Rank the picture below the Core on the template slide.

Studsvik Application Case

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Scope of project

The objectives to be accomplished during the Studsvik Application Case were:

• To get familiar with chapter five of IAEA’s document DS284
• To review the SAFRAN software as an implementation of the methodology outlined in DS284
• To apply SAFRAN on the ILW Facility at Studsvik as a way to assess its overall functionality, user-friendliness etc.
• To participate in two international IAEA meetings to discuss the software and its development
• To compare the results from last report and the proposed improvements for the software.
Studsvik Nuclear AB
Sweden

ILW Facility
Implementation

• Only relevant areas modeled (estimated to include 98% of activity)
• Static waste throughput was assumed
  – Liquid waste throughput – liquid, sludge, IXR
  – Solid waste – Based on one full mould
• Conditions such as activity, filtering efficiency, air release fractions etc. were estimated from operational data and from discussions with operators.
• Scenarios were developed to assess SAFRAN’s calculation tools
• Comparison between SAFRAN’s and Studsvik’s own results.
Assessed scenarios

• Normal operation dose to public under static conditions.
  – SAFRAN dose coefficients give a result about 70 000 times larger than Studsvik’s. This is a result of assumed conditions in the derivation of coefficients. SAFRAN’s dose factor calculator was not evaluated.

• Dose to public as a result of fire and/or filter failure in a part or the whole facility as.
  – SAFRAN’s results are somewhat larger than Studsvik’s, but only about one order of magnitude.

• External dose to worker as a result of leakage and waste package drop.
  – Calculated dose is an underestimate, probably due to the lack of build-up in the model.
SAFRAN as an implementation of DS284 chapter 5

• General
  – To a large degree a good implementation of DS284 chap 5

• Calculations
  – SAFRAN includes calculation tools for varying scenarios
  – Relatively easy to use
  – Functional as a first estimate
  – Lack of some important aspects (such as geometrical information, biota, material variation etc.)
  – Implemented models are conservative in comparison to Studsvik’s own models.
SAFRAN as an implementation of DS284 chapter 5

• Development and justification of scenarios
  – SAFRAN provides PIE-lists (potential initiating events) to help the user find relevant scenarios.
  – Justifications are required to inactive PIEs, in accordance with DS284:s requirement of possibility for re-evaluation.
  – Some improvements such as clarifications and differentiation between different PIE:s could be made.
Results, findings and discussion

• General
  – Good and helpful tool in carrying out safety assessment
  – Very usable for static conditions, but harder as complexity increases (relevant in all safety assessment)
  – In it’s current state probably not usable as the only tool for safety assessment

• User friendliness
  – Currently no up-to-date tutorials available
  – Basic modelling is relatively straight-forward
  – Some problems were encountered with some functions
Results, findings and discussion

• Modelling
  – Modelling of static and common activities is simple
  – Modelling of dynamic activities is harder
  – Some aspects (such as geometrical information) not possible to directly implement.

• Calculations
  – Simple models for many different scenarios implemented.
  – Some models lack in taking into account complexity (such as geometrical information, material variation etc.)
  – Generally conservative results
  – Some identified improvements could relatively easily be implemented while others are probably harder.
Results, findings and discussion

• Minor inconveniences
  – Some technical inconveniences and bugs were found and reported to Facilia
Conclusions

SAFRAN is good software to use as an aid in performing safety assessment for waste management facilities. It helps both in performing calculations as well as in visualising the waste streams in the facility. The software functions closely as an implementation of the DS284 chapter 5, but with some elements of the methodology not implemented.

In its current state, usage of SAFRAN should be complemented with usage of other software and or own data (such as dose coefficients).
Studsvik