

Overview of the Safety Assessment Framework Tool

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INTRODUCTION

The International Atomic Energy Agency (IAEA) Safety Assessment Framework (SAFRAN) tool was developed to apply the methodologies for safety assessment examined in two IAEA international projects, www.iaea.org.

- (1) *Predisposal Waste Management: Safety Assessment Driving Radioactive Waste Management Solutions (SADRWMS)*. The purpose of the SADRWMS project is to examine the application of safety assessment methodology to predisposal waste management practices and facilities, including waste storage. In comparing international approaches to safety assessment in these areas, the objective is to improve and harmonize such approaches and methodologies.
- (2) *Decommissioning: Evaluation and Demonstration of Safety during Decommissioning of Nuclear Facilities (DeSa)*. The overall aim of the DeSa project is to contribute to the development of a harmonised approach to the evaluation and review of safety assessment for the decommissioning of civilian nuclear facilities.

The SAFRAN tool applies the safety assessment methodologies developed by these projects. Its specific objectives are to assist operators, regulators and technical support specialists in performing systematic and structured safety assessments in compliance with national regulations, relevant international safety standards, and good international practice through:

- the development of a user friendly tool that assists the application of the safety assessment methodologies developed by SADRWMS and DeSa;
- investigating uses of the SAFRAN tool through performance of safety assessments for a selected number of predisposal and decommissioning test cases, capture lessons learned and improve the tool accordingly;
- providing a function within the tool to assist with both the development and the review of safety cases for predisposal radioactive waste management and decommissioning;
- providing a function within the tool to enable independent reviewers, including regulators, to determine the adequacy of safety assessments for facilities with different complexities and hazards; and
- maintaining the tool as an up-to-date web-based application with user-support providing selected test-case examples of SAFRAN use, links to other relevant national/international projects, and a utility for feedback to enable future and ongoing improvement of the software tool.

The SAFRAN tool allows the user to visibly, systematically and logically address pre-disposal radioactive waste management and decommissioning challenges in a structured way. It also records the decisions taken in such a way that it constitutes a justifiable safety assessment of the proposed management solutions.

SAFRAN ARCHITECTURE

Each SAFRAN project file consists of the following modules: *facilities, waste streams, activities, regulatory framework, methodology and safety assessments*. These modules may be

accessed in any given order, but some items need pre-defining, e.g. you need to first define a facility before you can start to develop a safety assessment for this facility. Figure 1 illustrates the overall architecture of the current SAFRAN tool.

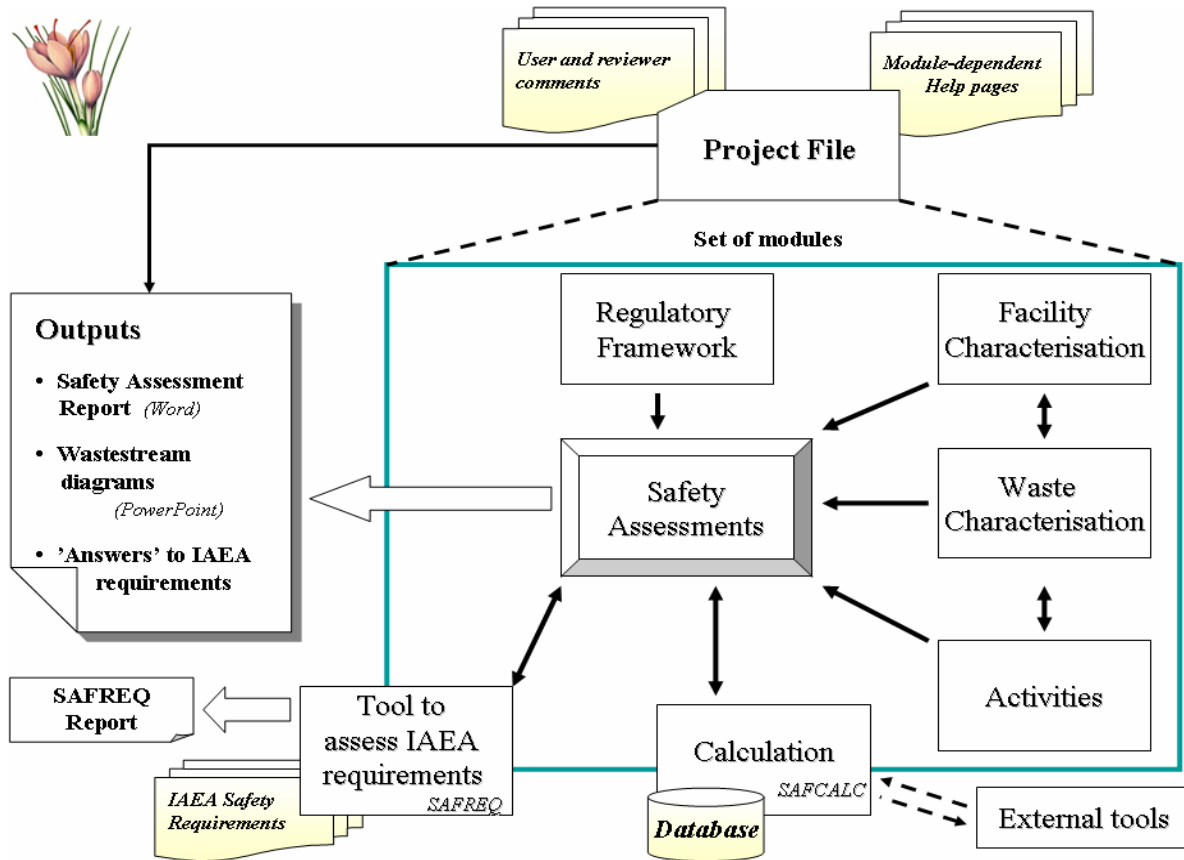


Figure 1. SAFRAN architecture presenting the modules that support the safety assessment.

Facilities. Facilities define the test site, including radioactive waste processing and storage facilities as well as facilities to be decommissioned (e.g. waste management facilities, reactors). Physical elements (e.g. roof of a facility, structures, equipment), and safety functions (e.g., shielding, containment) can also be specified in order to assess their adequacy in any given safety assessment.

Activities. This section describes all activities that elements containing radioactive materials (for decommissioning) and the radioactive waste (for waste management activities) will be subjected to. It is linked to the waste stream module, where the connections between elements containing radioactive materials and waste components with the decommissioning or waste management activities are defined.

Waste Streams. Waste streams can be defined. Each waste stream consists either of a primary waste component or an element containing radioactive materials subject to decommissioning as starting point. Defining the activities performed with this waste component or elements containing radioactive materials and the respective output of this activity (one or more) is an essential part of this characterisation process. The definition of output components involves the determination of the properties subject to be changed and also can handle the conversion of elements containing radioactive materials into radioactive waste through a decommissioning activity.

Input data on elements containing radioactive materials or waste components are needed before an assessment can be carried out. An overview of the waste components defined and their relationship with regard to the different process steps can be illustrated by radioactive waste stream diagrams. The tool also assists assessments for clearance.

Regulatory Framework. The user must enter user-defined definitions of general regulatory requirements and specify the types of endpoints and criteria to be used in the different safety assessments. Note that, as general requirements, both the optimization principle (ALARA) and the Graded Approach are already included as default.

In addition to these qualitative criteria, types of endpoints for quantitative criteria are specified. These can consist in dose or risk criteria, but also can relate to other types of endpoints such as activity releases or activity concentrations in specific media. Clearance levels and criteria are also included in this module.

Methodology – SAFREQ. This tool enables the user to assess whether IAEA safety standards are being met, with the help of a questionnaire to fill-in and guidance to help answers to be given.

Safety Assessment. A safety assessment consists of the definition of the purpose of the assessment and the assessment approach, the definition of assessment cases for normal operation and for accidental scenarios, the assessment of doses and risks arising from these, and their analysis in terms of regulatory criteria as well as with regard to the design of facilities and processes and required safety elements and safety functions.

A safety assessment module is available for all main steps of predisposal radioactive waste management and decommissioning activities. Each of the other modules (i.e. facilities, waste streams, activities, regulatory framework and methodology) is specifically designed to support safety assessments for these activities following the SADRWMS and DeSa methodologies.

The outcome of the safety assessment can be utilised for a different purposes ranging from selecting an adequate site, providing detailed definition of procedures for the operation of a facility, assessing compliance with regulatory criteria and providing monitoring and maintenance or provisions for emergency preparedness.

Calculation Tool – SAFCALC. This tool implements standard methodologies and performs dose and risk assessments for a number of scenarios (normal operation and accident conditions) of relevance for safety assessment in decommissioning and waste management. It can be used as a standalone application, or linked to the other SAFRAN modules. SAFCALC directly uses the information supplied when defining facilities and waste streams. It should be mentioned that the user is not obliged to use this tool and can introduce the results obtained in the safety assessment.

Other Features. SAFRAN also support a number of other features, both in terms of usability and applicability. This can greatly assist in the elaboration of the safety case. These include:

- *help pages* to guide the users in filling the various forms within SAFRAN;
- *comments boxes* that allow both users and reviewers to record comments, and thus provide a means of dialoguing;
- *link to documents* and other electronic material (e.g. pictures, maps) for uploading as

- part of the safety assessment; and
- *reporting*, i.e. create a Microsoft Office[®] Word file that contains all the steps of the safety assessment performed as well as the characteristics of the relevant waste components, facility and waste stream diagrams (in Microsoft Office[®] PowerPoint).

FUTURE ACTIVITIES

The SAFRAN tool is being developed in three phases: (1) to test the existing prototype on selected number of facilities (completed); (2) to establish a number of resource databases, *e.g.* software package, user's guidelines, website (currently under development); and (3) to implement the final software to selected test facilities (scheduled for 2008). The project aims to finalise the SAFRAN tool by the end of 2009. A working version will be available for testing in late summer 2008.

SAFRAN is available, in English and in Russian, free of charge and can be downloaded on <http://www.project.facilia.se/safran/>. Registration is required to enable developers to inform users of latest updates and news. A series of test cases will be also available to illustrate SAFRAN's applicability..

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