STUK

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INES CLASSIFICATION OF EVENTS AT NUCLEAR FACILITIES

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Authorisation

By virtue of the below acts and regulations, the Radiation and Nuclear Safety Authority (STUK) issues detailed regulations that apply to the safe use of nuclear energy and to physical protection, emergency preparedness and safeguards:

- Section 55, paragraph 2, point 3 of the Nuclear Energy Act (990/1987)
- Section 29 of the Government Resolution (395/1991) on the Safety of Nuclear Power Plants
- Section 13 of the Government Resolution (396/1991) on the Physical Protection of Nuclear Power Plants
- Section 11 of the Government Resolution (397/1991) on the Emergency Preparedness of Nuclear Power Plants
- Section 8 of the Government Resolution (398/1991) on the Safety of a Disposal Facility for Reactor Waste
- Section 30 of the Government Resolution (478/1999) on the Safety of Disposal of Spent Nuclear Fuel.

Rules for application

The publication of a YVL guide does not, as such, alter any previous decisions made by STUK. After having heard those concerned, STUK makes a separate decision on how a new or revised YVL guide applies to operating nuclear power plants, or to those under construction, and to licensees' operational activities. The guides apply as such to new nuclear facilities.

When considering how new safety requirements presented in YVL guides apply to operating nuclear power plants, or to those under construction, STUK takes into account section 27 of the Government Resolution (395/1991), which prescribes that *for further safety enhancement, action shall be taken which can be regarded as justified considering operating experience and the results of safety research as well as the advancement of science and technology.*

If deviations are made from the requirements of the YVL guides, STUK shall be presented with some other acceptable procedure or solution by which the safety level set forth in the YVL guides is achieved.

Translation. Original text in Finnish.

1 General

The International Nuclear Event Scale (INES) is a means to illustrate the radiation and nuclear safety significance of events as they are communicated to the public. The scale has been developed jointly by the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA).

A duty of the Radiation and Nuclear Safety Authority (STUK) is to communicate and publish information in its field of activity (Decree on the Radiation and Nuclear Safety Authority, 618/1997, section 1). As regards the regulatory control of the use of nuclear energy, STUK informs among other things on events at nuclear facilities. STUK uses the INES scale in communication of events at Finnish nuclear facilities.

IAEA maintains an INES communication network, and STUK is its contact organisation in Finland. STUK communicates to IAEA the INES levels of events at Finnish nuclear facilities according to internationally agreed principles. IAEA transmits rating information to the other countries participating in the network, and they may use the information in communication on events to the public. As necessary, STUK uses INES levels received through IAEA in communication on events at foreign nuclear facilities in Finland.

INES classification procedures and responsibilities in Finland as well as INES rating principles are presented in this Guide.

In Finland the events at the following nuclear facilities or activities are classified based on the INES scale:

- nuclear power plants
- research reactor
- handling, storage and transport of fresh and spent nuclear fuel
- handling, storage and disposal facilities of nuclear wastes.

The INES scale is not applied to events which have no influence to radiation or nuclear safety. As regards events at nuclear power plants, the INES scale is not applied e.g. to disturbances which affect only the availability of a turbine or generator. In addition, the INES classification is not applied to deficiencies in procedures or equipment used only for nuclear material control.

2 Principles of INES classification

The INES scale includes seven levels: levels 1–7. The INES levels and the principles of their determining are presented in Table I. The INES level of an incident or accident is determined based on impact on defence in depth or off-site impact or on-site impact. When determining the level all impacts of the incident or accident are separately considered. If the level can be determined based on more than one impact, and if different INES levels are received according to classification bases, the highest level will be chosen. In addition to levels 1–7, there is level 0. The significance of level 0 events to radiation and nuclear safety is so small that the event is not classified to the lowest possible level based on any impact.

The INES level is determined according to the IAEA publication [1]. The names of the INES levels used in this Guide (Table I) are based on the mentioned publication. In applying INES level 6, Serious Accident, it shall be taken into account that a severe accident referred to in section 2 of the Government Resolution 395/1991 may also be classified at other levels depending on impacts. General guidance on the INES rating for events at nuclear power plants are given in Annex to this Guide. Annex includes also examples from Finnish nuclear power plants. More detailed guidance on the INES rating of events occurred at nuclear facilities and in transport and handling of radioactive materials is presented in the IAEA publication [1].

The INES scale can also be applied to events occurred in other activities than nuclear facilities and their use, if an event is significant to radiation safety. E.g. in industry or research activities such events are incidents occurred in transport or handling of radioactive materials. In Finland STUK decides on case by case bases on the need of the INES classification of these events. When necessary, the INES level is determined according to the IAEA publication [1].

Table I. Principles of INES rating.

INES level	Area of impact		
	Off-site impact	**On-site impact**	**Impact on defence in depth**
7 Major accident	Major release of radioactive materials: release of several tens of thousands TBq (^{131}I eq), widespread health and environmental effects		
6 Serious accident	Significant release of radioactive materials: release of the order of thousands to tens of thousands TBq (^{131}I eq), likely to require full implementation of protective measures		
5 Accident with off-site risk	Limited release of radioactive materials: release of the order of hundreds to thousands TBq (^{131}I eq), likely to require partial implementation of protective measures	Severe damage to reactor core or radiological barriers	
4 Accident without significant off-site risk	Minor release of radioactive materials: radiation dose of the most exposed member of the public in the surroundings (average dose of the members of the so called critical group) is however of the order of a few mSv	Significant damage to reactor core or radiological barriers or most likely fatal exposure of a worker	
3 Serious incident	Very small release of radioactive materials: radiation dose of the most exposed member of the public in the surroundings is of the order of tenths of mSv	Severe spread of radioactive materials at the facility or exposure of a worker resulting in acute health effects	Incidents near to an accident: no safety layers remaining
2 Incident		Significant spread of radioactive materials at the facility or exposure of a worker exceeding the dose limit	Incidents with significant failures in safety provisions
1 Anomaly			Anomaly beyond the authorised operating regime
0 Deviation	No safety significance		

3 Procedures and responsibilities for INES classification

The licensee of a nuclear facility shall provide STUK with an estimate of the INES level of an event if

- the event is considered to belong to at least level 1
- a special report or reactor scram report is prepared on the event according to Guide YVL 1.5
- the event is considered to belong to level 0 but it is supposed to raise general interest in Finland or abroad.

The INES level estimate and a description on the event shall be submitted to STUK as soon as possible so that STUK can use the level in its communication. The INES level estimate shall be submitted to STUK e.g. as facsimile or in other suitable written form.

The INES level estimate shall be justified in written according to the IAEA publication [1] or Annex of this Guide. The final INES level of the event is decided by STUK (see chapter 4). STUK may decide the INES level also without the estimate submitted by the licensee.

This procedure is also used, as far as applicable, in emergency situations (emergency standby, site emergency and general emergency) referred to in Guide YVL 7.4. If the INES level of an accident changes as the situation proceeds, the level may be determined at several different points in time. The rating shall show that the level is based on the situation at that time and the level may be changed. The INES level based on off-site impact is mainly determined after the release has started. The level may also be determined based on a release estimate. In this case the rating shall include information that the rating is based on an estimate. The final level is determined after the amount of the release of radioactive materials or the radiation dose of the most exposed member of the public in the surroundings has been confirmed.

If the licensee of a nuclear facility considers the change of the INES level justified e.g. based on facts arisen in subsequent analyses or investigations, the new INES level estimate shall be proposed to STUK.

The submission of an INES level estimate to STUK is no substitute for the responsibilities of the licensee of a nuclear facility for alerting and notifying STUK in emergency and disturbance situations.

In addition, any report referred to in Guide YVL 1.5 shall include the INES level and its justification, if the INES level has been determined based on the requirements presented above.

The licensee shall file written documents emerged during the INES rating. This applies also to events, which the licensee has rated but for which no INES level estimate is needed to be submitted to STUK.

The licensee shall have written procedures for the INES classification. Responsible persons shall also be appointed within the licensee's organisation for the INES classification. In addition, a task for the INES classification shall be included in the duties of the emergency organisation. The instructions on the INES classification procedures shall be submitted to STUK for information.

4 Regulatory control

STUK reviews the submitted INES level estimates based on guidelines given in Annex of this Guide or in the IAEA publication [1]. STUK takes into account the safety significance of the event when deciding the INES level. STUK communicates the INES level to the public as necessary either by a separate press release or in connection with the Quarterly Report on nuclear safety published by STUK.

STUK controls the activities of the licensee in the INES rating both in connection with events occurred and as a part of the periodic inspection programme for the operation.

5 References

1. The International Nuclear Event Scale (INES). User's Manual. 2001 Edition. Jointly prepared by IAEA and OECD/NEA. International Atomic Energy Agency, Vienna, 2001.

Annex: INES rating of events occurred at nuclear power plants

1 Rating based on off-site impact

When the INES level is determined based on the off-site impact, the actual radiological impact outside the plant site caused by an accident or incident is considered. Radiological impact is assessed based on the amount of radioactive release or radiation doses to members of the public in the surroundings. If the amount of the release cannot be assessed accurately at the early stage of an accident, the INES level can be determined based on a release estimate. The level is re-evaluated later on when release and dose information is available.

The highest level is level 7 where a large fraction of radioactive materials in a nuclear power plant is released into the environment. Based on off-site impact, level 3 covers an event where the radiation dose to the most exposed member of the public in the surroundings is 0,1–1 mSv. If the radiation dose remains below one tenth of the annual dose limit, the event is not rated based on off-site impact. The INES rating principles are presented in Table 1. More detailed guidelines for the rating are given in the IAEA publication [1].

2 Rating based on on-site impact

When the INES level is determined based on on-site impact, the extent of reactor core damage, the spread of radioactive materials within the site and the levels of radiation doses to workers are evaluated. Based on the extent of reactor core damage the level is 4 or 5. Based on the amounts of spread radioactive materials within the site the level is 2 or 3. If radiation doses have been caused to workers, the level is 2, 3 or 4.

Based on on-site impact the next level below level 2 is level 0.

The INES rating principles are presented in Table 1. More detailed guidelines for the rating are given in the IAEA publication [1].

3 Rating based on impact on defence in depth

3.1 Events occurring on reactors at power

When the INES level of events occurring on reactors at power is determined based on impact on defence in depth, the frequency of a real or assumed initiator (initiating event) is considered; in addition it is evaluated how a safety function has been fulfilled or how it has been assumed to be fulfilled. The basic level of an event is determined from Table A.I or A.II. Table A.I is used for events where an initiator has occurred requiring the functioning of one or more safety systems. Table A.II is used for events where no initiator has occurred but some safety function would not have been fulfilled as planned in case of an initiator because one or more safety systems have been degraded. The terms used above are made clear in chapter 4. The highest possible INES level is 3 when using the rating based on impact on defence in depth.

In the IAEA publication [1] examples of initiators for pressurised and boiling water reactors are given as grouped according to the frequency of occurrence. Plant specific initiating events may also be used as initiators. Based on the frequency they are grouped according to chapter 4 of this Annex.

In connection with defects of systems designed for a severe accident Table A.II is applicable in a same way as for unlikely events.

In the INES rating Tables A.I and A.II are primarily applied. There is, however, no need to use the tables in the rating of some events evidently at level 0. Examples of such level 0 events are presented in the IAEA publication [1].

The basic level, determined according to Table A.II, may be reduced if the safety function operability has been degraded by an inoperable

Table A.I. INES rating in the case where an initiator has occurred.

Safety function operability	Initiator frequency		
	Expected	Possible	Unlikely
A	0	1	2
B	1/2 [1]	2/3 [1]	2/3 [1]
C	2/3 [1]	2/3 [1]	2/3 [1]
D	3+ [2]	3+ [2]	3+ [2]

[1] The lower one is chosen if there were redundant or diverse operable safety systems available for the initiator.
[2] The INES level may be determined based on off-site impact or on-site impact.

Table A.II. INES rating in the case where no initiator has occurred.

Safety function operability	Initiator frequency		
	Expected	Possible	Unlikely
A	0	0	0
B	0	0	0
C	1/2 [1]	1	1
D	3	2	1

[1] Level 1 is chosen if there were redundant or diverse operable safety systems available for the initiator.

Categories for safety function operability:
A. All safety systems and components which are provided by the design to cope with the particular initiator are fully operable. Also redundant subsystems and diverse systems shall be available.
B. The minimum operability of safety systems providing the required safety function specified in the Technical Specifications when continued operation at power is permitted. If an expected initiator has occurred and the safety functions are almost fully operable, the INES level can be determined from the line A in Table A.I.
C. The level of operability of safety systems is sufficient to achieve the particular safety function for the initiator considered.
D. The degraded operability of safety systems is such that the needed safety function cannot be fulfilled for the initiator considered. In the case of a real initiator safety margin to the spread of radioactive materials or reactor damage is very small, and the INES rating based on off-site or on-site impact may be applied (3+ -marking in Table A.I).

component of a safety system, the unavailability period of which is significantly shorter than the interval between tests of the component.

If desired, the licensee may propose a change of the INES level or additional bases for the INES level based on the results of a probabilistic safety analysis (PSA), when the basic level has been determined by means of Table A.I or A.II.

The INES rating procedure based on the frequency of an initiator and the state of safety functions can also be applied to some special cases such as structural defects, potential initiators (see chapter 4 of Annex) and events related to internal and external hazards. Guidance on rating and rating examples of these events are given in the IAEA publication [1].

In addition to events at nuclear power plants during power operation, the INES rating procedure based on the frequency of an initiator and the state of safety functions may also be applied to the rating of events occurred during outages. The procedure can be used provided that the initiators during outages and the safety systems designed for them have been defined. The procedure described in chapter 3.2 of this Annex may also be applied to the rating of events occurred during outages.

As far as applicable, guidance concerning nuclear power plants is applied to the INES rating of events occurred at the research reactor. The procedure described in chapter 3.2 may also be applied to the INES rating of events at the research reactor.

3.2 Other events

The rating procedure described here is applicable to the INES rating of events occurred e.g. during nuclear power plant outages, in nuclear fuel and waste management activities and at the research reactor. When the INES level is determined based on impact on defence in depth, the level is influenced by the number of available safety layers and the INES level of the most severe possible situation. This INES level based on the maximum potential consequences is determined for the event in question assuming that no safety layer is available. This maximum potential rating is mainly determined based on off-site or on-site

Table A.III. INES rating using the safety layers approach.

Number of remaining safety layers	Maximum potential consequences		
	INES levels 5, 6 or 7	INES levels 3 or 4	INES levels 2 or 1
> 3	0	0	0
3	1	0	0
2	2	1	0
1 or 0	3	2	1

impact. The basic level of the event is determined according to Table A.III.

The highest possible level based on the degradation of safety shall be clearly lower than the level based on an assumed accident. E.g. if the highest possible level based on the amount of released radioactive materials during an accident would be 4, the highest possible level based on the degradation of safety layers could be 2.

The event may be rated at level 0, if the only remaining safety layer is very reliable as regards the spread of radioactive materials. The basic level determined according to Table A.III may be reduced, if the period of unavailability of a component of a safety layer is much shorter than the interval between tests of the component.

3.3 Upgrading the INES level

The basic level determined according to chapters 3.1 and 3.2 is upgraded

- if the reliability of the fulfilment of a safety function is due to a common cause failure much lower than assumed or the use of systems has become more difficult because of missing or misleading information.
- if significant deficiencies are found in procedures affecting the event. E.g. an operator has incorrect or inadequate instructions for disturbances, or there are deficiencies in the surveillance programme.
- if an event has showed such deficiency in safety culture, which has influenced the emergence of the event. A single human error does not cause the upgrading of the level. Indicators on a deficiency in safety culture may be e.g.
  - a conscious violation of the Technical Specifications or a violation of a procedure without justification
  - a deficiency in quality management
  - an accumulation of human errors
  - a failure in the control of releases of radioactive materials or a failure in the monitoring of occupational exposure
  - a repetition of an event, indicating that either possible lessons learned from the first event have not been utilised or corrective actions have not been taken.

When considering the upgrading of an INES level the following is taken into account:

- An event may be rated at level 1 although there would not be any other safety significance than this upgrading factor.
- If additional factors, e.g. a common cause failure, have been taken into account in the basic rating, the basic level is not anymore upgraded based on these factors. The level of an event can only be upgraded by one level, although all additional factors would separately cause the upgrading.
- After upgrading, the highest level is level 3 for events at nuclear power plants during power operation and for other events the level is determined according to the lowest line of Table A.III. This highest level is possible after upgrading only in the case that one additional event (an expected initiator or a component failure) would cause an accident.

After the INES level rating, the compatibility of the level with the general description of the level in Table I is checked.

4 Definitions

Initiator (initiating event) is in the INES rating a single event which requires the starting of one or more safety systems. The grouping of the initiators described in the IAEA publication [1] is used in this Guide. The frequency of an **expected initiator** is at least once during the operating life of the plant. A **possible initiator** is an initiator which is not expected but has an anticipated frequency of $10^{-4}…10^{-2}$ per year. An **unlikely initiator** is an initiator which has been taken into account in the design of a nuclear power plant and which has a frequency of less than the frequency of a possible initiator.

Basic level means the level derived from Tables A.I, A.II or A.III of this Annex, without reducing or upgrading the level.

Potential initiator is an event which does not as such require the starting of a safety system but means the increase of the frequency of an initiator. Examples of these situations are leaks which have been terminated by an operator's actions or failures in process instrumentation and control systems.

Safety system is a system performing a safety function.

Operability of a safety system. A system or component is operable, if it is capable of performing its required function in the required manner. The support systems of a safety system, such as electric power supply, cooling and instrumentation, shall be available so that the safety system can be considered operable.

Safety culture is the way of action of the whole organisation. It is based on the safety oriented attitude of the topmost management of the licensee of a nuclear facility and on its ability to motivate the personnel for responsible work.

Safety function is an entire function to prevent an accident or to mitigate its consequences. Safety functions related to the INES rating are: controlling the reactivity, cooling nuclear fuel and radioactive wastes and preventing the spread of radioactive materials. In the INES rating the fulfilment of the whole safety function is considered, not only the performance of a single safety system.

Operability of a safety function (related to Tables A.I and A.II).

A. All safety systems and components which are provided by the design to cope with the particular initiator are fully operable. Also the redundant subsystems and diverse systems shall be available.
B. The minimum operability of safety systems providing the required safety function specified in the Technical Specifications when continued operation at power is permitted. If an expected initiator has occurred and the safety functions are almost fully operable, the INES level can be derived from the line A in Table A.I.
C. The level of operability of safety systems is sufficient to achieve the particular safety function for the initiator considered.
D. The degraded operability of the safety systems is such that the safety function cannot be fulfilled for the initiator considered. In the case of a real initiator, the safety margin to the spread of radioactive materials or reactor damage is very small, and the INES rating based on off-site or on-site impact may be applied (3+ marking in Table A.I).

Safety layer means a safety provision that cannot be broken down into redundant parts.

Safety provisions mean passive safety systems and safety systems to be started automatically or manually as well as administrative actions to ensure that required functions are available.

Common cause failure means the failure of several components or structures in consequence of the same single event or failure.

5 Examples of the INES rating of events at Finnish nuclear power plants

The INES rating is illustrated in the following by means of events occurred at the Finnish nuclear power plants. The events have been reported in Quarterly Reports on Operation of Finnish Nuclear Power Plants published by STUK.

Example 1. Containment spray system partially inoperable at Loviisa 2 during annual maintenance outage. INES 0. STUK-B-YTO 128, 3/1994.

During the start-up of Loviisa 2 on 26 September 1994 from annual maintenance outage, one half of the containment spray system was erroneously disconnected from the operating readiness due to valve repair. The plant unit had reached the hot shutdown state. According to the Technical Specifications both spray lines shall be operable in such a way that at least one pump in each line is available. It was erroneously determined as the valve's repair condition that transfer to the next start-up phase cannot be implemented before the valve has been repaired. The correct condition would have been that the plant unit

must be brought to a cold shutdown state. Due to the event, the plant unit was in violation of the Technical Specifications for about eight hours.

Initiator:
LOCA (assumed)

Frequency of the initiator:
unlikely

Safety functions operability:
adequate (the redundant line of the spray system as well as diverse systems for preventing the spread of radioactive materials were available)

Table A.II:
INES level 1 (the basic level)

The level was reduced by one because the unavailability time (8 hours) of the part of the system was short compared with the interval between tests of this part of the system (2 weeks).

The event was a single error so that it was not the case of a deficiency in safety culture, and there was no need to upgrade the level. In addition, there were no other additional factors for upgrading. So the event was rated at level 0.

Example 2. Olkiluoto 1 reactor scram due to erroneous opening of switches. INES 1. STUK-B-YTO 167, 2/1997

As a result of an operational error a reactor scram occurred at Olkiluoto 1 on 27 May 1997. At the time of the event, the plant unit was in power operation and preparations were made to shut it down for annual maintenance. Safety measures prior to the shutdown include i.a. disconnection of the TIP (Traversing Incore Probe) drive mechanisms from the 400 V battery-backed switchgears supplying power to them. However, a mistake was made during the disconnection. Instead of the switches of three drive mechanisms, the main switches of three distribution cubicles were opened. When the distribution cubicles were de-energised, process transients were caused resulting finally in a reactor scram. The restoration of voltage to the distribution cubicles took about half an hour.

The power failures caused alarm printer and process computer malfunctions which impaired the work of the control room personnel. The functioning of all safety systems during the power failure was not completely recorded on computer. Thus, it has not been possible to check afterwards the functioning of the systems. The safety systems start to operate regardless of the process computer. The process computer displays became operational immediately on restoration of power supply.

Initiator:
reactor scram (real)

Frequency of the initiator:
expected

Safety function operability:
full

Table A.I:
INES level 0 (the basic level).

The basic rating was upgraded by one due to a deficiency in procedures. The operational error resulted here in a common cause failure.

Example 3. Pressurised emergency water tank at Loviisa 2 inoperable due to a sunken float. INES 1. STUK-B-YTO 169, 3/1997.

It was noted at Loviisa 2 on 7 September 1997 that the float in one pressurised emergency water tank of the plant unit's emergency cooling system had erroneously closed the tank's discharge pipe. No alarm signal was transmitted of the movement of the float. Thus the exact closing time of the discharge pipe is not known. The tank's discharge test would have disclosed this failure to operate, and the previous test was conducted in the 1996 annual maintenance outage. The tank had performed faultlessly in the test. In a potential accident situation, the float closing the discharge pipe would have prevented injection of water from the tank to the reactor, and this would have been impossible to repair during an accident.

Emergency cooling systems remove heat from

the reactor in loss of coolant and other accident situations. The emergency cooling systems of the Loviisa plant units include i.a. four pressurised emergency water tanks. Two tanks supply water to the lower part of the reactor pressure vessel and two above the reactor core. The supply of water is sufficient if at least one tank feeding the upper and one feeding the lower part are operable.

Initiator:
Major LOCA (assumed)

Frequency of the initiator:
unlikely

Safety function operability:
adequate (less than required by the Technical Specifications because the pressurised emergency water tank was inoperable significantly longer than permitted repair times of some operational deviations of the tanks specified in the Technical Specifications)

Table A.II:
INES level 1 (the basic level).

There was no need to reduce the basic level because the pressurised emergency water tank had been inoperable for a year. There were no additional factors for upgrading.

Example 4. Reactor containment personnel air lock open in violation of the Technical Specifications at Olkiluoto 2. INES 1 STUK-B-YTO 196, 2/1999

The door of a reactor containment lower personnel air lock at Olkiluoto 2 was open for about an hour in violation of the Technical Specifications. The event occurred during the annual maintenance outage on 6 May 1999 in connection with the replacement of the motor of one main circulation pump.

During part of the servicing time of the pump, the reactor cooling water is kept inside the pressure vessel by means of a plug or cap installed in a pump shaft hole in the bottom of the reactor pressure vessel. Due to the demanding service work, detailed technical and administrative instructions have been prepared for the tasks. In addition, for preventing the erroneous lifting of the plug the plugging equipment has been provided with a shear pin. By keeping the door of the lower personnel air lock closed it is ensured that, should the plug or cap fail, water leaking from the reactor through an open shaft hole would not escape from the containment via an open door but would be available for the reactor emergency core cooling system for recirculation into the reactor pressure vessel. The reason for the open door of the lower personnel air lock was a breach in the flow of information.

INES level based on maximum potential consequences:
5 or higher

Number of remaining safety layers:
3 (the plug remaining in place, preventing the erroneous lifting of the plug by a shear pin, work permit procedures)

Table A.III:
INES level 1.

Example 5. Inoperable containment isolation valve at Olkiluoto 1. INES 1. STUK-B-YTO 199, 4/1999 (in Finnish).

It was discovered at Olkiluoto 1 on 12 October 1999 that, due to the incorrect settings of the torque switching of its actuator, an isolation valve in a pipeline penetrating the containment would not have been closed in all situations requiring valve closure. The valve is situated outside the containment in a suction line of the shut-down cooling system. The valve actuator had been replaced with a repaired and serviced actuator in the annual maintenance outage 1998. The actuator's torque switching settings should have been tested in a test bench prior to installation. This had not been done, however.

The utility checked also the torque switching settings of all isolation valve actuators at both plant units. One actuator with incorrect settings was found at both units. These actuators were in valves that are in a closed position during plant operation and the incorrect settings thus had no significance for the valves' isolation function.

Initiator:
pipe rupture (assumed)

Frequency of the initiator:
unlikely

Safety function operability (prevention of the spread of radioactive materials):
adequate (according to the Technical Specifications the operation of the plant unit is not permitted without restrictions, if only one isolation valve is operable)

Table A.II:
INES level 1 (the basic level).

The basic level was not reduced because the failure was not found in a periodic inspection and because the valve was inoperable for a period which was relative long compared with the interval between tests of the valve. There were no additional factors for upgrading. The deficiency in maintenance activities has been taken into account in the basic rating, and therefore the level was not upgraded based on this deficiency.