sub-system performance
FEP and uncertainty treatment description	How the FEP, and if necessary the uncertainty, is/are treated, and why this is reasonable/supported.	Text field
FEP and uncertainty treatment	How the FEP and uncertainty is treated in the 2011 performance assessment calculations.	*Drop-down box – 6 options:* None (e.g. because assigned "Low" above, or because standard stylised assumptions are applicable) Alternative model Alternative (variant) case (i.e. substantially different input parameter set or boundary conditions) Parameter variation – deterministic

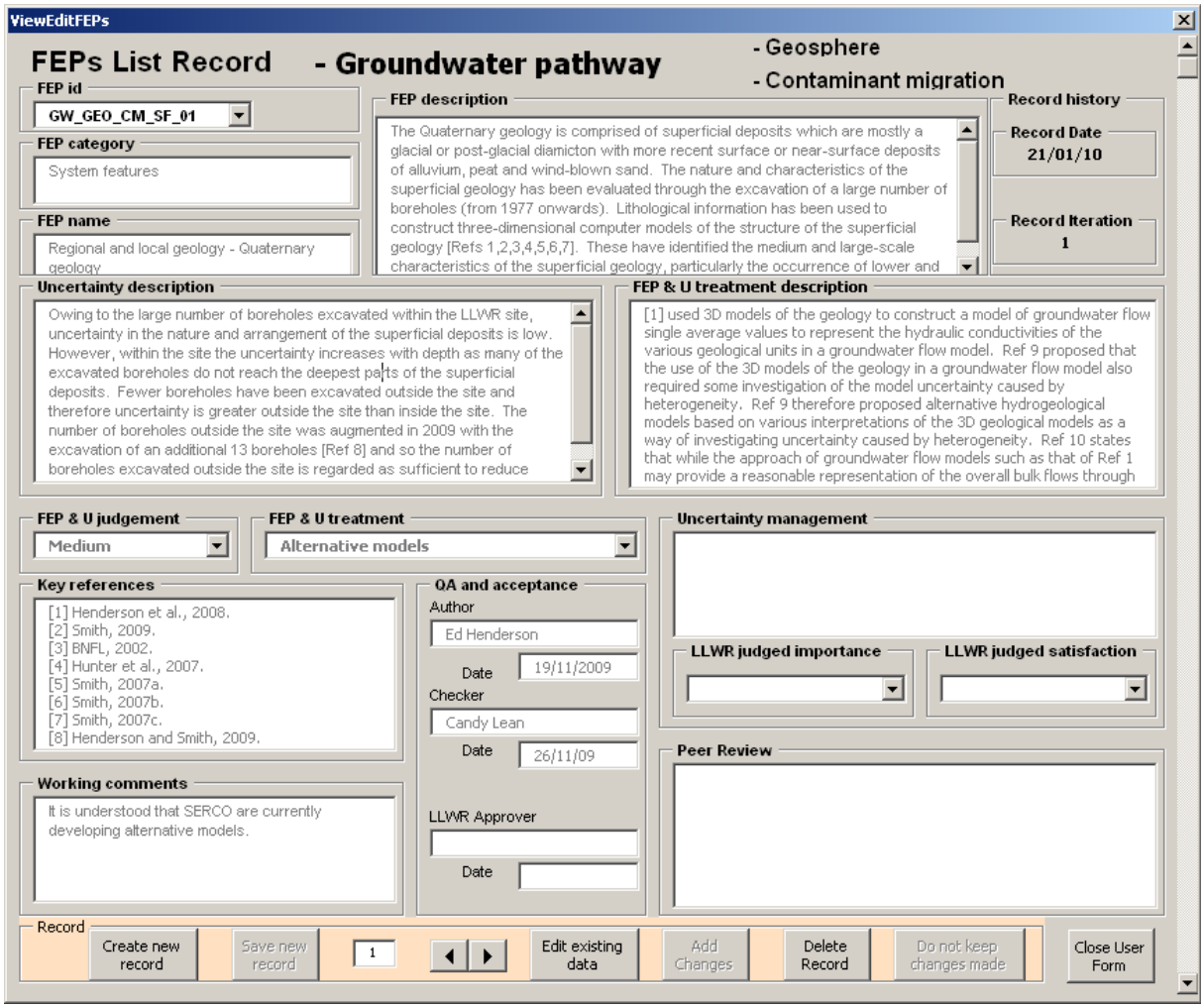
Field	Explanation / comment		Field content
		Parameter variation – probabilistic Not modelled	
Key references	List of key references; with number for identification within each record.		Text field
Working comments	Place to add reminders about refinement or more work needed on this record. Generally, will be blank at the time of version freeze.		Text field
QA & acceptance	Contractor QA (author & checker) and LLWR acceptance boxes – names and dates – as in prototype.		Names and dates boxes
Record history	Update history (use the same day rule).		Date list and iteration number
Uncertainty management	LLWR view on the importance of the uncertainty and whether this uncertainty has been satisfactorily "bottomed out" in the assessment, or needs additional assessment or management going forwards from the 2011 ESC.		Text field
Uncertainty management – code 1 – importance	LLWR judged importance of FEP and uncertainty.	*Drop-down box – 3 options:* Negligible impact Significant for safety assessment Significant for ESC	
Uncertainty management - code 2 – satisfaction level	LLWR judged satisfaction level with current treatment of FEP and uncertainty.	*Drop-down box – 3 options:* Content Minor concerns (some work needed) Serious concerns	
Peer review or Environment Agency comments	Blank field for peer reviewers or the Environment Agency to use when reviewing the FEP tracking system.		Text field

As discussed in Section 2.3, all the FEPs worksheets may be accessed using the command buttons on the high level user interface, i.e. the 'MAIN' worksheet.

Data entry to the FEP and uncertainty tracking system is controlled through the use of forms, thereby allowing the user to enter data and interrogate the database in a logical manner. The forms also provide a user-friendly means of viewing the information in the system.

An example form is provided in Figure 2.

Figure 2: Example data entry and review form



The data entry and viewing forms are reached through the 'View / Edit Table' tab on the top left hand corner of all the FEPs worksheets. Initially, the form is in view only mode and cannot be edited. A password is required to take action on the record so as to create, edit or delete a FEP (see Annex). Table 3 describes the functionality available in the form.

Table 3: Action buttons on the data entry/view forms

Action button	Function
FEP id	The FEP id drop-down list can be used to select the FEP the user wants to view. The FEP id and FEP category cannot be edited from within the form.
Create new record	Depressing this command button prompts the user to select a category to which the FEP belongs and then creates a new entry in the FEP list. Due to deletions that may already have occurred, the sequential number applied to the new FEP id is based on assessing the ids in this worksheet and also in the 'Tracked Changes' worksheet.
Save new record	Having created a new record, the user has the option to save the additional text added since the record was created. Navigating away from the record or closing the form without depressing this button will lose any information added to this record.

Action button	Function
Spin buttons	The spin buttons allow the user to advance through the FEP list one by one. A wrap feature of the buttons means that at the last record advancing sets the next record viewed to 1.
Edit existing data	This enables the edit mode for the FEP list. The user selects this command button if they wish to edit any details in the FEP record. Note that FEP ids and FEP categories cannot be edited.
Add changes	Once the changes are made in the form, depressing this button saves the changes to the worksheet. If the change is made on the same day and the record set is the first iteration then no change will be tracked, else the original and all altered versions will added to the 'Tracked Changes' worksheet. See Table 4 for further details. Note that depressing this button turns off the ability to edit the records further until the password is again entered.
Delete record	Clicking this button will prompt the user for a comment to justify the deletion, which must be entered before the deletion can occur. The record will be removed and placed in the 'Tracked Changes' worksheet.
Do not keep changes made	If the form is in edit mode and edits have been made in the form and the user does not wish to keep these then this button allows the user to reset the content to the version prior to editing. Note that this is not an undo function; once edited changes have been saved to the worksheet table they cannot be undone, except through further editing.
Close user form	This button closes the form. Note that during certain operations this button will be disabled to prevent accidental loss of data during editing. For the same reason it is suggested that the 'X' close button in the top right corner of the form is not used.

If the close button in the top right of the form is used, then the form will close, with any changes to the FEP being reviewed/edited lost.

3.2. Updating of FEP and uncertainty information

In order to make a change to the FEP information, the user must use the navigation in the 'MAIN' worksheet to select the appropriate pathway and then depress the 'View / Edit FEP List' command button in the selected worksheet. The default state of all the worksheets containing FEP information is locked and password protected to prevent editing other than through the use of the supplied forms. The appropriate FEP for editing can be selected by using either the 'FEP id' drop-down list or the spin buttons at the bottom of the form. Clicking the 'Edit existing data' button brings up a prompt for a password. After the successful entry of the password, the text in the form will change from a grey to a black font and edits can be made.

To control how the system is used during editing, only the buttons 'Add changes' and 'Do not keep changes made' remain enabled. If the latter button is depressed then any edits made will be lost. If the 'Add changes' button is depressed then any edits made to the current FEP information will be written to the worksheet's table and the previous data are written to the 'Track Changes' worksheet.

In the case that existing information in the database requires updating, for example to take account of new data, all original entries are saved to a separate worksheet within the database to maintain a full audit trail of changes. A same day rule is used for tracking of changes to avoid partially complete updates being recorded on every save.

The record history of each entry details the date of the most recent entry and the number of iterations made to each FEP. The iteration number and record date are used to determine how an edit of a FEP is recorded in the 'Tracked Changes' worksheet. Table 4 shows the approach undertaken by the system to track changes dependent on the status (record date and iteration) of the FEP record. Initially all records are set to iteration 1 and the 'Tracked Changes' worksheet is empty.

Table 4: Tracked changes actions

FEP Function	Iteration	Difference between edit date and iteration date	Action taken
Edit	1	>= 1 day	Both the original record and edited record are copied into the 'Tracked Changes' worksheet. The cells containing the edited information are highlighted in red font(1) in the 'Altered' record. 'Iteration' is set to 2 and 'Record date' is set to the date that the edit was made.
Edit	>1	Same day	Upon the 'Add Changes' button being depressed, the altered record in the 'Tracked Changes' worksheet is changed to reflect the edits made to the record.
Edit	>1	>=1 day	Upon the 'Add Changes' button being depressed, a new 'altered record' is added to the 'Tracked Changes' worksheet and the differences between this record and the previous record are highlighted in red font(1).
Delete	n/a	n/a	A password and an explanation are required in order to delete a FEP from the record set. The FEP id of the deleted FEP is recorded in the 'Tracked Changes' worksheet and will not be available again when adding new FEPs.
Add	n/a	n/a	The user will be prompted for the category against which the new FEP will be placed and the system will assign the FEP id based on the next available sequential number (after first checking the 'Tracked Changes' table for deleted FEP ids so as to maintain the integrity of the FEP ids).

1 - Note that all the text in the cell is changed to red font, not just the edited components within the cell.

The 'Tracked Changes' worksheet is shown in Figure 3. The column entitled 'Reason for change' shows the basis of the tracked change, which can include added, original, altered or deleted records. Note that in the example given in Figure 3 to create iteration 2, the FEP name has been altered and now has a red font to highlight the change. The reason for the record deletion is also captured as well as the time of deletion.

Figure 3: Tracked changes worksheet

Worksheet	Reason for change	Date of Change	FEP id	Iteration	FEP Category	FEP name
Common	Added	28/01/2010	Common_LLWR_13	1	LLWR-specific	
Common	Original	21/01/2010	Common_LLWR_01	1	LLWR-specific	Trenches inventory
Common	Altered	28/01/2010	Common_LLWR_01	2	LLWR-specific	Trenches inventories
Common	Deleted To create an example for the user guide.	28/01/2010	Common_LLWR_01	2	LLWR-specific	Trenches inventories

3.3. Uncertainty tracking worksheet

The system also includes an 'Uncertainty Tracker' worksheet which allows the user to list all FEPs that are associated with uncertainties that may have significance on either the overall ESC or on calculated site impacts. Uncertainties may be listed according to expert judgement on the importance of the uncertainty in the FEP and its impact on sub-system performance (the 'FEP and uncertainty judgement' data field) and also on the means by which the FEP and uncertainty is treated in the 2011 ESC (the 'FEP and uncertainty treatment' data field). This worksheet is designed to support the development of a register of significant uncertainties.

The 'Uncertainty Tracker' worksheet is shown in Figure 4 and the drop-down lists available for selection and tracking are shown in Table 5.

Figure 4: Uncertainty tracker worksheet

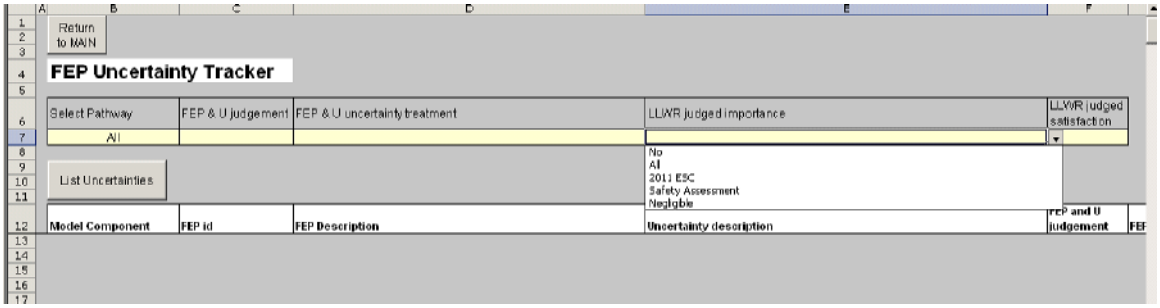


Table 5: FEP information available to be tracked

Selection	Description	Contents of the drop-down menu
Select Pathway	Selects the worksheets to search.	• All • Common FEPs • Groundwater pathway • Gas Pathway • Coastal Erosion • Human Intrusion • Miscellaneous Other FEPs
FEP & U judgement	Selects what to track in the FEP & U judgement column of each FEP table.	• No • All • High • Medium • Low • n/a
FEP & U treatment	Selects what to track in the FEP & U treatment column of each FEP table.	• No • All • None • Alternative models • Alternative cases • Parameter variation - deterministic • Parameter variation - probabilistic • Not modelled
LLWR judged importance	Selects what to track in the LLWR judged importance column of each FEP table.	• No • All • 2011 ESC • Safety Assessment • Negligible
LLWR judged satisfaction	Selects what to track in LLWR judged satisfaction column of each FEP table.	• No • All • Content • Minor • Major

Selecting 'No' or leaving the field empty (NULL) deactivates this field from the search.
Selecting 'All' returns all non blank cells for this field.

3.4. Audit of 2011 FEP list against 2002 FEP list worksheet

Part of the development of the FEP and uncertainty tracking system included a requirement to review the FEPs derived during the development of the 2002 LLWR Post-Closure Safety Case, mapping (where possible) 2002 FEPs to FEPs considered in the 2011 list and providing an explanation of those 2002 FEPs no longer considered (Lean and Willans, 2010). Figure 5 shows an extract of this exercise from the FEP and uncertainty tracking system.

Figure 5: Accountancy of the 2002 FEP lists

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FEP Number	Description	Key words	FEP not considered insignificant in terms of potential impact in 2002 PCRSA	Related FEPs	Comments
	I/A2 Influence of the Geosphere on the Near-field				
	I/A2/1 Groundwater flow into the Near-field resulting in:				
I/A2/1.1	Generation of leachate flux	Flow – direction	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.2.1	Influence on biogeochemical evolution - aqueous	Chemistry - composition	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.2.2	Influence on biogeochemical evolution - gaseous	Gas – composition	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.3	Promotion of the degradation of barriers (carbonation etc);	Flow – physical	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.4	Generation of preferential flow paths	Flow – direction	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.5	Variation in saturated depth	Flow – physical	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.6	Dissipation of Heat	Heat	no		FEP not included in 2002 PCRSA
I/A2/1.7.1	Effects on physical properties of near-field due to particulate transport - flow field	Particulate – colloids	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.7.2	Effects on physical properties of near-field due to particulate transport - engineering performance	Particulate – colloids	yes - included within another FEP	GW_NF_SE_EC_05	
I/A2/1.8	Effects on chemical properties of near-field due to particulate transport	Particulate – colloids	yes - included within another FEP	GW_NF_SE_EC_05 GW_GEO_CM_MPRRM_8	
I/A2/1.9	Introduction of colloids	Particulate – colloids	yes - included within another FEP	GW_NF_SE_EC_05 GW_GEO_CM_MPRRM_8	
I/A2/2	Ground movement resulting in disruption of near-field engineering and waste form	Engineering – failure	yes - included within another FEP	Misc_Other_03	
I/A2/3	Geological gas transport into the near-field	Gas – flow	no		FEP not included in 2002 PCRSA
	I/A3 Influence of the Biosphere on the Near-Field				
	I/A3/1 Bioturbation effects resulting from:				
I/A3/1.1	Root ingress	Biological – distribution	yes - as standalone FEP	Misc_Other_01	
I/A3/1.2	Animal ingress	Biological – distribution	yes - as standalone FEP	Misc_Other_02	

3.5. References worksheet

All references are listed in alphabetical order. A view of the 'References' worksheet is given in Figure 6. The 'Table Reference' is as shown in the forms and the FEP tables. The 'Report Reference' contains the full reference.

Figure 6: References worksheet

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Table Reference	Report Reference
AGIR, 2009.	AGIR, 2009. Advisory Group on Ionising Radiation report: Radon and public health. Documents of the HPA RCE-11.
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4. Making structural changes to the system

The FEP and uncertainty tracking system lies on a Microsoft Excel™ platform with navigation and editorial changes controlled through the use of VB commands.

In the previous sections of this user guide, descriptions of how the system operates have been provided, sufficient to inform those who which to review or update information contained within the system. This section briefly details the steps required to make more significant structural changes to the system, and the impacts of such changes. This could include creation or deletion of a new FEP table or adding a new field to existing tables.

It is recommended that when structural changes are made to the system, a 'frozen version' of the existing system is made and a new version of the system created. Table 6 provides the steps necessary to undertake the most likely structural changes that may be required in the future. Structural changes should only be made by someone who is suitably qualified and experienced in Microsoft VB programming.

Note that access to Microsoft VB Editor is password protected. Different passwords are required for adding/editing data within the system and for making structural changes to the system. These can be made available, where appropriate, by the LLWR ESC Project document controller.

Table 6: Steps required to make structural changes to the system

Creating a new FEP table (worksheet) • Insert and name a new worksheet • Copy and paste the contents of a populated FEP worksheet into this new worksheet. • Copy the command buttons 'Return to Main' and 'View / Edit FEP List' ensuring that the corresponding VB code is also transferred. • Insert and populate a new row into the second table in the 'Lookup Lists' worksheet. • Insert and populate new rows as applicable into the third table in the 'Lookup Lists' worksheet. • Set cell "B1" to the table order and cell "A3" to the table reference. • Alter the VB associated with the appropriate toggle button in the 'MAIN' worksheet to include the new worksheet. • Create a new command button (with appropriate VB) to navigate to the new worksheet. • Alter 'Readme' content and populate FEP table.
Deleting an existing FEP table (worksheet) • Delete worksheet. • Delete corresponding row from the second table in the 'Lookup Lists' worksheet. • Delete corresponding rows from the third table in the 'Lookup Lists' worksheet. • Alter the VB associated with the appropriate toggle button in the 'MAIN' worksheet to exclude the deleted worksheet. • Delete the command button used to navigate to the deleted worksheet. • Alter 'Readme' content.

Adding a new field to the FEP tables
• Within one of the 21 worksheets containing FEP details insert a new column to represent the required field. Name the field and then copy and insert to the remaining 20 FEP worksheets and the 'tracked changes' worksheet.
• Edit input form to include the new field.
• Edit the input form's command button VB to include the new field during edits and tracked change operations. VB alteration will also be required to Module procedures including:
  • EditTextBoxes; SaveEditedChanges; SaveNewRecord;
  • TransferOldRecord; UpdateTextBoxes; HighlightChanges; and

Adding a new field to the FEP tables cont'd

- ReplaceTrackedRecord; TransferEditedRecord and TransferNewAndOldRecords.
- Information extracted into the 'tracked changes' worksheet works from specific ranges. Adding new fields may affect these ranges and will need to be updated in the VB code.
- Alter the 'Readme' content.

Deleting an existing field from the FEP tables

- Delete the unwanted field from each of the 21 FEP tables as well as the table in 'Tracked Changes' worksheet.
- Redesign the form to remove the unwanted field.
- Alter all VB code to ensure that lookup ranges remain correct.

Introducing a new category to a FEP table

- Insert a new row for each new category as required in the third table of the 'Lookup Lists' worksheet.

Renaming an existing category from a FEP table

- Alter the appropriate row of information in the third table of the 'Lookup Lists' worksheets. If the category pre-exists in the FEP table, then changes must be made in the worksheet itself. Category changes cannot be made using the forms.
- This change will not be automatically captured in the 'Tracked Changes' worksheet.

Renaming a FEP table (worksheet)

- Change the tab name.
- Alter the details in the second table of the 'Lookup Lists' to match.
- Alter the details in the third table of the 'Lookup Lists' to match.
- If altering the reference, update cell "A3" and alter any pre-existing references in the FEP Table and tracked changes, as appropriate.
- In the 'MAIN' worksheet alter the navigation command button VB to match.
- Alter the 'Readme' worksheet.

Altering the fields returned to the Uncertainty Tracker

- Alter the VB in the 'List Uncertainties' command button to bring in the information from the appropriate fields when a match is found.

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6. Annex: Procedure to allow record creation and editing

To control and track changes to the FEP and Uncertainty Tracker tool, a series of passwords should be used dependent on the circumstance of the alteration of the data by the user. The table below shows the passwords that should be entered when editing the FEP & U tracker tool.

Password	When is the password to be used
password when wishing to edit text using the main form	
mfeplist	Allows the user to edit the text in the main and QA sections of the form (for principal authors).
lfeplist	Allows the user to edit the text in the main, QA and LLWR sections of the form (for LLWR personnel only).
pfeplist	Allows the user to edit the text in the review section of the form (for personnel reviewing the FEP data).
password when wishing to add or delete records using the main form	
mfeplist	To add a new FEP record
mfeplist	To delete an existing FEP record
Password to unprotect the worksheet in excel	
FEPl1sts	To protect and unprotect the worksheets (note that any changes outwith the use of the forms will not be captured in the tracked changes worksheet).

It should be noted that a further password is required to access the VB editor in the spreadsheet tool. This has not been included within this document and should be sought from the LLWR.

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