The Swedish Nuclear Power Inspectorate Regulatory Code

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The Swedish Nuclear Power Inspectorate's Regulations concerning Safety in Nuclear Facilities

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On the basis of 20 a and 21 §§ of the Ordinance (1984:14) on Nuclear Activities, the Swedish Nuclear Power Inspectorate has issued the following regulations and general recommendations.

Chapter 1. Applicability and definitions

1 § These regulations apply to measures required to maintain safety in connection with the construction, possession and operation of nuclear facilities with the aim of, as far as reasonably achievable taking into account the best available technology, preventing nuclear accidents and preventing the unlawful possession of nuclear material and nuclear waste. The regulations comprise provisions on technical, organizational and administrative measures.

These regulations apply to the following types of nuclear facilities for which permission to conduct nuclear activities is issued by the Government on the basis of 5 § of the Act (1984:3) on Nuclear Activities

- a nuclear power reactor,
- a research or materials testing reactor,
- a facility for the handling, treatment or storage of nuclear material,
- a facility for the handling, treatment or storage of nuclear waste,

- a facility for the final disposal of nuclear material or nuclear waste which has not been finally closed.

Basic regulations on the safety of nuclear activities are stipulated in 4 § of the Act (1984:3) on Nuclear Activities.

Regulations on the safety of a repository for nuclear material or nuclear waste after its closure are stipulated in SKI's Regulations (SKIFS 2002:1) concerning Safety in connection with the Disposal of Nuclear Material and Nuclear Waste.

2 § In these regulations, nuclear facility, nuclear material and nuclear waste refer to the same terms as those defined in 2 § of the Act (1984:3) on Nuclear Activities. The following terms and definitions are also used in these regulations:

Decommissioning: Measures adopted by licensees after the final shutdown of a facility, in order to dismantle the facility in a safe manner, as well as handle the nuclear material and nuclear waste at the facility site.

Barrier: Physical confinement of radioactive substances.

Defence-in-depth: Application of several, overlapping levels of technical equipment, operational measures and administrative procedures to protect the facility's barriers and to maintain their effectiveness as well as to protect the surroundings if the barriers should not function as intended.

Physical protection: Technical, administrative and organizational measures for the purpose of protecting a facility against unauthorised access, sabotage or other such impact which can result in a nuclear accident and for the purpose of preventing unauthorized dealing with nuclear material or nuclear waste.

Normal operation: Operation within the conditions and limitations stipulated in the Operational Limits and Conditions for a facility.

Nuclear accident: Any deficiency arising in a barrier or any other condition leading to the dispersion of radioactive substances, or which leads to radiation doses exceeding permissible limits during normal operation.

Final shutdown: When the main activity of a facility has been terminated and will not be resumed.

Safety function: Technical systems with which a facility is equipped to protect, in a specific manner, the facility's barriers with the aim of preventing a nuclear accident.

Safe state: An operating state that minimizes the risk of a nuclear accident. For a nuclear power reactor, the following normally applies: assured sub-criticality and temperature below 100 degrees Celsius in the reactor pressure vessel.

Chapter 2. Basic safety provisions

Barriers and defence-in-depth
1 § Nuclear accidents shall be prevented through a facility-specific design which shall incorporate multiple barriers as well as a facility-specific defence-in-depth system.

Defence-in-depth shall be achieved by
- ensuring that the design, construction, operation, monitoring and maintenance of a facility is such that abnormal operation and accidents are prevented,
- ensuring that multiple devices and prepared measures exist to protect the integrity of the barriers and, if the integrity should be breached, to mitigate the ensuing consequences,
- ensuring that any release of radioactive substances, which may still occur as a result of abnormal operation and accidents, is prevented or, if this is not possible, controlled and mitigated through devices and prepared measures.

Handling of deficiencies in barriers and in defence-in-depth
2 § The facility shall be brought to a safe state without delay if it is found that the facility is functioning in an unexpected manner, or if it is difficult to determine the severity of a deficiency.

3 § If a deficiency is observed or if there is reason to suspect that there is a deficiency in a barrier or in the defence-in-depth system, measures shall be taken to the extent and within the time necessary, depending on the severity of the deficiency. For this purpose, the deficiencies shall be evaluated, classified and investigated without delay. Taking into account the degree of severity, the deficiencies shall be classified in accordance with Appendix 1.

4 § When a **category 1** deficiency in accordance with Appendix 1 has been observed, or if there is reason to suspect such a deficiency, the facility shall be brought to a safe state without delay.

Before the facility may be allowed to return from a safe state to operations without special limitations, a safety review in accordance with Chapter 4. 3 § shall be conducted of the investigations conducted and the measures taken as a result of the deficiency, and such investigations and measures shall be reviewed and approved by the Swedish Nuclear Power Inspectorate.

5 § When a **category 2** deficiency in accordance with Appendix 1 has been observed, or when there is reason to suspect such a deficiency, the facility may continue in operation during the time that corrective action is taken. In connection with this, the necessary limitations or controls to maintain safety shall be observed.

If corrective action, in accordance with the first paragraph, can be taken within the allowed repair time, in accordance with the Operational Limits and Conditions, the facility may be returned to operations without special limitations after the measures have been taken and readiness for operation has been checked. A safety review in accordance with Chapter 4. 3 § shall subsequently confirm that the safety margins of the facility have been restored through the measures taken.

In those cases where conditions for corrective action are not specified in the Operational Limits and Conditions, the facility may not be returned to operations without special limitations until corrective action has been taken, and a safety review in accordance with Chapter 4. 3 § has confirmed that the safety margins are restored.

If it should be found during the investigation of the deficiency that the deficiency is of a more severe type than covered by the category 2 classification or that there is significant uncertainty concerning the safety margins, the deficiency shall be re-classified as category 1 and the measures that are then necessary shall be taken without delay.

6 § In the event of a **category 3** deficiency in accordance with Appendix 1, the facility may continue in operation with the limitations that are necessary to maintain safety, taking into account the deficiency, during the time that corrective action is taken. Before measures are taken as a result of the deficiency,

a safety review of the time and means of implementing the measures shall be performed in accordance with Chapter 4. 3 §.

Organization, management and control of the nuclear activity

7 § The nuclear activity shall be conducted with an organization that has adequate financial and human resources and that is designed to maintain safety.

8 § The nuclear activity shall be managed, controlled, evaluated and developed with the support of a management system that is designed so that the requirements on safety are met. The management system, including the routines and instructions that are necessary for the control of the nuclear activity, shall be kept up to date and be documented.

The application of the management system, its effectiveness and efficiency shall be systematically and periodically investigated by an audit function which shall have an independent position in relation to the activities which are to be audited. An established audit programme shall exist at the facility.

9 § The licensee shall ensure that

1. documented safety objectives and directives exist for how safety is to be maintained and developed in the nuclear activity as well as those who work with this activity are well acquainted with the objectives and directives,
2. responsibilities, authority and co-operation are defined and documented for the personnel performing duties which are important to safety in the nuclear activity,
3. the nuclear activity is planned so that adequate time and adequate resources are allocated for the safety measures and the safety review that need to be performed,
4. decisions on safety issues are preceded by adequate investigation and consultation so that the issues are comprehensively examined,
5. the personnel has the competence and suitability that is otherwise needed for tasks which are of importance for safety in the nuclear activity as well as ensure that this is documented,
6. the personnel working in nuclear activity is provided with the necessary conditions to carry out work in a safe manner,
7. experience of importance for safety from the facility’s own and from similar activities is continuously utilized and communicated to the personnel concerned,
8. safety in the nuclear activity is routinely monitored and followed up, deviations are identified and handled so that safety is maintained and con-

tinuously developes according to the objectives and directives that apply.

Additional regulations concerning the competence of personnel are stipulated in the SKI's Regulations (SKIFS 2000:1) concerning the Competence of Operations Personnel at Reactor Facilities.

Safety programme

10 § After it is taken into operation, the safety of a facility shall be continuously analyzed and assessed in a systematic manner. An established safety programme shall exist for the safety improvement measures, technical as well as organizational, which arise as a result of this continuous analysis and assessment. The safety programme shall be evaluated and updated on an annual basis.

Physical protection

11 § A facility shall have physical protection. The design of the protection shall be based on an analysis of the threat scenarios for the facility and shall be documented in a plan where the design, organization, management and staffing of the protection shall be described. The analysis of the threat scenarios and plan shall be kept up-to-date and the effectiveness of the plan shall be investigated through exercises conducted on a regular basis.

Before the facility may be taken into operation, a safety review shall be conducted of the plan for physical protection in accordance with Chapter 4. 3 § and the plan shall be reviewed and approved by the Swedish Nuclear Power Inspectorate. Safety reviews in accordance with Chapter 4. 3 § shall be conducted of modifications to the plan which affect physical protection. Before the modifications may be implemented, the Swedish Nuclear Power Inspectorate shall be notified of the modifications.

Emergency preparedness

12 § In the case of abnormal operation and accident conditions which may require protective measures within and outside a facility, preparedness shall exist for

- the classification of events in accordance with the applicable alarm criteria,
- alerting the facility's emergency preparedness personnel,
- assessing the risk of and size of possible releases of radioactive material and time-related aspects
- returning the facility to a safe and stable state, and
- providing information to the competent authorities about the technical situation at the facility.

It shall be possible to immediately initiate necessary measures at the facility site in order to fulfil the tasks stipulated in the first paragraph.

Additional regulations concerning preparedness are stipulated in the Act (2003:778) on Protection against Accidents and the Ordinance (2003:789) on Protection against Accidents.

13 § The measures in accordance with 12 § shall be documented in an emergency preparedness plan which, before the facility may be taken into operation, shall be subjected to a safety review in accordance with Chapter 4. 3 § as well as reviewed and approved by the Swedish Nuclear Power Inspectorate. The plan shall be kept up-to-date and its effectiveness shall be investigated through exercises conducted on a regular basis.

A safety review in accordance with Chapter 4. 3 § shall be conducted on modifications to the preparedness plan which affect the measures as stipulated in 12 §. Before the modifications may be implemented, the Swedish Nuclear Power Inspectorate shall be notified of the modifications.

The licensee shall appoint special personnel as well as ensure that adequate management centres, technical systems, aids and protective equipment exist to the extent necessary in order to fulfil the tasks stipulated in 12 §.

Chapter 3. Facility design

1 § The design of a facility shall

- be able to withstand component and system failures,
- have reliability and operational stability, and
- be able to withstand such events or conditions which can affect the barriers' or defence-in-depth safety functions.

Furthermore, the design shall be performed in such a way that it is possible to maintain, inspect and test the systems, components and devices that are necessary for safety. In addition, the design shall, as far as possible, take into account the implementation of a future safe decommissioning of the facility.

The design of nuclear fuel shall be adapted to the specific reactor facility where the nuclear fuel is used, to devices for handling and storage at the reactor facility and to the existing or planned systems used for transportation, interim storage, processing and final disposal of spent nuclear fuel.

Additional regulations on the design of nuclear reactors are stipulated in SKI's Regulations (SKIFS 2004:2) concerning the Design and Construction of Nuclear Power Reactors.

2 § Design principles and design solutions shall be tested under conditions corresponding to those that can occur during the intended application in a facility. If this is not possible or reasonable, the design principles and design solutions shall be subjected to testing or evaluation in a way that shows that they have the necessary durability, reliability and operational stability, taking into account their function and importance for the safety of the facility.

3 § The design shall be adapted to the personnel's ability to, in a safe manner, monitor and manage the facility and the abnormal operation and accident conditions which can occur.

More detailed provisions concerning control room design and emergency control posts for nuclear reactors are stipulated in SKI's Regulations (2004:2) concerning the Design and Construction of Nuclear Power Reactors.

4 § Structures, systems, components and devices shall be designed, manufactured, installed, controlled and tested in accordance with requirements which are adapted to their function and importance for facility safety.

Chapter 4. Assessment and reporting of the safety of facilities

Safety analysis

1 § The capacity of a facility's barriers and defence-in-depth system to prevent nuclear accidents and mitigate the consequences in the event of an accident shall be analyzed by deterministic methods before the facility is constructed and taken into operation. The analyses shall subsequently be kept up-to-date.

The safety analyses shall be based on a systematic inventory of those events, event sequences and conditions which can lead to a nuclear accident. Models, methods and data used to determine design and operating limits shall be validated and uncertainties shall be taken into account.

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More detailed regulations on devision into event classes and analysis assumptions for nuclear power reactors are stipulated in SKI's Regulations (2004:2) concerning the Design and Construction of Nuclear Power Reactors.

In addition to deterministic analyses in accordance with the first section, the facility shall be analyzed by probabilistic methods in order to obtain as comprehensive a view as possible of safety.

Safety report[1]

2 § A safety report shall, when it is complete in accordance with the second section, provide an overall view of how the safety of the facility is arranged in order to protect human health and the environment against nuclear accidents. The report shall reflect the facility as built, analyzed and verified, as well as show how the requirements on its design, function, organization and activities are met[2]. Modifications to the facility shall be evaluated on the basis of the conditions specified in the safety report.

A preliminary safety report shall be pupdated before a facility may be constructed. The safety report shall be updated before trial operation of the facility may be started. The safety report shall be supplemented before the facility is subsequently taken into operation. The complete safety report shall, taking into account the experience gained from trial operation, contain no less than the information specified in Appendix 2 as well as the Operational Limits and Conditions stipulated in Chapter 5. 1 § first paragraph.

A safety review in accordance with 3 § shall be performed on all stages of a safety report, as described in the second section and the safety report shall be successively reviewed and approved by the Swedish Nuclear Power Inspectorate. The safety report shall subsequently be kept up-to-date.

Safety review

3 § A safety review in accordance with the provisions of these regulations shall be performed in order to verify that applicable safety aspects have been taken into account and that applicable safety requirements with respect to the design, performance and organization of the facility are met. The review

1 Corresponds to a Safety Analysis Report (SAR) in accordance with the IAEA's terminology.
2 Valid requirements are stipulated in applicable regulations and licensing conditions as well as rules, such as industrial standards, that the licensee, in addition, applies to the facility.

shall be performed in a comprehensive and systematic manner and shall be documented.

The safety review shall be performed in two stages. The first stage, the primary review, shall be performed within the parts of the facility's organization that are responsible for the specific issue. The second stage, the independent safety review, shall be performed within a safety review function appointed for this purpose, which shall have an independent position relative to the parts of the organization which are responsible for the specific issues.

Periodic safety review of the facility

4 § An integrated analysis and overall assessment of the safety of the facility shall be performed at least once every ten years and shall concern the way in which the facility at the time of analysis complies with the valid safety requirements as well as whether the necessary conditions exist to operate the facility in a safe manner until the next review occasion, taking into account the development in science and technology. The analyses, assessments and measures proposed on the basis of these shall be documented and submitted to the Swedish Nuclear Power Inspectorate which will decide on the detailed deadline for the review.

Modifications

5 § Technical and organizational modifications to a facility, which can affect the conditions specified in the safety report as well as principal modifications in the safety report shall be reviewed in accordance with 3 §.

Before modifications in accordance with the first paragraph may be implemented, the Swedish Nuclear Power Inspectorate shall be notified of the modifications.

Chapter 5. Operation of the facility

Operational Limits and Conditions[3]

1 § The licensee shall prepare Operational Limits and Conditions for the management of facility operation. The Operational Limits and Conditions shall contain the information provided in Appendix 3. The Operational Limits and Conditions shall, together with the procedures stipulated in 2 §, provide the personnel with the necessary guidance for ensuring that facility operations is conducted in accordance with the conditions stated in the facility's safety report.

3 Usually refered to as STF.

Before the facility may be taken into routine operation, the Operational Limits and Conditions shall be reported and approved in accordance with Chapter 4. 2 §.

The Operational Limits and Conditions shall be kept up-to-date. A safety review in accordance with Chapter 4. 3 § shall be carried out of any modifications or any planned temporary deviations from the Operational Limits and Conditions. The Swedish Nuclear Power Inspectorate shall be notified of the modifications or of planned temporary deviations before they may be applied.

Procedures and guidelines

2 § Procedures established by the licensee shall exist for the measures which shall be taken at a facility during normal operation, abnormal operation and design basis accidents. Furthermore, in the case of a nuclear power reactor, symptom-based emergency operating procedures shall exist to re-establish or compensate for lost safety functions with the aim of avoiding core damage. The mentioned procedures shall be adequate, documented and kept up-to-date. The personnel concerned shall be well acquainted with the procedures.

In addition to procedures in accordance with the first paragraph, documented guidelines shall exist at the facility for measures which may be necessary to implement in order to control and mitigate the consequences of beyond design basis accidents.

Procedures that concern the control of readiness for operation as well as procedures and guidelines that are intended to be applied in connection with abnormal operation and accidents in accordance with the first and second paragraph shall, before they may be applied, be reviewed in accordance with Chapter 4. 3 §.

Maintenance, continuous surveillance, inspection and testing

3 § Structures, systems, components and devices of importance for safety at a facility shall be inspected and maintained on a continuous basis in such a way that they meet the safety requirements. Programmes for maintenance, surveillance testing and control as well as for the management of ageing degradation and damage shall exist. The programmes shall be documented and shall be reviewed and updated in the light of experience gained as well as the development in science and technology.

Detailed provisions on in-service inspection of mechanical devices are stipulated in SKI's Regulations (SKIFS 2000:2) concerning Mechanical Components in Certain Nuclear Facilities.

Functional testing shall be conducted to verify the facility's readiness to operate before components and devices in accordance with the first paragraph are taken into operation.

Investigation of events and conditions
4 § Such an investigation as required by Chapter 2. 3§, or performed for other safety-related reasons, shall be conducted in a systematic manner. As far as possible and reasonable, the investigation shall determine the sequence and causes of an event or the causes of another demonstrated safety deficiency as well as establish the measures needed to restore the facility's safety margins and to prevent the recurrence of safety deficiencies.

The results of investigations in accordance with the first paragraph shall be communicated to the personnel concerned at the facility and shall be used to develop the safety of the facility. Furthermore, the results shall be reported to the Swedish Nuclear Power Inspectorate in accordance with the provisions of Chapter 7. 1-3 §§.

Chapter 6. Nuclear material and nuclear waste

1 § An inventory shall be made of the nuclear waste within the site area of a facility. An identity-marked waste package or other unit that allows for unique identification shall correspond to each registered waste item. The list shall be kept up-to-date.

2 § Measures shall be undertaken to prevent criticality in connection with handling, treatment and storage of nuclear material at the facility. Such measures shall be specified in a safety report in accordance with Chapter 4. 2 §.

3 § Nuclear material and nuclear waste that is handled, processed, stored or disposed of at the facility shall be confined in a safe manner.

The necessary preparatory measures shall be taken at the facility for a safe confinement of nuclear material and nuclear waste in connection with transport to and storage or disposal in another facility.

Measures required in accordance with the first and second paragraph shall be specified in the safety report in accordance with Chapter 4. 2 §.

4 § If nuclear waste arises which, in terms of quantity and type, deviates from that specified in the safety report, the necessary measures for safe confinement of the non-conforming waste shall be documented in a plan. Before the measures may be initiated, a safety review of the plan shall be performed in accordance with Chapter 4. 3 § and the Swedish Nuclear Power Inspectorate shall be notified of the plan.

Chapter 7. Reporting of events and conditions to the Swedish Nuclear Power Inspectorate

1 § Events which have occurred and conditions which are detected which have an essential impact on the safety of a facility shall, without delay, be reported to the Swedish Nuclear Power Inspectorate in the manner described in Appendix 4.

2 § Events which have occurred and conditions which are detected which are of a less severe nature than mentioned in 1 § but of importance for the safety of the facility shall as soon as possible be reported to the Swedish Nuclear Power Inspectorate in accordance with Appendix 4.

3 § Routine reports concerning the operational state and concerning activities which are of importance for the safety of the facility shall be submitted in accordance with Appendix 4.

Chapter 8. Documentation and document retention

1 § Technical documentation concerning the facility and safety reports which have been prepared in accordance with Chapter 4. 2 § shall be retained for as long as the nuclear activity is carried out at a facility.

2 § Documentation of the operational activity and of other activities which are of importance for the safety of a facility shall be retained for the necessary length of time in order to be able to investigate and analyze the causes of events which have occurred in the facility as well as in order to be able to conduct periodic reviews of the safety of a facility in accordance with Chapter 4. 5 §

for as long as the nuclear activity is conducted at the facility.

Chapter 9. Decommissioning of the facility

1 § Before a facility may be constructed, a preliminary plan shall be compiled for the future decommissioning of the facility. The plan shall contain the information specified in Appendix 5. The preliminary plan shall be supplemented and kept up-to-date as long as the facility is in operation and shall be reported to the Swedish Nuclear Power Inspectorate every ten years.

2 § Before the dismantling of the facility may be initiated, the decommissioning plan in accordance with 1 § shall be supplemented and incorporated into the facility's safety report which is stipulated in Chapter 4. 2 §. A safety review in accordance with Chapter 4. 3 § shall be performed of the revised safety report and the report shall be reviewed and approved by the Swedish Nuclear Power Inspectorate.

The Environmental Impact Assessment which is submitted to the Environmental Court in accordance with the Ordinance (1998:905) on Environmental Impact Assessments shall be attached to the revised safety report stipulated in the first paragraph.

3 § When a decision has been made on final shutdown of a facility within a certain time, an integrated analysis and assessment of how safety is being maintained during the time remaining until the closure, shall be made without delay. The analyses, assessments and the measures caused by these shall be documented and reported to the Swedish Nuclear Power Inspectorate.

Chapter 10. Exceptions

1§ The Swedish Nuclear Power Inspectorate may grant exceptions from these regulations if particular grounds exist and if this can be done without neglecting the purpose with the regulations.

Entry into force and transitional regulations

These regulations shall enter into force on January 1, 2005.

At the same time, SKI's Regulations (SKIFS 1998:1) concerning Safety in Certain Nuclear Facilities cease to apply.

The licensee of the facility, for which permission to conduct nuclear activities has been decided before these regulations enter into force, shall prepare programmes for the handling of ageing degradation and damage in accordance with Chapter 5. 3 § as well as report a plan for the decommissioning of the facility in accordance with Chapter 9. 1 §, no later than by December 31, 2005.

For periodic safety reviews initiated before January 1, 2005, the older provisions of Chapter 4. 5 § of SKIFS 1998:1 apply.

On behalf of the Swedish Nuclear Power Inspectorate

JUDITH MELIN

Erik Jende

Appendix 1

Category 1
Observed deficiencies in one or more barriers or in the defence-in-depth system as well as a well-founded suspicion that safety is severely threatened shall be classified as Category 1.

The following events or conditions shall be assigned to Category 1

1.1 exceeding the highest permissible limit (HTG), in accordance with the definition provided in the Operational Limits and Conditions,
1.2 a deterioration in the integrity of any of the barriers for the containment of radioactive materials, such as
- a nuclear fuel damage which results in an extensive release of fission products to the reactor coolant,
- damage to the primary system pressure boundary which results in the activation of the facility's safety functions,
- damage to the reactor containment which means that the containment does not fulfil the postulated leaktightness and structural integrity requirements in the safety report,

1.3 an unplanned reactivity increase in a reactor, or unintentional criticality in a reactor, or criticality in areas where nuclear material is handled, stored or kept,
1.4 a deficiency in an activity, management or control which is of such an extent that it severely threatens safety,
1.5 a deficiency or deviation of such a severe nature or extent that it gives cause to question the safety report of the facility,
1.6 an event or deficiency in the physical protection which is of such a nature or extent that it is a severe threat to safety.

Category 2
Observed deficiencies in one barrier or in the defence-in-depth system which are less severe than that which is referred to in Category 1, as well as a well-founded suspicion that safety is threatened, shall be classified as Category 2.

The following events or conditions shall be assigned to Category 2

2.1 a deviation from the Operational Limits and Conditions which is within the assumptions and conditions of the safety report,
2.2 a deviation from specified system or component performance,
2.3 a condition which results in operational limitations or in limitations on the duration of operation. However, this does not include planned measures which are specified in the Operational Limits and Conditions,
2.4 a condition which has prevented or could have prevented the intended functioning of equipment which is of importance for safety,
2.5 the limit for the activation of the safety function is observed to result in a lower margin to the safety limit than specified in the safety report,
2.6 a nuclear fuel damage which entails damage to the cladding or other damage of the fuel pin which results in releases of radioactivity or mechanical damage to components, geometric deformation or another condition which may make a fuel bundle unsuitable for continued operation. However, this does not include fuel which is being investigated in a special research or materials testing reactor,
2.7 a condition in the facility which results in nuclear material occurring in equipment which is not approved for this,
2.8 a condition in the facility which means that a substance with moderating properties is present, to a greater extent than that postulated during normal operation, in a component or equipment where moderation control is necessary,
2.9 a deficiency of importance for safety in a single analysis in the safety report or in a method used for such analysis,
2.10 another technical or organizational condition which threatens safety,
2.11 an event or deficiency in physical protection which threatens safety.

Category 3
A temporary deficiency in the defence-in-depth system which arises when such an event or condition is corrected and which, without measures, could lead to a more severe condition and which is documented in the Operational Limits and Conditions in accordance with Chapter 5. 1 §.

An event or condition assigned to Category 3 may not prevent the function of the facility but indicates the need for measures or testing since there is a risk that the component or system will not fulfil requirements concerning readiness for operation in accordance with the Operational Limits and Conditions. However, the time for the measures may not exceed the analyzed permissible repair time specified in the Operational Limits and Conditions.

For Category 3 to apply, the event or condition has to be of such a nature that immediate measures are not warranted.

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Appendix 2

The safety report for a facility shall contain no less than the following information. Furthermore, the report shall, in a suitable manner, taking into account the need for confidentiality, contain information on the design assumptions and design of the physical protection.

In addition to the information specified here, the Swedish Radiation Protection Authority decides on reporting from the radiation protection standpoint.

Site
A description of how the site and its surroundings, from the standpoint of safety, can affect the facility, for example with respect to hydrological conditions, geology and seismic conditions as well as ongoing activities within the area.

Design rules
A description of the safety principles, rules and design assumptions that have controlled the design and construction of the facility. An account of how the facility fulfils the rules and assumptions mentioned, as well as of how structures, systems, components and devices in the facility have been assigned to classes which specify their importance for safety.

A safety report concerning facilities for the handling of spent nuclear fuel or nuclear waste shall also contain such rules which can be derived from the analysis of safety in the particular repository after its closure.

Rules for design and construction as well as the design assumptions which have been added after start-up and which have been assessed by the licensee to be of essential importance for the safety of the facility shall be documented. These rules and assumptions shall be incorporated into the safety report as soon as the ensuing measures are implemented.

Facility and functional description
A description of the facility and its systems, function and performance during normal operation, including the handling of nuclear material and nuclear waste. Detailed descriptions of the facility's barriers and safety functions along with safety systems. Descriptions of the systems and the equipment which, in addition to safety systems, have been found to be of essential importance for the defence-in-depth. A description of the principles for control room design

and other monitoring/maneuvering devices where the interface between the personnel and the facility is of importance for safety.

A description of the criteria for including equipment in the Operational Limits and Conditions as well as the principles for determining the functional testing and testing intervals necessary to control that the facility is being operated within the established limits (readiness for operation).

Radioactive material
A basis for determining the quantities and types of radioactive substances which can be released in the event of nuclear accidents, known as source terms.

Radiation protection
The Swedish Radiation Protection Authority decides what shall be reported in this section.

Operation of the facility
A description of the organization and principles for the management and control of

- operations, including control room work,
- maintenance, continuous surveillance and testing as well as the handling of ageing degradation and damage,
- nuclear material and nuclear waste,
- the safety work at the facility, including the system for operational experience feedback,
- emergency preparedness.

A description of the package of procedures that is applied during normal operation, abnormal operation and accidents.

A description of the principles for facility staffing, as well as the system for training of personnel with tasks of importance for safety in the nuclear activity.

Analysis of operational conditions
A report of the safety analyses conducted in accordance with Chapter 4. 1 § and of studies which have been carried out relating to the construction of the facility and its environmental impact during normal operation, abnormal operation and accidents.

An account of analyses performed concerning mitigating measures in connection with severe accidents.

References
References belonging to the main safety report.

Drawings
General drawings of the facility and of its systems as well as flow charts.

Appendix 3

In order to ensure that the conditions reported or assumed in the safety report are maintained at the facility, the Operational Limits and Conditions in accordance with Chapter 5. 1 § shall contain a specification of:

- the highest permissible limits (HTG)[4] which are of importance for the fuel cladding and primary system integrity in a reactor facility,
- the other safety limits that are necessary to ensure that the fuel cladding, primary system and reactor containment design limits are not exceeded in a reactor facility,
- other necessary conditions and limitations which are necessary to maintain and control the readiness for operation to ensure that the performance does not exceed or fall below the specified levels during the necessary period of time, in such systems and components which are of importance for safety during a particular operational state,
- safety functions as well as other equipment which is of essential importance for the defence-in-depth system with:
  - information on the systems and components included,
  - the requirements on readiness for operation[5] for the operational states in question as well as
  - the measures to be taken when readiness for operation does not apply, for example limitations in the form of a permitted repair time or a permitted power level,
- the principles for the management and control of facility operations, the rules for the handling of failures, abnormal operation as well as maintenance work, testing and modification work,
- the necessary staffing to ensure safe operation during different operational states,
- the events and conditions at the facility which result in such measures as those stipulated in Chapter 2. 2-6 §§, such measures as those stipulated in Chapter 5. 4 § as well as reporting to the Swedish Nuclear Power Inspectorate in accordance with Chapter 7. 1-3 §§.

4 In the case of pressurized water reactors, the term ”safety limits” is used instead of limits.
5 For non-safety classified equipment requirement refer to avaliability for operation.

Appendix 4

Reporting in accordance with Chapter 7. 1 §
1. The following shall be reported without delay:

- an event or condition which causes an alarm for increased preparedness or accident in accordance with the alarm criteria which have been established by the Swedish Radiation Protection Authority,
- an event or condition which belongs to Category 1 in accordance with Appendix 1,
- a scram in a reactor facility where expected consequential functions of importance for safety have failed.

The Swedish Nuclear Power Inspectorate shall, in these cases, be informed within one hour after the event or condition has occurred or the condition has been detected.

The following information shall be reported to the Swedish Nuclear Power Inspectorate when such an event or condition has occurred

- what has occurred,
- when it occurred,
- which immediate consequences it has resulted in,
- which actions have been taken,
- which actions are planned,
- an assessment of the continued development.

Followup reports shall be submitted in the event of any essential change in the safety state or when a new assessment is made of the continued development.

2. The following shall be reported within 16 hours:

- an event or condition which, in accordance with the applicable technical criteria, is classified as Level 2 or higher on the International Nuclear Event Scale (INES).

3. The following shall be reported within 7 days:

- a comprehensive report on any event or condition which has resulted in an alert in accordance with point 1 above or which has been assigned to Category 1 in accordance with Appendix 1. Such a report shall contain:

- a description of the event and event sequence

- a preliminary analysis of causes and consequences as well as an assessment of the importance of the event for safety
- measures that have been taken and are planned to restore the safety margins and to prevent a recurrence

Minutes or corresponding statements of undertaken safety reviews shall be attached to the report.

Reporting in accordance with Chapter 7. 2 §
4. Within 30 days the following shall be reported:

- a comprehensive report on any event or condition which has been assigned to Category 2 in accordance with Appendix 1,
- an event or condition that is assigned to Level 1 on the International Nuclear Event Scale (INES),
- a scram report for a reactor facility.

If particular grounds exist which mean that a final report in accordance with the first paragraph cannot be submitted within 30 days, a preliminary report shall be submitted to the Swedish Nuclear Power Inspectorate. This report shall also contain a justification of the particular grounds and a fixed time-schedule specifying when a final report can be ready. A safety review of such a justification and time-schedule shall be carried out in accordance with Chapter 4. 3 §.

In addition to the reporting of events and conditions, SKI’s Regulations (SKIFS 2000:2) concerning Mechanical Components in Certain Nuclear Facilities contain requirements on the special reporting of damage that has occurred.

Reporting in accordance with Chapter 7. 3 §
5. A nuclear power reactor shall submit the following report every day (daily report):

- operational state during the day,
- thermal power level in percent,
- event or condition of Category 1, 2 or 3 that has occured,
- abnormal operation, for example the activation of the reactor protection system,
- other circumstances which may be of importance for safety.

6. Other facilities shall submit the following report every week (weekly report):

- abnormal operation,
- event or condition of Category 1, 2 or 3 that has occured,
- other circumstances which may be of importance for safety.

7. The following report shall be submitted every year (annual report):

- an integrated report of activities at the facility during the calendar year with experience gained and conclusions reached with regard to safety. Events or conditions which have been assigned to Categories 1, 2 or 3 or which have resulted in reactor scram shall also be included in the report. Conditions which have been assigned to Category 3 shall also be described with respect to the purpose of the measures and the time utilized to implement the measures (prevention time).

The annual report shall be submitted to the Swedish Nuclear Power Inspectorate no later than March 1, the following year.

Appendix 5

The complete decommissioning plan for a facility shall contain the following information. The preliminary decommissioning plans which are reported in accordance with Chapter 9. 1 § shall contain the information below which it is reasonable to expect could be available at the time of reporting. Where the corresponding information exists in the facility's safety report or in other safety documentation, it is sufficient to refer to this information. Radiation protection provisions are stipulated in the Swedish Radiation Protection Authority's regulations (SSI FS 2002:4) concerning the Planning before and during the Decommissioning of Nuclear Facilities.

Documentation of the facility

- Current facility description with drawings.
- Operating data, operating experience and events that may be of importance for safety during decommissioning.
- A description of the radioactive material that remain in the facility after final shutdown.

Prerequisites for planning

- Report on available or planned systems for final disposal of the nuclear waste arising in connection with decommissioning.
- Report on the ultimate objective of decommissioning.
- Report on intended deadlines for the start and end of decommissioning. These deadlines shall be justified, taking into account inter alia the availability of personnel with operating experience from the facility and from decommissioning.

Decommissioning activity

- A description of the planned activity from final shutdown until the time that decommissioning is completed. The division into different stages and the choice of methods for decontamination and dismantling shall be justified.
- An account of the planned organization as well as the management and control of the decommissioning activity as well as an estimate of the need for personnel and competence at different stages.
- An account of the planned activity's safety consequences taking into account the risk for nuclear accidents.
- A description of the planned handling of radioactive material as well as measures that must be taken for the safe confinement of the nuclear waste that arises in ways described in Chapter 6. 3 §.

The Swedish Nuclear Power Inspectorate Regulatory Code

GENERAL RECOMMENDATIONS

The Swedish Nuclear Power Inspectorate's General Recommendations concerning the Application of the Regulations (SKIFS 2004:1) concerning Safety in Nuclear Facilities

General Recommendations

Such general recommendations on the application of regulations which specify how someone can or should act in a certain respect.

[1 § Regulatory Code Ordinance (1976:725)]

The Swedish Nuclear Power Inspectorate's General Recommendations concerning the Application of the Regulations (SKIFS 2004:1) concerning Safety in Nuclear Facilities

Comments on Certain Paragraphs

Chapter 1. 1 §

A nuclear power reactor is the complete facility needed for production of nuclear energy, including secondary and auxiliary systems as well as devices within the facility which are necessary for the handling of nuclear material and nuclear waste.

It should be noted that, according to the Act on Nuclear Activities (1984:3), spent nuclear fuel is considered to be nuclear material until it is deposited in a repository. According to the definition in the Act, it is then considered to be nuclear waste.

As is evident from the second paragraph of the section, the regulations do not apply to facilities for the final disposal of nuclear waste after closure[6]. However, the regulations apply to the measures which are implemented before closure, i.e. for measures during the design, construction and operation of the repository.

A facility for the storage of nuclear waste which has a separate licence and which is operated by the same licensee as a nuclear power plant can, in connection with the application of these regulations, be considered to be part of the nuclear power plant.

The decommissioning of a nuclear facility is also included in the concept of nuclear activity as this is defined in the Act (1984:3) on Nuclear Activities.

6 Requirements on safety after final closure are stipulated in the SKI's Regulations (SKIFS 2002:1) concerning Safety in connection with the Disposal of Nuclear Material and Nuclear Waste.

Chapter 1. 2 §
The decommissioning process includes measures for shutdown operations, service operations and dismantling, as well as for handling of the nuclear material and nuclear waste at the facility site at final shut down, and the nuclear waste which arises in connection with dismantling. The shutdown operations stage comprises necessary measures as long as nuclear material remains in the facility. The service operations stage comprises necessary measures after the nuclear material has been removed from the facility and until dismantling is started.

It should be observed that the concept of normal operation covers all of the operating states included in the Operational Limits and Conditions.

Definitions of "management system" and "audit" are provided in the Swedish Standard, SS-EN ISO 9000:2000. Management Systems for Quality – Principles and Terminology.

Chapter 2. 1 §
The overall purpose of the defence-in-depth system is to compensate for possible technical failures and errors in the handling of the facility, to maintain the effectiveness of the barriers by averting damage and malfunctions in the facility as well as to protect the public and the environment from harmful effects if the barriers should not perform as intended.

The defence-in-depth system should be applied on five levels in accordance with the table below[7]. If one level should fail, the next level will take over. A failure in a component or in a maneuver on one level, or combinations of failures which occur simultaneously on different levels must not degrade function on the next level. Independence between the different levels in the defence-in-depth system is therefore essential to achieve this. An extra strength in one barrier or defence-in-depth level should therefore not be credited in order to accept deficiencies in another barrier or defence-in-depth level.

7 See also "Defence in Depth in Nuclear Safety". IAEA-INSAG-10. A report by the International Nuclear Safety Advisory Group. International Atomic Energy Agency, Vienna, 1996 and "Basic Safety Principles for Nuclear Power Plants". IAEA-INSAG 12. A report by the International Nuclear Safety Advisory Group. International Atomic Energy Agency, Vienna, 1999.

SKIFS 2004:1

Level	Purpose	Main measures
1	Prevention of abnormal operations and failures	Robust design and high requirements on design, operation and maintenance
2	Control of abnormal operation and detection of failures	Control and protection systems as well as surveillance and in-service-inspection
3	Control of accidents within the design basis	Technical safety functions as well as emergency operating procedures
4	Control of severe plant conditions, including prevention of accident progression and mitigation of the consequences of severe accidents	Prepared engineered measures and effective accident management at the facility
5	Mitigation of consequences of significant releases of radioactive substances	Effective co-operation with the competent authorities for protection of the public and the environment

Important general conditions to achieve and maintain an effective defence-in-depth system are that a suitable organization and an effective system should be applied for the management, control and follow-up of activities at the facility. This means that:

- safety is prioritized,
- sufficient financial resources and personnel with adequate competence are available,
- safety is monitored and followed up, failures and deficiencies are identified and corrected as well as the organization learns from its own mistakes and from those of others so that deficiencies in safety are not repeated,
- conservative assumptions and good safety margins are applied in the design and operation of the facility,
- quality assurance is applied in the nuclear activity,
- opportunities for safety improvement are used,
- the organization as a whole is characterized by a good safety culture.

Provisions regarding the organization, management and control of the nuclear activity are stipulated in 7-10 §§.

The defence-in-depth system is based on the assumption that there are a number of specially adapted physical barriers placed between the radioactive material and the personnel of a facility and the environment. The design of the barriers may vary depending on the characteristics of the contained material and on possible deviations from normal operation which may result from the breach of other barriers.

For nuclear power reactors which are in operation, the barriers usually comprise the fuel geometry, the cladding, the primary system pressure boundary and the reactor containment. Barriers can also comprise spent nuclear fuel containers and other qualified packaging, stocks and storage facilities used to confine nuclear material and nuclear waste. For barriers in connection with final disposal of nuclear material and nuclear waste, see SKI's Regulations (SKIFS 2002:1) concerning Safety in connection with the Disposal of Nuclear Material and Nuclear Waste.

The defence-in-depth system comprises different numbers and types of technical systems, operational measures and administrative procedures to protect the barriers and maintain their effectiveness during normal operation and during postulated events, incidents and accidents. If this should fail, measures which have been prepared in advance must exist to limit and mitigate the consequences of a more severe accident.

In order to ensure that safety as a whole is satisfactory, it should be analysed which barriers and components on different levels of the defence-in-depth system must function during different operational states in a facility. When a facility is in full operation, all barriers and parts of the defence-in-depth system should be in function. When the facility is shut down for maintenance or a barrier must be disabled for other reasons, this should be compensated for by other measures of a technical, operational or administrative nature. Chapter 5. 1 § stipulates how this is to be controlled.

Chapter 2. 3 §
The requirements regarding investigating and taking measures, when there is a deficiency in a barrier or in the defence-in-depth system, also apply in the event of a suspicion that safety is threatened which is based on performed safety analyses as well as on events which have occurred and on conditions detected at other similar facilities. The degree of severity of the failure type or deficiency as such, the possible safety impact that it may have as well as the safety impact in the particular case in question, should be determined by the investigation.

The requirement regarding taking a measure without delay means that it must be taken as soon as the necessary basis for the measure is available.

Chapter 2. 4 §, Appendix 1
Point 1.2: Damage as a result of dryout is an example of damage that can lead to an extensive release of fission products and nuclear material to the reactor coolant.

Point 1.3: When deciding which unplanned reactivity increase in the reactor should be assigned to Category 1, reactivity increases which are greater than half of the average value of the delayed neutrons in the core may provide guidance. A lower unplanned reactivity increase, or if the event is included in the safety report of the facility, may be assigned to Category 2.

Point 1.5: Such a deficiency or deviation may have been identified through an event, investigation, analysis or other experience which has emerged at the facility itself or at another similar facility. Fuel bending, which can prevent control rods from being inserted into the core, is an example of a deficiency that is of such a serious nature that the safety report of the facility can be called into question.

Chapter 2. 5 §, Appendix 1
Point 2.6: When such a nuclear fuel defect occurs which can lead to difficulties in detecting new damage or the release of uranium to the primary system which makes testing and maintenance difficult or if the quantity of alpha activity in the operational waste from the facility exceeds the acceptable limit for nuclear waste disposal, the reactor should be shut down as soon as possible and suitable and the damaged fuel should be removed from the core.

Chapter 2. 7 §
The organization should be designed and staffed so that it supports a safe and reliable operation of the facility as well as allows for effective measures to be taken in an emergency situation. The suitability of the organization in these respects should be regularly evaluated.

Chapter 2. 8 §
The management system should encompass the entire nuclear activity at the facility. Therefore the scope should not be too narrow. The IAEA safety standards, for quality assurance of safety in nuclear power plants and other nuclear

facilities, can provide guidance with respect to the design of the management system which is needed with respect to safety[8].

The management system should pay particular attention to the crosscutting organizational processes in the nuclear activity. The crosscutting processes place special demands on co-ordination, transparent allocation of responsibilities and authority etc. One example is the management and control of plant modifications which normally concerns several units in the facility's organization.

The management system should clearly specify how sub-contractors and suppliers of services and equipment for the nuclear activity are assessed and how these assessments are kept up-to-date.

The audit function should be given an adequately strong and independent position in the organization and should have the authority to report directly to the highest manager of the facility. The auditors should be appointed so that the audit activity has continuity and is performed by individuals with a good knowledge of the activity being audited.

When determining suitable audit intervals, the importance of the different activities for safety and the special needs for auditing that can arise should be taken into account. Normally, all of the audit areas should be evaluated at least once every four years.

The audit activity as such and the facility management function should also be periodically subjected to an audit.

Chapter 2. 9 §
Point 1: The directives for safety should, in a tangible manner, specify how the safety goals will be achieved. The goals and directives should clearly specify that safety is always prioritized in the nuclear activity.

The safety goals may be both quantitative and qualitative. Goals should be formulated so that they can be followed up.

8 Latest edition: IAEA Safety Series No 50-C/SG-Q. International Atomic Energy Agency. Vienna, 1996. These standards are currently being revised and will be replaced by standards for Management Systems.

The adequacy and application of the goals and directives should be evaluated on a regular basis.

All personnel working in the nuclear activity should know the safety goals and directives, including hired personnel and, to a suitable extent, suppliers to the nuclear activity.

Point 2: The personnel should be well acquainted with responsibilities, authority and conditions for co-operation and suitable processes should be set up for communication in the organization. In cases where a category of personnel is conducting similar tasks of importance for safety in the nuclear activity, it is sufficient to define the responsibilities and authority for the personnel category.

Point 3: The requirement on planning encompasses both the regular activity at the plant and procurements conducted which are of importance for safety.

Point 4: In order to ensure adequate investigation and consultation, in addition to the provisions of Chapter 4. 3 §, a safety committee should be established with the aim of functioning as an advisory group with respect to principal safety issues. The committee members should have a high level of integrity and broadly-based expertise in nuclear safety issues and should report to the manager who has the ultimate responsibility for safety at the facility.

Point 5: The requirements concerning personnel also apply to sub-contractors, and other temporarily hired personnel for the nuclear activity, where applicable.

In order to ensure the availability of personnel with adequate competence, competence and staffing plans should be prepared for several years in advance. In order to analyze the need for personnel and the competence that is needed in the activity, a systematic method should be used which, based on the analyses of the tasks identifies the staffing and competence requirements as well as the need for training. The systematic method also includes a regular evaluation of the effectiveness and efficiency of completed training.

A systematic competence follow-up should be conducted every year in order to check that the personnel performing tasks of importance for safety in the nuclear activity has the competence required for the tasks, and to analyze the need for supplementary training and further education. The follow-up should be conducted with explicit criteria regarding acceptable performance.

In order to develop and maintain adequate competence within the organization of the facility, the advantages and disadvantages of using in-house personnel should be weighed against using sub-contractors and other temporarily hired personnel. The necessary competence to be able to order, lead and evaluate the result of work which is of importance for safety and which is carried out by sub-contractors or other hired personnel should always be maintained within the facility's organization.

For personnel to be evaluated as otherwise suitable, an analysis must be carried out of the medical demands of various tasks which are of importance for safety, for example with regard to keenness of vision, ability to distinguish colours and hearing ability, as well as the health status that can affect work ability. A documented policy should also exist for the handling of different factors which can affect the performance of the personnel in a negative way for safety, for example, alcohol and other drugs. Such a policy should include preventive measures and measures to be taken if the personnel should be found to be under the influence or in the event of abuse. The division of responsibilities for such measures should be clarified and supervisors and other concerned personnel should be given training, with respect to these issues.

For an evaluation of suitability otherwise, also an adequate security clearance of the personnel must be performed.

Point 6: A number of factors at work affect people's ability to function, for example, the organization of the activity, the layout of the workplace, equipment and aids as well as the physical environment, how work is supervised, instructions and procedures, communication with others, the work load and working hours. The correction of any deficiencies in the conditions for work which can have a detrimental impact on safety, is an important part of the preventive safety work. For this purpose, and in order to further improve the conditions for safe work, analyses and evaluations of the man-technology-organization interaction should be carried out and recurrent evaluations performed.

Point 7: Efficient procedures should exist for continuous experience feedback within the nuclear activity. In the light of experience gained, it should be continuously investigated whether the facility and its activities comply with the applicable conditions and regulations.

SKIFS 2004:1

Point 8: The management system should clearly control how deviations identified in audits and other follow ups are corrected. The deviations may concern deviations from safety goals and directives in accordance with Point 1 as well as deviations from procedures and instructions that are applied in the nuclear activity. Safety indicators can be a suitable aid in the monitoring and follow-up of the nuclear activity.

Chapter 2. 10 §

The continuous analysis and evaluation of facility safety should particularly take into account technical and organizational experience from the activity itself, from similar facilities, results from safety analyses, results from research and development projects which may be of importance for the evaluation of safety and the development of such standards as used in the construction and operations of the facility. Organizational experience refers to, for example, results from analyses of man-technology-organization interaction, evaluations of the organization and the personnel's conditions for working as well as self assessments of the safety climate and safety culture.

The safety programme should specify overall priorities and timetables for the measures in the programme.

The possibility of improving safety should be taken into account in every measure resulting in modifications to the facility or in its activities.

Chapter 2. 11 §

In order to establish the focus and scope of physical protection, it should be noted that the expression ”measures which aim at protecting a facility” normally includes measures which are necessary for obstructing, delaying and limiting the consequences of unauthorized intrusion, sabotage or other such actions.

An analysis of the threat scenarios for the facility should include a number of typical cases/scenarios included in the design basis threat scenario for the physical protection. For each of these, typical cases/scenarios, overall assumptions for the threats as well as acceptable consequences and essential countermeasures should be described. Changes in the treat scenarios should be analyzed to verify that the plan for physical protection is still adequate.

9 The design basis threat scenario is currently reported in SKI-PM 2003:7 (confidential).

Physical protection should be planned as a comprehensive activity, i.e. ensuring that technical systems, administrative and organizational measures exist in combination with adequate personnel resources. The understanding of the entire staff for the need for physical protection and its procedures is a fundamental factor for the effectiveness of the protection.

Regular exercise means that exercises should be conducted to the extent necessary to maintain effective protection. Each facility should have a training and exercise plan that is reviewed on an annual basis. Each exercise should be systematically evaluated in order to verify the adequacy of the physical protection and to identify the need for training personnel concerned.

Chapter 2. 12 §
In order to ensure that alarming and other initial measures in an accident situation can be implemented without delay, there should be adequate co-ordination between the emergency operating procedures of a facility and the alarm criteria which are established by the Swedish Radiation Protection Authority. Furthermore, efficient in-house procedures should exist for decision-making concerning the mobilisation of emergency preparedness personnel and, to an adequate extent, check lists and procedures should be available as support for decision-makers.

The technical systems which are used for alerting the emergency preparedness personnel should be tested on a regular basis to check that they will perform as intended.

Individuals should be appointed by name and should have received training and should have participated in exercises for the emergency preparedness tasks. Furthermore, for each task, a number of back-up personnel should exist to ensure that personnel is always available and to ensure that the necessary endurance is ensured in connection with lengthy accident sequences.

Aids and procedures should exist, to the extent needed, for the evaluation of source terms in order to determine the quantity of the radioactive material that could be released, both in terms of the amount that will be contained as well as the amount that could be released to the environment.

A technical support function should be set up to assist the operations personnel on duty in analyzing the event sequence and in proposing the measures which might be necessary to implement also on the long term. Furthermore, the support function may be responsible for preparing work which must be

done in connection with emergency repairs and other measures which are necessary in the facility.

Chapter 2. 13 §
Planning should cover all types of accidents for which the facility is designed as well as measures to mitigate the consequences of possible accident sequences which can occur in addition. Furthermore, combinations of events should be taken into account, such as fire or sabotage in combination with a nuclear accident.

Adequate management centres means that they are equipped with the necessary communication equipment and other necessary tools, access routes, radiation protection and protective ventilation.

Technical systems are for instance communication equipment and such equipment which allows the state of the facility to be evaluated also during severe conditions and during a long event sequence. For example, this means that the evaluation can also be conducted during severe radiological conditions.

Regular exercise means that exercises should be carried out to the extent that is necessary for emergency preparedness personnel to be able to safely and effectively fulfil the duties stipulated in 12 §. Each facility should have a training and exercise plan which should be updated on an annual basis. Each exercise should be systematically evaluated to ensure the adequacy of the preparedness as well as to identify the need for training of the emergency preparedness personnel.

Chapter 3. 1 §
The design requirements which are specified in the regulations are of a fundamental nature and should, to the appropriate extent, be taken into account during all design work, before a facility is taken into operation as well as in connection with later plant modifications.

Ability to withstand such events or conditions which can affect the function of the barriers or the defence-in-depth system, refers to events or conditions which, in safety analysis, in accordance with Chapter 4. 1 §, have been found to affect the safety functions in a significant manner. Examples of such events or conditions are pipe breaks, transients, fire, flooding, earthquakes, clogging of cooling water intakes, sabotage and disturbances in or loss of offsite power.

Chapter 3. 2 §
The provisions in this section refers among others to environmental qualification in the form of documented tests to ensure that components function as postulated in the safety report. In order to meet this requirement, it is important that such qualification should be performed taking into account normal operation as well as conditions which arise in connection with abnormal operation and design basis accidents. These requirements also concern such components which are intended for a facility for the final disposal of nuclear waste and which are necessary to maintain safety after the closure of the facility.

Chapter 3. 3 §
The design should be adapted to the functions and tasks which are to be carried out as well as to the possibilities and limitations of human beings. Experience from the facility in question should be taken advantage of at an early stage in the design process. To ensure a knowledgeable evaluation of such design solutions where the capability of the personnel is an important pre-requisite, experts on the man-technology-organization interaction should be used to take part in the design, analysis and evaluation of the solutions.

The design of the facility should allow sufficient time for consideration for those operator actions that affect the safety functions. Information and annunciator systems in control rooms should ensure that the personnel has access to the information which is needed at different operational states without becoming overloaded by information during abnormal operation, accidents or refuelling and maintenance outages. The man-machine interface should be designed in accordance with good ergonomic practice so that the interface is compatible with human conditions and satisfies the need for interaction and communication during work. The solutions which are developed should be evaluated in the context where they will be used.

Chapter 3. 4 §
In order to ensure that structures, systems, components and devices are as well adapted as possible for their importance for safety, a classification system should be applied for controlling requirements with respect to design and quality control.

Chapter 4. 1 §
Safety analyses should include a set of events or scenarios which, as far as possible, cover the event sequences and conditions which can affect the function of the defence-in-depth system and, thereby, ultimately have a radiological

impact on the environment. The frequency of different events or scenarios is a basis for division into different event classes.

For each event class, quantitative analyses should show that the consequences are acceptable, in relation to the Swedish Radiation Protection Authority's regulations concerning protection of the environment. On the basis of the event classes, design basis events should be identified for the barriers' and defence-in-depth function. This refers to events which determine requirements for facility design, namely with respect to the properties of barriers and the protection of the barriers, to ensure an acceptable level of safety. Probable as well as less probable design basis events should be specified. Identified events which are not subject to further analysis should be specified in the safety analysis.

Anticipated operational occurrences and component failures, as well as the possible action of operators and operator errors should be analyzed in order to investigate the possibility of the facility to withstand postulated events. In the analysis of how the facility copes with postulated events, a random failure[11] should also be assumed to occur in the safety functions, in connection with the initiating event or thereafter. The impact of uncertainties which are important for the results should also be analyzed.

One of the purposes of analyses of postulated events and transients should be to identify the necessary operator action and to judge the degree to which the procedures, the instrumentation as well as other factors determining these actions are adequate.

A safety analysis should generally be of high quality with respect to documentation, references, review procedures etc. The objective of the analysis should be clearly specified as well as the uncertainties and limitations of the analysis. Furthermore, the analysis should have a good traceability and well-justified assumptions and data which are relevant for the facility. The report of results should contain an explicit conclusion regarding the safety of the facility within the conditions and limitations of the analysis.

10 Currently SSI FS 2000:12. The Swedish Radiation Protection Authority's Regulations on Radiation Protection of Human Health and the Environment from the Releases of Radioactive Substances from Certain Nuclear Facilities.

11 Called a single failure in connection with safety analysis.

The safety analysis for the decommissioning or dismantling of a facility should particularly take into account factors such as rapid changes in facility status, the removal of both active and passive safety functions, the handling of large quantities of nuclear waste, as well as unusual and changing working conditions.

Specifically for probabilistic analysis

Probabilistic analyses should be as realistic as possible with respect to models and data. These analyses should also analyze the impact of uncertainties which are of importance for the results.

For a reactor facility, probabilistic safety analyses (PSA) should contain
- level 1: an analysis of the probability of core damage occurring, as well as
- level 2: an analysis of the probability of releases of radioactive material to the environment. Furthermore, the analyses should comprise the operational states, power operation, also including start up and planned shut down, as well as scheduled outages which also include refuelling.

Probabilistic analysis should be routinely used in a reactor facility to evaluate the safety importance of events and plant modifications.

The deterministic requirements are the basis for the operating permit of the facility. The requirements on the facility design should be verified and developed with the help of probabilistic safety assessment, in order to achieve a more certain basis for the design.

When applying probabilistic analysis for the evaluation of a facility's design and operation, the following should be taken into account:

- One aim should be to achieve a safety level without dominant weaknesses.
- The consequence of changes, in deterministic design requirements based on probabilistic analysis, should be evaluated with sensitivity analysis to demonstrate that the design will continue to be sufficiently robust. The fact that simplicity and transparency are essential properties for achieving a high safety level should be taken into account.
- When changing one requirement, other requirements on systems that belong to the same safety function or barrier should be taken into account. For example, in connection with change in the frequency of component testing, other components and systems which contribute to the same safety function should be evaluated.

Chapter 4. 2 §
The safety report should be structured in a clear and logical manner. The presumptions and methodology should be well described with clear references to all underlying data. Furthermore, the report should contain an overall conclusion on the safety and radiological environmental impact of the facility.

The report and its underlying data should be documented so as to enable the report to be effectively kept updated and available.

All that is stipulated for preliminary, renewed and supplementary safety reporting should also, in addition to new facilities, be applied to major reconstruction and modification of existing facilities.

Chapter 4. 2 §, Appendix 2
Equipment which, in addition to the safety systems, has essential importance for the facility's defence in depth refers to such structures, systems, components and devices that have been found to have significant importance for the protection of the environment, in accordance with operational experience and probabilistic safety analyses.

Further guidance regarding what can be included in a safety report for a nuclear reactor is provided in the IAEA's safety standard on the format and content in safety reports for nuclear power plants[12].

Chapter 4. 3 §
The safety review should comprise a review of technical factors as well as a review of the man-technology-organization interaction. Thus, personnel with adequate technical competence within the areas in question as well as personnel with competence in behavioural sciences should participate in the review work. Personnel working with the independent safety review should have such knowledge and experience that they can independently assess the matters that are submitted for review.

The primary safety review should be as comprehensive as possible and should not take into account that an independent review is also being conducted. The

12 Most recent edition: IAEA Safety Guide GS-G-4.1: Format and content of the Safety Analysis Report for Nuclear Power Plants. International Atomic Energy Agency, 2004.

following questions should normally be included in a primary safety review:

- that the motive for implementing a measure is acceptable from the standpoint of safety,
- that presumptions and delimitations as well as input data for analyses, investigations and modifications are correct or reasonable, as well as that standards and other rules cited are suitable for the case in question,
- that the methods used, the analysis and calculation models, are verified and qualified or well tested, that they are applicable in the case in question and that they have been applied within their possibilities and limitations,
- that the analysis, investigation or calculation results are correct, that the measures are suitable from the standpoint of safety and that they can be conducted in the intended manner and with sufficient quality, as well as that proposals for measures in response to events that have occurred or conditions that have been detected are such that they prevent a recurrence, and
- that the measures are at least leading to maintaining, and preferably improving, safety.

The independent safety review should, in the light of how an issue has been handled within the responsible parts of the organizations, check that the issue has been handled in a correct manner from the standpoint of safety. The aim is not to repeat the primary safety review, although it may be necessary to repeat some part of it. Furthermore, a broader perspective should be used than that applied in the primary review. The independent safety review should therefore take into account

- whether the issue in question has been correctly handled,
- whether the conclusions drawn and proposals reported have been factually supported in a correct manner,
- whether applicable safety aspects, including physical protection, have been taken into account and whether applicable safety requirements are met, and
- whether measures adopted are leading to maintaining safety or increased safety.

The independent safety review thereby comprises both the quality of the handling of the case and a factual assessment of the case.

The independent function for safety review should be given a sufficiently strong and independent position in the organization with the authority to report

directly to the facility's highest manager. Furthermore, its personnel should not participate in work on analyses or investigations of issues as long as such work is being handled within the responsible organizational parts.

Chapter 4. 4 §

The periodic safety review of the facility should provide a basis which can be used in connection with a regulatory review of the safety of the facility, namely, in order to check, at an established time, whether the facility can be further operated with the level of safety that is assumed in the licence for the nuclear activity and which shall be described in the safety report in accordance with 2 §. As a basis for such a regulatory review, conducted by the Swedish Nuclear Power Inspectorate on the basis of 16 § of the Act (1984:3) on Nuclear Activities, an integrated analysis and overall evaluation is needed by the licensee regarding whether the facility complies with the safety requirements posed on the facility at the time of the regulatory review, and regarding whether the necessary conditions exist to continue to operate the facility with full safety until the time of the next regulatory review, normally within ten years' time.

The Swedish Nuclear Power Inspectorate establishes the detailed reporting deadline for the periodic safety review. The licensee should, in good time, inform the Inspectorate that the work on the review has started, so that a necessary dialogue can be conducted regarding the planning of the work.

The periodic safety review should be supported by sufficient analyses of the facility and its activites. The analyses should be conducted in a systematic manner and using a described methodology.

References to the requirements and standards that apply to the design of the facility should be reported, as should the more recent safety standards and practices which are a result of developments in science and technology, and which is judged to be applicable to the type of facility in question. It should be possible to justify the selection with respect to the more recent standards.

The periodic safety review should cover, to applicable extent, safety within the following areas as well as provide an overall evaluation

1. Design and construction of the facility (including modifications)
2. Management, control and organization of the nuclear activity
3. Competence and staffing of the nuclear activity
4. Operations, including the handling of deficiencies in barriers and

defence-in-depth

5. Core and fuel issues as well as criticality issues
6. Emergency preparedness
7. Maintenance, materials and in-service inspection issues, particularly taking into account degradation due to ageing
8. Primary and independent safety review
9. Investigation of events, experience feedback and external reporting
10. Physical protection
11. Safety analyses and safety reporting
12. Safety programme
13. Retention of facility documentation
14. Handling of nuclear material and nuclear waste
15. Non-proliferation control, export control and transport safety

Analyses should be conducted of how devices and activities in each area comply with regulatory requirements as well as internal requirements at the time of analysis, and if the applied solutions have a continued capacity to prevent such possible deficiencies in barriers and defence-in-depth that can lead to a nuclear accident. Furthermore, a systematic analysis should be conducted in each area of how devices and activities meet new safety standards and practices that are relevant for the facility. The need for measures that follow from these analyses should be listed, and the importance for safety should be assessed using deterministic, and where appropriate, probabilistic methods, or where this is not possible or reasonable, through expert assessment with specified criteria.

Where the facility does not fulfil relevant, new safety standards, measures should be implemented if this is considered to be reasonable with respect to the benefit to safety and suitable, taking into account the existing design assumptions of the facility. An action plan should be prepared for such measures and other measures that are not of an acute character, but which are judged to need to be conducted so that the facility can continue to be operated with a high level of safety up to the time of the next safety review. The action plan should state priorities, types of measures and time of implementation. After it is decided, the plan should be incorporated into the facility's safety programme.

The periodic safety review should be documented in a systematic and comprehensive manner in an integrated report. The report should contain an overview of the analyses and evaluations conducted in the different areas as well as an overall evaluation. References to underlying documents should be explicitly stated.

Chapter 4. 5§

All consequences of a modification should be analyzed so that improved safety in one respect does not lead to degraded safety in another respect, in such a way that safety as a whole is degraded.

In this context, technical modifications refer to modifications in the design or construction of barriers as well as such systems, components and devices that are necessary in order for defence in depth to function in the way intended in the safety report. Modifications of software in control equipment, which affect a safety function, are also considered to be technical modifications.

Organizational modifications refer to such changes that are of importance for the management and control of the nuclear activity. Examples are changes in the principles for decisions on or the financing of safety measures, dividing of production units, outsourcing of activities that are of importance for safety, reduction of the personnel force in operation and maintenance, centralization or decentralization of technical support and maintenance functions, as well as changes in the functions for safety review and auditing.

Essential modifications in the safety report refer to, for example, modifications of design or functional requirements, modifications in the principles for maintenance and the principles for the control of readiness for operation, modifications in the classification into event or safety classes and modifications resulting from safety analyses.

The Swedish Nuclear Power Inspectorate should be notified of any modifications in as good time as is possible and reasonable, taking into account the nature of the matter. A notification of a modification should contain an explicit description of what has been changed in relation to previous designs, the justification of the modification, consequences to safety, as well as statements from the independent safety review in accordance with Chapter 4. 3 §.

In connection with major modifications, it is suitable to submit an initial early notification which encompasses the implementation plan and the preconditions for the modification, including the standards that will be applied.

Chapter 5. 1 §
The Operational Limits and Conditions should be formulated in a clear and unambiguous manner. The personnel concerned should be well acquainted with the Operational Limits and Conditions and their background, so that the essence is clear if problems of interpretation should arise. The Operational Limits and Conditions should be modified if this is justified by modifications in the facility or new knowledge. The Swedish Nuclear Power Inspectorate should be notified of modifications in as good time as possible and reasonable, taking into account the nature of the matter.

What is stated about the safety report in the first paragraph of the section also applies to planned temporary deviations.

Chapter 5. 2 §
The procedures should be technically correct and easy to use under the conditions for which they are intended. Thus, if possible and to the extent applicable, a simulator should be used to verify the technical content and the adequacy of the procedures. The users of the procedures should also themselves participate in preparing and revising the procedures. The procedures should be used on a regular basis in operator training.

Maintenance of the facility should also be controlled by adequate procedures to the extent needed for safety.

Guidelines for management of accidents that have not taken into account in the facility design should be developed to the extent that is possible and reasonable, with respect to the need for the protection of the environment. The guidelines should be well co-ordinated with the facility's emergency operating procedures.

Chapter 5. 3 §
It should be noted that equipment of importance for the physical protection of the facility, such as alarm systems, surveillance equipment and communication equipment are also counted as components, systems and other devices of importance for safety.

In order to have suitable programmes for the periodic functional testing of active components, both the consequences of a failure and the probability of its occurrence should be considered. Quantitative measures of failure probabilities as well as qualitative indicators should be based on systematic analyses of the

failures and deviations which can arise with respect to different components.

The functional testing should reflect the conditions that are expected to occur when the safety function is needed. If this is not possible or reasonable, an analysis should show that an adequate verification of the safety function exists in spite of the limitations in the functional testing. The functional testing should be of such a frequency and scope that it gives confidence that the equipment, when needed, complies with the functional requirements that are credited in the safety analyses. Functional testing should also encompass necessary auxiliary systems such as auxiliary power supply and cooling systems.

Functional testing should be carried out so that the safety function can be fulfilled, if it should be called upon during testing. Deviations from this can be applied during a limited period, if a safety analysis finds that the risk contribution that thereby arises is very small.

Preventive maintenance with adequate safety and quality requires extensive analyses of component reliability, which should be performed on the basis of maintenance statistics as well as a good monitoring of the component status during operation and in-service inspection. It is appropriate to also use experience from the same types of components at other similar facilities.

The programme for the management of ageing degradation and damage should comprise the identification, monitoring, handling and documentation of all the ageing mechanisms that can affect structures, systems and components as well as other devices that are of importance for safety.

A clear distinction should be drawn between maintenance work and plant modifications. The latter involves changing the specification of the facility which requires another type of handling procedure than a direct replacement and repair of existing equipment.

Additional guidance on maintenance and the management of ageing degradation can be found in the IAEA's safety standard on maintenance, control and testing of nuclear power plants[13].

13 Later edition IAEA Safety Guide NS-G-2.6: Maintenance, Surveillance and In-Service Inspection in Nuclear Power Plants. International Atomic Energy Agency. Vienna, 2002.

Chapter 5. 4 §
Events that have occurred and conditions of importance for safety should be systematically investigated so that the event sequence is completely clear, including the circumstances that could have prevented or stopped the event progression, so that the consequences are determined, the underlying causes are investigated and well-founded measures are specified in order to prevent similar events, conditions or deficiencies from occurring again.

In this context, systematic means that the investigation must be carried out in a logical manner with a documented methodology, clearly documented results and must contain conclusions for safety which are based on the results obtained. The investigation methodology should be such that all aspects and circumstances are taken into account, technical as well as those relating to the interaction man-technology-organization.

Chapter 6. 1 §
An inventory is a list or register, which is divided into waste units that correspond to packages, components, containers or other units that comply with the handling of the waste. For each waste unit, the list should contain information on

1. the identity of the unit,
2. the origin or from which facility components the waste originates,
3. the treatment of the waste and its physical and chemical form,
4. waste quantity,
5. nuclide specific content of radioactive substances with reference date,
6. external radiation level with distance and reference date,
7. storage position, and
8. date for completed treatment.

Clear identity marking should, in the first instance, be conducted through a unique marking of the waste package or, in the second instance, through a unique marking of the site, area or container where a certain waste item is stored.

Chapter 6. 2 §
The requirement on preventing criticality encompasses all dealings with nuclear material apart from the intended use in a reactor. In order to limit the risk of criticality in the storage of nuclear material and in systems for the handling of nuclear material, physical principles should be applied. A suitable means of reducing the risk of criticality is to use geometrically safe configurations.

Chapter 6. 3 §
A safe confinement refers to measures for ensuring the barrier function, namely, with respect to the volume contained, radioactive inventory and other properties, a safe design of containers, packaging or other confinement as well as, to an adequate degree, devices and prepared measures to protect confinement integrity.

The handling of nuclear material and nuclear waste conducted at the facility should be adapted to the requirements, with respect to a safe confinement, which are set in connection with the further handling, the subsequent transfers as well as in connection with the final disposal of the nuclear waste.

The requirement that the specified measures must be described in the safety report means that only waste packages approved by the Swedish Nuclear Power Inspectorate may be brought to a repository. For such approval to be granted, the waste must comply with the conditions stipulated in the safety report for the repository. For waste which is routinely handled and treated, a notification can be made which pertains to the particular type of waste package. For such type descriptions, a template exists which has been jointly established by the Swedish Nuclear Power Inspectorate and the Swedish Radiation Protection Authority. The type descriptions are a part of the safety report both for the facility where the waste is produced and treated as well as for the repository.

Chapter 6. 4 §
The plan concerns such cases where nuclear waste is temporarily generated, in connection with special projects, and which falls outside the scope of the normal procedures in terms of type and quantity. Such examples include waste which is generated when large components are replaced and in connection with decontamination of reactor systems. Additional examples of nonconforming waste are old waste, with deficient characterization or documentation, which is placed in temporary storage and which must be reconditioned, or that the originally stated chemical/physical properties have been re-evaluated prior to final disposal. Changes of the originally declared radionuclide inventory in the waste can also be assigned to the category of nonconforming nuclear waste.
If nonconforming waste is found to occur more regularly at a facility, the measures for a safe confinement of the waste should be incorporated in the safety report in accordance with Chapter 4. 2 §.

Chapter 7. 1-3 §§, Appendix 4
Reporting in accordance with 1 §
In order for the Swedish Nuclear Power Inspectorate to be notified within one hour, the Inspectorate maintains constant preparedness through an on-duty decision-maker.

Events and conditions which are within the scope of the ”International Nuclear Event Scale” (INES), are described in the International Atomic Energy Agency’s (IAEA) and the Nuclear Energy Agency’s (NEA)[14] document: ”INES: The International Nuclear Event Scale – User’s Manual”. The manual describes how the events are to be classified and what a report should contain.

Reporting within 16 hours of events which are assigned to INES Level 2 or higher is required for the Swedish Nuclear Power Inspectorate to be able to confirm the classification and to report, in its turn, to the IAEA within 24 hours after the event has occurred, in accordance with the agreement that has been signed between Sweden and the IAEA.

Reporting in accordance with 2 §
These reports should primarily contain an informative description of the event sequence and of the operational consequences, assessments of the importance for safety and of the root causes as well as a description of measures implemented and planned in order to prevent a recurrence. The report should further contain information on the experience which has been gained on the basis of what has occurred, as well as the conclusions of the safety review of the investigation which has been carried out at the facility.

An integrated report can be submitted when any of the following occurs or is detected during a planned nuclear reactor shutdown
- single earth fault,
- instrument instability and unstable setting detected during calibration,
- containment isolation valve leakage exceeding the stipulated total leakage[15].

The integrated report should describe the individual events and should contain an integrated analysis and evaluation of the failure type they represent.

14 Nuclear Energy Agency within OECD.
15 Specified in the Operational Limits and Conditions for the facility.

Nuclear fuel damages, which require the dismantling of the fuel to investigate root causes, may be examples of special reasons not to submit a final report in 30 days. However, in such cases, the final reporting should be conducted as soon as the results from the investigations are available.

Reporting in accordance with 3 §
In addition to a report of experience and conclusions from the standpoint of safety, the annual report of a reactor facility should contain a summary of the following:

a. operating experience and events and conditions which have been assigned to Categories 1, 2 or 3 in accordance with Appendix 1
b. production data,
c. core and fuel conditions and criticality safety issues,
d. hydrochemical conditions,
e. planned and unplanned outages as well as a report on the completed refuelling outage,
f. repairs in equipment of importance for safety,
g. modifications to the facility design as well as to the organization, management and control of the nuclear activity,
h. expert tasks and service work conducted within the nuclear activity which have been contracted out,
i. changes in competence requirements and training programmes which are caused by changes in the facility and its activity as well as a summary of planned and conducted training for personnel with tasks of importance for safety in the nuclear activity,
j. investigations and analyses performed, the results of which are expected to affect the conditions specified in the safety report,
k. production, storage, transport from as well as final disposal within the facility, of nuclear waste and information on material that has been given clearance,
l. experience from the physical protection of the facility.

With respect to other facilities, the report should contain the above information to the extent applicable.

Annual reporting which is required by other regulations and licence conditions issued by the Swedish Nuclear Power Inspectorate can either be submitted separately or included in the above-mentioned annual report.

Chapter 8. 1 §
In this context, technical documentation is up-to-date drawings of the facility, of its building structures, systems, components and devices as well as the documents which show how these have been manufactured, installed and inspected. Where relevant, information on the modifications that have been made to the facility should also be included in the documentation.

The technical facility documentation should also include up-to-date process and flow charts, investigations and analyses upon which safety reports are based as well as the inventories mentioned in Chapter 6. 1§.

Document retention is storage of documents in accordance with the regulations and general recommendations[16] of the National Archive concerning the planning, design and operation of archive premises.

In addition to these requirements on retention, the Swedish Radiation Protection Authority issues requirements concerning the retention of nuclear documentation[17].

Chapter 8. 2 §
In the evaluation of the extent and time during which registered process and parameter data from the operational activity should be retained, such operating conditions, events or abnormal operation, which can give rise to damage to, or the failure of components a long time after the event or abnormal event or incident has occurred, should be taken into account. Examples of such events are thermal and chemical transients.

Other safety-related activities are, for instance, maintenance and modification activities as well as investigations into events, safety reviews, quality audits, training activities and competence follow-up. In order to fulfil the requirements, the documentation of the maintenance activity which is retained should also contain information on surveillance testing and other recurrent tests, calibrations and controls.

Chapter 9. 1 §
If several facilities are located at one site, the decommissioning plan for each facility should be based on a general decommissioning plan or decommissioning strategy for the entire site. The strategy can be reported as a separate basis for the decommissioning plan or included as a special part of the planning prerequisitions which are to be reported in accordance with Appendix 5.

16 Currently RA-FS 1997:3.
17 Currently SSI FS 1997:1

Chapter 9. 2 §
The safety requirements intended for waste management in connection with dismantling should correspond to the requirements on the confinement of radioactive material which have applied to similar activities, such as maintenance work and waste treatment, during the time that the facility has been in operation.

Chapter 9. 3 §
Final shut down within a certain time means a period which comprises a minimum of six months and a maximum of five years, from the time of the decision to the final shut down date.

The integrated analysis and evaluation should primarily encompass how the operational safety is maintained, with respect to the risks of personnel resignations and the impact on the motivation of the personnel. Furthermore, an evaluation should be made of the need to reinforce management supervision of the activities that are of importance for safety, as well as continued measures for in-service inspection, testing and maintenance of the facility.

AB Danagårds Grafiska, Ödeshög 2005