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FaSa

International Project on Use of Safety Assessment in the Planning and Implementation of Decommissioning of Facilities using Radioactive Material



Preamble - There is an increasing number of decommissioning activities worldwide at facilities that use radioactive material. In most cases this is because these facilities are either reaching the end of their lifetime, have already been shut down as planned or have been shut down prior to their expected lifetime (either as

a result of accidents, political, social or other reasons). These facilities are large in number and cover a wide range of types including small research laboratories, research reactors, reprocessing facilities, fuel fabrication facilities, nuclear power plants, mining and mineral processing facilities, etc.

Safety of all facilities using radioactive material needs to be ensured through their lifetime and therefore evaluation and demonstration of safety is essential in the planning and implementation (e.g. instructions, procedures) of decommissioning in accordance with the national legislation and internationally agreed recommendations. In order to assist operators, regulators and other experts involved in the planning, performance, control and termination of decommissioning activities, the International Atomic Energy Agency (IAEA) launched an international project on "Evaluation and Demonstration of Safety during Decommissioning of Nuclear Facilities" (DeSa), in November 2004. This project was also implemented in response to the International Action Plan on Decommissioning of Nuclear Facilities (approved by the IAEA Board of Governors in 2004).

The three year project fulfilled the planned tasks, provided important input to the [Safety Guide WS-G-5.2 "Safety Assessment for Decommissioning of Facilities Using Radioactive Material"](#) (published in 2009) and a series of national and IAEA technical projects on [decommissioning](#). The participants in the DeSa project also recognized that further international co-operation and work is required in areas such as:

- Structure, content and interface of a decommissioning plan and safety assessment
- The use and application of safety assessment results in planning and conduct of decommissioning
- Safety assessment for deferred dismantling strategy
- Evolution of safety assessment through the facility lifecycle

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Objectives

On the basis of the revised [Action Plan](#) on Decommissioning of Nuclear Facilities (2007) and the recommendation made by the DeSa project at the 4th Joint Meeting in 29 October – 2 November 2007, a new international project was prepared and launched in November 2008. This project aims to build on the DeSa project outcomes, to review international experience, and to develop agreed recommendations on:

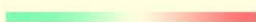
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- The use and application of safety assessment in the development and review of decommissioning plans and safety related documents through the life cycle of nuclear facilities and other facilities that use radioactive material
- The implementation of the safety assessment results in the conduct of decommissioning activities (e.g. optimization, defense in depth, technical feasibility, safety functions and controls)
- Application of the graded approach in the application of safety assessment
- Update of safety assessment, the operators/regulators review of safety assessments and the implementations of its results during planning and conduct of decommissioning (e.g. single and multi-facility sites)
- Demonstrate the application of these recommendations on selected real facilities planned for or undergoing decommissioning

A decision about the [proposed scope, objectives and activities](#) of the FaSa project was reached at its first FaSa project meeting from 17 to 21 November 2008 in Vienna, Austria.

Scope

The FaSa project was aimed at illustrating the dynamic nature of decommissioning safety assessments and the need for their periodic review and updating, in order to take into account the changing facility status and hazards, the complexity of decommissioning activities at key phases, and/or the stage of decommissioning. It addressed initial safety assessments at early optioneering stages once the decommissioning plan was agreed, at key stages of decommissioning after shutdown, including unanticipated circumstances during decommissioning, through to safety assessment on the completion of decommissioning, which could be for the purposes of site release for unrestricted or for restricted use.

The FaSa project provided recommendations on the use of the safety assessment methodology and recommendations that were developed in the [DeSa project](#).

The project addressed immediate dismantling and deferred dismantling of a large range of facilities with different hazards and complexities, endpoints and end states (release of the site for restricted and for unrestricted use). The project illustrated its recommendation through test cases, based on real decommissioning projects volunteered by Member States. This range of test case applications was extended beyond those addressed by the DeSa project namely, to a nuclear power plant, a large research reactor, a mining facility and a fuel fabrication facility.

The project focused on radiological hazards to workers, the public and the environment. However, it also addressed industrial hazards during decommissioning that contribute to radiological hazards and their potential consequence.

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Main Activities

On this basis, the structure and activities of the FaSa project were undertaken in three steps, described below.

Step 1 – Development of recommendations on the role, evolution and interface between safety assessment and its results, and the decommissioning plan and supporting documents through the lifetime of a single or multi-facility site:

- Decommissioning planning
- Decommissioning conduct
- Termination of decommissioning

The development of the selected test cases commenced at this phase on the basis of real facilities volunteered by Member States:

- A nuclear power plant
- A fuel fabrication facility
- A complex research reactor
- A mining and mineral processing facility

Step 2 – Development of detailed specific recommendations on the use of safety assessment during the decommissioning:

- The implementation of safety assessment results in the development, revision of decommissioning plans, supporting documents and working documents (e.g. facility instructions, procedures) in particularly addressing issues such as optimization, defence in depth, uncertainties, industrial and safety controls, etc.
- Review of implementation of safety assessment results by operators and regulators, including inspections. The development of the test cases will continue at this phase of the project in coordination with the remaining FaSa Working Groups

Step 3 - Evaluation of the lessons learned and development of recommendations from the Working Groups and the entire FaSa project. The draft report of the FaSa project will be finalized on the basis of the outcomes of the working groups' activity.

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Participation

The FaSa project gathered experts and organizations (e.g. operators, regulatory bodies, and supporting organizations) from Member States that are, or will be, involved in the planning, evaluating, undertaking or regulating the decommissioning of facilities using radioactive material.

During the working group meetings participants contributed by presenting approaches to the use and application of safety assessment in the planning, undertaking and termination of decommissioning and sharing experiences from relevant national projects and by participating in technical discussions and FaSa project activities. The participants actively participated in the assessments and in the development of project test cases. Through this means the FaSa project provided a valuable forum for the exchange of experience, knowledge and lessons learned between countries with on-going decommissioning programmes and countries that are in the planning stage of decommissioning.

Project implementation

The project was implemented during three years. It commenced on 17 November 2008, at an opening meeting at the IAEA Headquarters in Vienna, Austria, where the detailed project scope, objectives and activities, including the work plan, were discussed and agreed upon.

[Annual Joint Meetings](#) of all FaSa project working groups were organized to facilitate the coordination of the project activities, recommendations and development of the inputs to the Safety Report. In addition individual working group meetings were conducted in order to facilitate the work of each group according to the agreed FaSa plan. The Coordinating Working Group had its annual meetings, usually in conjunction with other project meetings.

The project was [concluded](#) during the Fourth and Final Joint Meeting held on 21-25 November 2011 in Vienna.

Outcomes

The project resulted in:

- Recommendations on the role of the decommissioning safety assessment in the lifecycle of existing facilities and the development of decommissioning plans
- Recommendations on implementation of decommissioning safety assessment results during individual phases of the decommissioning of a facility
- Documentations on the test cases performed to demonstrate the application of decommissioning safety assessment methodology and the implementation of decommissioning safety assessment results during the different periods of the lifecycle of a real facility and during different phases of the decommissioning project
- Recommendations on the independent review by operators and by the regulatory body on the implementation of decommissioning safety assessment results, including inspections and periodic safety reviews,

as well as on the interactions between operators and regulatory body regarding the implementation of decommissioning safety results

- Improvement of capabilities of the Member States in this field and enhancement of the exchange of information between Member States on lessons learned related to the development, review and update of decommissioning safety assessment during all periods of the life cycle of a facility using radioactive material
- Recommendations for enhancement of the DeSa methodology
- A useful input to the current revision of the Safety Guides on decommissioning of NPPs, research reactors, fuel cycle facilities and medical, industrial and research facilities

Assistance was provided, through the FaSa project, to experts involved in the adequate development, review and implementation of safety assessments and their results and decommissioning plans in practice in accordance with good practice in Member States and international safety standards.

The recommendations developed and the project's test cases will be documented in an IAEA Safety Report Series publication.

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Telephone: (+431) 2600-0, Facsimile (+431) 2600-7
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Conclusion of the FaSa Project



International Project on Use of Safety Assessment in the Planning and Implementation of Decommissioning of Facilities using Radioactive Material (FaSa)

In 2011, participants of all five FaSa Working Groups (WG) and those of the four Test Cases (TC) continued to work on the relevant parts of the FaSa report, drawing upon their experience of decommissioning safety assessment. Planning, review and coordination of group activities was carried out at various Working Group and Test Cases meetings.

Schedule of Meetings

Two meetings of individual Working Groups were held in 2011 - one in Grenoble, Research Reactor Test Case in March and one in Rome, Nuclear Power Plant Test Case.

A combined meeting of three Working Groups and Test Cases was held in Paris comprised of the Decommissioning Conduct Working Group, the Implementation of the Safety Assessment Working Group and the Fuel Fabrication Facility Test Case Group, in September, 2011.

A meeting of the FaSa Coordinating Group was organized in Rome, on 4 to 6 May, 2011. At this meeting, progress achieved by all Working Groups and Test Case Groups since the Joint Meeting in 2010 was reviewed, while activities to be completed prior to the Final Joint Meeting in Vienna, November 2011, were planned. The work done by the different Working Groups and Test Case Groups was cross-checked so as to ensure consistency.

[The Fourth and Final Joint Meeting](#) of the FaSa project was held in Vienna, on 21 to 25 November, 2011 and was attended by 43 participants from 24 countries. Participants reviewed the progress achieved in 2011 and finalized all the project activities initiated and conducted during the First, Second and Third Joint FaSa Meetings, held in 2008, 2009 and 2010, respectively. The participants also reviewed the implementation of these activities, implemented through several meetings of the Working Groups and Test Cases Groups during the 2009-2011 period.

A few remaining activities to be completed in early 2012 were identified, including the finalization of the FaSa report and its submission for publication by the end of 2012. Materials prepared at the Final Joint Meeting will be reviewed by the FaSa Project Coordinating Group and prepared for publication in 2012.

Summary

The FaSa project was an excellent example of enthusiastic and very efficient joint work carried out by many experts from countries with different regulatory frameworks, different facilities, diverse human and financial resources, and varying levels of progress in decommissioning.

The project provided a forum for collection of best practices in decommissioning safety assessment and their implementation in practice, and for exchange of national experience. It also provided valuable input for the on-going revision of the [IAEA safety standards for decommissioning](#) (ppt). Similar projects should be considered in the future to address other priority topics on decommissioning.

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