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MEASURES TO STRENGTHEN INTERNATIONAL CO-OPERATION IN MATTERS RELATING TO NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

1. In paragraph 7 of resolution GC(XXXV)/RES/553, the General Conference recommended to Member States "that they avail themselves fully of the Agency's services for advancing operational safety, including OSART and ASSET missions", and in paragraph 8 it urged Member States "to use the Incident Reporting System for the analysis and feedback of operating experience and, in a timely manner, the International Nuclear Event Scale, as appropriate, for reporting all nuclear accidents or incidents".

2. Annexes 1-4 contain, for the information of Member States, reports relating to OSART and ASSET missions, to the Incident Reporting System and to the International Nuclear Event Scale.

92-2967

STATUS REPORT ON OPERATIONAL SAFETY REVIEW TEAM (OSART) MISSIONS

1. Since the 1991 session of the General Conference (as of 31 July 1992), there have been full-scope OSART missions to the Koeberg nuclear power station in South Africa (4 to 22 November 1991), the Grafenrheinfeld station in Germany (25 November to 13 December 1991), the Fessenheim station in France (9 to 27 March 1992), the Fukushima station in Japan (23 March to 10 April 1992) and the Grand Gulf station in the United States (3 to 21 August 1992), and a limited-scope OSART mission[1] to the Blayais station in France (13 to 31 January 1992); in addition, there have been technical exchange missions[2] to Dukovany in Czechoslovakia (14 to 25 October 1991) and Angra in Brazil (4 to 15 May 1992).[3]

2. Eight OSART/Pre-OSART missions have been requested for the remainder of 1992 and the first half of 1993 - by the Republic of Korea, the United Kingdom, Slovenia, Czechoslovakia, Mexico, France, Romania and China; also, a technical exchange mission has been requested by the Philippines.[4]

3. OSARTs visiting industrialized countries identified very few significant issues, although in some countries the need for more effective management involvement and for improvements in training programmes, in operating experience and equipment performance feedback and in emergency planning and preparedness was identified.

4. Although improved operational safety is the primary goal of the OSART programme, the Nuclear Operational Safety Services Section is re-evaluating the role and structure of the programme with a view to determining whether more emphasis should be placed on regulatory and nuclear safety aspects and less on the industrial practices involved in the operation of nuclear power plants. To this end, a group of consultants reviewed the OSART programme in June 1992. They found the scope and methodology of OSART missions to be fundamentally sound and encouraged the Agency to promote the OSART process as it stands at present. At the same time, they identified some parts of the programme

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1 A limited-scope OSART mission is a mission that covers only some of the eight OSART review areas (see Table 1 in the Appendix to the Attachment to document GC(XXXV)/961, issued in August 1991).

2 A technical exchange mission is a mission that covers a given operational or technical area in great depth. It generally goes beyond the OSART review areas, being designed specifically to meet a detailed request from a Member State.

3 Altogether, 64 missions of various kinds have been carried out since the inception of the OSART programme.

4 Many Member States with operating nuclear power plants have requested more than one OSART/Pre-OSART mission, but a few have not yet requested any.

that could be enhanced and suggested an in-depth review.

5. This in-depth review may result in some modifications as regards the activities performed during OSART missions, increased emphasis being placed on subjects such as the assessment of safety culture, the establishment and communication of safety policies and objectives, the testing of safety systems, the feedback of operating experience, the interface with regulatory authorities and refresher training for operating staff (especially in areas like emergency operations and accident management provisions).

STATUS REPORT ON THE ASSESSMENT OF SAFETY SIGNIFICANT EVENTS TEAM (ASSET) MISSIONS

1. Since the 1991 session of the General Conference (as of 31 July 1992), three ASSET missions have been conducted - to France (Fessenheim), the Russian Federation (Kursk) and Ukraine (Chernobyl). In addition, there have been nine seminars to present and discuss the ASSET methodology and one mission to assist plant management in implementing ASSET recommendations. For the remainder of 1992 and for 1993, nine ASSET missions have been requested; of these, seven are related to the Agency's programme on the safety of reactors in Eastern Europe and CIS countries. In addition, three ASSET seminars and five follow-up visits have been scheduled. (See the Appendix).

2. A series of five ASSET missions to nuclear power plants (NPPs) of the WWER-440/230 type was completed in 1991. At present, there are series of missions in progress to NPPs of the following types: PWR (Krsko, Angra, Gravelines, Fessenheim), RBMK (Chernobyl, Kursk, Smolensk, Ignalina, Leningrad), CANDU (Karachi), BWR (Laguna Verde), GCR (Vandellos, Dungeness), WWER-440/213 (Paks, Dukovany) and WWER-1000 (Balakovo).

3. Russia, Ukraine and Lithuania have requested ASSET missions to their RBMKs inorder to identify pending safety issues and to analyse them in depth with a view to eliminating the root causes of potential accidents.

4. The growing interest in the Agency's ASSET services is due both to the integrated ASSET approach (which aims at an optimum in terms of three basic attributes - proficiency of personnel, adequacy of procedures and adequacy of equipment design) and to the ASSET methodology (which aims at eliminating the root causes of potential accidents).

5. The ASSET methodology has been adopted at most plants visited and has become part of the regulatory requirements of many countries which have hosted ASSET missions.

6. ASSET mission reports, which are usually derestricted, include both the conclusions of the ASSET experts and the official response of the host organization to the ASSET recommendations. Annual reports are being prepared which summarize the main ASSET findings.

7. The ASSET methodology is being refined at the request of operating and regulatory organizations. In particular, computer software is being developed for the identification of plant safety issues, for the assessment of their safety significance and for root cause analysis. The already available ASSETAS (ASSET Automatic System) software, which can at present be used only for root cause analysis, has been provided to those countries which have hosted ASSET seminars in 1992.

8. At the request of Member States, ASSET services are to be made available also for nuclear installations other than NPPs.

I. ASSET MISSIONS

I.1 MISSIONS TO REVIEW SAFETY-RELATED OPERATIONAL EVENTS

COUNTRY	NPP/LOCATION	DATE	PLANT TYPE	FUNDING
YUGOSLAVIA	KRSKO	1986	PWR 650 MW	NENS
BRAZIL	ANGRA	1988	PWR 650 MW	NENS
LITHUANIA	IGNALINA 1,2	NOV. 1989	RBMK 1500 MW	NENS
GERMANY	GREIFSWALD 1,2,3,4	FEB. 1990	WWER-440/230	NENS
CSFR	BOHUNICE 1,2	OCT. 1990	WWER-440/230	NENS
BULGARIA	KOZLODUY 1,2,3,4	NOV. 1990	WWER-440/230	NENS
MEXICO	LAGUNA VERDE	24 FEB.-8 MAR. 1991	BWR 675 MW	TC
RUSSIAN FED.	KOLA 1,2	15-26 APR. 1991	WWER-440/230	E.B.
RUSSIAN FED.	NOVOVORONEZH 3,4	13-24 MAY 1991	WWER-440/230	E.B.
FRANCE	FESSENHEIM	4-15 MAY 1992	PWR 920 MW	M.S.
RUSSIAN FED.	KURSK	20-31 JULY 1992	RBMK 1000 MW	E.B.
RUSSIAN FED.	BALAKOVO	5-16 OCT. 1992	WWER 1000 MW	E.B.
HUNGARY	PAKS	2-13 NOV. 1992	WWER-440/213	TC
UK	DUNGENESS "B"	7-18 DEC. 1992	AGR 600 MW	M.S.
LITHUANIA	IGNALINA	1-12 FEB. 1993	RBMK 1500 MW	TC
UKRAINE	CHERNOBYL	8-19 MAR. 1993	RBMK 1000 MW	TC
RUSSIAN FED.	LENINGRAD	19-30 APRIL 1993	RBMK 1000 MW	E.B.
NETHERLANDS	BORSSELE	7-18 JUNE 1993	PWR 480	M.S.
RUSSIAN FED.	SMOLENSK	19-30 JULY 1993	RBMK 1000	E.B.
CSFR	DUKOVANY	11-22 OCT. 1993	WWER-440/213	TC

I.2 MISSIONS TO ANALYSE HIGHLY SAFETY-SIGNIFICANT EVENTS

COUNTRY	NPP/LOCATION	DATE	PLANT TYPE	FUNDING
PAKISTAN	KARACHI	MAY. 1989	CANDU 140 MW	NENS
PAKISTAN	KARACHI	SEPT. 1989	CANDU 140 MW	NENS
FRANCE	GRAVELINES	JULY 1990	PWR 950 MW	NENS
SPAIN	VANDELLOS 1	DEC. 1990	GCR 450 MW	NENS
UKRAINE	CHERNOBYL	22-26 JUNE 1992	RBMK 1000 MW	TC

II. ASSET-RELATED ACTIVITIES

II.1 ASSET SEMINARS

COUNTRY	NPP/LOCATION	DATE	PLANT TYPE	FUNDING
GERMANY	*GREIFSWALD*	*JULY 1990*	*WWER-440/230*	*NENS*
HUNGARY	*BUDAPEST*	*SEPT. 1990*	*WWER-440/213*	*NENS*
BELGIUM	*TIHANGE-DOEL*	*28 JAN-1 FEB.1991*	*PWR 1000 MW*	*M.S.*
SPAIN	*TRILLO*	*11-15 FEB. 1991*	*PWR 1000 MW*	*M.S.*
KOREA, REP. of	*SEOUL-TAEJON*	*25-29 MAR. 1991*	*PWR 950 MW*	*M.S.*
NETHERLANDS	*THE HAGUE*	*8-11 APR. 1991*	*PWR 480 MW*	*M.S.*
RUSSAIN FED.	*KIEV*	*14-18 OCT. 1991*	*WWER-RBMK*	*E.B.*
SWEDEN	*STOCKHOLM*	*23-25 OCT. 1991*	*PWR-BWR*	*M.S.*
CSFR	*BRATISLAVA*	*3-7 FEB. 1992*	*WWER-440*	*TC*
SOUTH AFRICA	*JOHANNESBURG*	*17-21 FEB. 1992*	*PWR 950 MW*	*M.S.*
BULGARIA	*SOFIA*	*2-6 MAR. 1992*	*WWER-440/230*	*TC*
CHINA	*WUHAN*	*9-13 MAR. 1992*	*PWR 300 MW*	*TC*
FINLAND	*HELSINKI*	*30 MAR.-3 APR. 1992*	*PWR-BWR*	*M.S.*
BRAZIL	*ANGRA*	*6-10 APR. 1992*	*PWR 650 MW*	*TC*
HUNGARY	*PAKS*	*15-19 JUNE 1992*	*WWER-440/213*	*TC*
UKRAINE	*ZAPOROZHE*	*7-11 SEPT. 1992*	*PWR-RBMK*	*TC*
ROMANIA	*CERNAVODA*	*21-25 SEPT. 1992*	*CANDU 700 MW*	*TC*
RUSSIAN FED.	*MOSCOW*	*14-18 JUNE 1993*	*WWER-RBMK*	*E.B.*

II.2 ASSISTANCE IN IMPLEMENTING ASSET RECOMMENDATIONS

COUNTRY	NPP/LOCATION	DATE	PLANT TYPE	FUNDING
GERMANY	*GREIFSWALD 1,2,3,4*	*JUNE 1990*	*WWER-440/230*	*NENS*
PAKISTAN	*KARACHI*	*6-10 JAN. 1991*	*CANDU 140 MW*	*TC*
PAKISTAN	*KARACHI*	*13-17 JAN. 1991*	*CANDU 140 MW*	*TC*
BULGARIA	*KOZLODUY*	*1-5 JUNE 1992*	*WWER-440/230*	*E.B.*

II.3 FOLLOW-UP MISSIONS

COUNTRY	NPP/LOCATION	DATE	PLANT TYPE	FUNDING
BULGARIA	*KOZLODUY*	*19-30 OCT. 1992*	*WWER-440/230*	*TC*
BRAZIL	*ANGRA*	*23-27 NOV. 1992*	*PWR 650 MW*	*TC*
CSFR	*BOHUNICE*	*5-9 JULY 1993*	*WWER-440/230*	*TC*
RUSSIAN FED.	*KOLA*	*4-8 OCT. 1993*	*WWER-440/230*	*E.B.*
RUSSIAN FED.	*NOVOVORONEZH*	*8-12 NOV. 1993*	*WWER-440/230*	*E.B.*

STATUS REPORT ON THE INCIDENT REPORTING SYSTEM (IRS)

1. The IRS was established in 1983 for the exchange of information on unusual events at nuclear power plants (NPPs) whenever a national analysis of such an event identifies a lesson that others should learn in order that a repetition elsewhere may be avoided.[1] It is operated by the Agency in close co-ordination and co-operation with the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA/OECD), which operates a system for OECD countries.

2. While the International Nuclear Event Scale (INES) is meant to be a tool for the rapid transmission of information on unusual events at NPPs to opinion-formers, decision-makers and the media, the IRS is intended to provide extensive, detailed technical information on the development of such events - including the direct and root causes of the malfunctioning of equipment, the causes of human error and corrective measures taken. However, IRS co-ordinators are provided with important information received through INES.

3. States are making increasing use of information received through the IRS, and IRS co-ordinators are being encouraged to submit more reports to the IRS on lessons learned and measures taken in the light of IRS information. Also, States are being encouraged to use systematic methods such as root cause analysis and probabilistic safety assessment (PSA) in the analysis of unusual events.

4. Steps are being taken to operate the IRS more effectively, inter alia by further improving the co-operation between the Agency and NEA/OECD. Agreement has been reached by the Agency and NEA/OECD on combining the best features of the two organizations' IRS computer software. Improvements in the IRS coding scheme and proposals for long-term improvements, including the computer storage of full reports and the enhancement of the existing computerized search capabilities, will be discussed at the next meeting of IRS co-ordinators - to be held in October 1992.

5. Efforts are being made to improve the documentation of patterns and trends in NPP events and to compile information on national actions taken in the light of IRS reports. On the basis of the results, the Agency, in close co-operation with NEA/OECD, will continue to prepare reports on selected safety issues identified by the IRS.

6. Assistance will be offered to States in reviewing the role of regulatory organizations in the feedback of safety-related operational experience.

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[1] The 26 countries participating in the IRS are listed in the Appendix. At present, the IRS contains information on more than 1200 events. The number of events being reported to the IRS and the speed of transmission of reports are steadily increasing; the technical quality of reports is improving.

PARTICIPANTS IN THE NUCLEAR POWER PLANT INCIDENT REPORTING SYSTEM

Argentina	since May 1983
Brazil	since November 1983
Bulgaria	since February 1985
Canada	since May 1987
China	since May 1992
Czechoslovakia	since January 1985
Finland	since May 1983
Hungary	since October 1984
India	since June 1984
Korea, Rep. of	since February 1983
Mexico	since May 1991
Netherlands	since June 1983
Pakistan	since August 1984
South Africa	since April 1990
Spain	since January 1983
Russian Federation	since September 1984
United Kingdom	since March 1986
Yugoslavia	since May 1986

PARTICIPANTS THROUGH NEA/OECD

Belgium	since February 1983
France	since June 1983
Germany	since July 1983
Italy	since March 1985
Japan	since February 1991
Sweden	since October 1983
Switzerland	since February 1987
United States	since August 1985

STATUS REPORT ON THE INTERNATIONAL NUCLEAR EVENT SCALE (INES)

1. The International Nuclear Event Scale was developed by the Agency and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA/OECD), with the help of experts from their Member States, for the purpose of facilitating rapid communication on nuclear events between the nuclear community, the media and the public. As can be seen from the second page of Appendix 1, events can be: "out of scale", "below scale" and "on scale". Events "out of scale" do not have any nuclear safety relevance. Events "below scale" are safety-relevant, but not safety-significant. Events "on scale" - i.e. of safety significance - are categorized on the basis of their consequences: defence-in-depth degradation; on-site impact; and off-site impact. "On scale" events are categorized at seven levels - those categorized at levels 1 to 3 are termed "incidents", and those categorized at levels 4 to 7 are termed "accidents".

2. Early in 1992, following a successful trial of INES in 1990 and 1991, the Agency and NEA/OECD invited all countries to adopt the scale for use in classifying incidents and accidents occurring at nuclear power plants (NPPs). Also, they invited all countries possessing nuclear facilities of other types to participate in a one-year trial to test the use of INES in categorizing other nuclear events (for example, events at research reactors, irradiation facilities, enrichment plants, fuel fabrication facilities, reprocessing plants and waste storage facilities). As of 1 July 1992, more than 30 Member States have officially adopted INES. Extensions of INES to cover events at other nuclear facilities will significantly increase the number of participants.

3. The Agency has built a communication network around INES, the INES Information System.[1] The purpose of this system is to ensure the prompt dissemination of authoritative information about nuclear events. It is supported by an INES National Officer in each of the 32 Member States participating in it and by an Agency INES Co-ordinator (see Appendix 2).

4. The INES National Officers are responsible for transmitting to the Agency, within 24 hours, authoritative information about all nuclear events which are of higher safety significance (level 2 and above) or might be of public interest (though at level 1 and below) and for disseminating to their national media, public and nuclear professionals authoritative information about foreign nuclear events.

5. The Agency INES Co-ordinator has to ensure the verification and prompt dissemination of authoritative information on any nuclear event received at any time, and a system for round-the-clock operation has been set up.

6. At the request of Member States, the Agency provides advice and training related to the use of INES and the classification of events. An annual meeting of INES National Officers reviews past experience and suggests improvements which might be necessary.

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[1] A list of the participants in the INES Information System is given in Appendix 2.

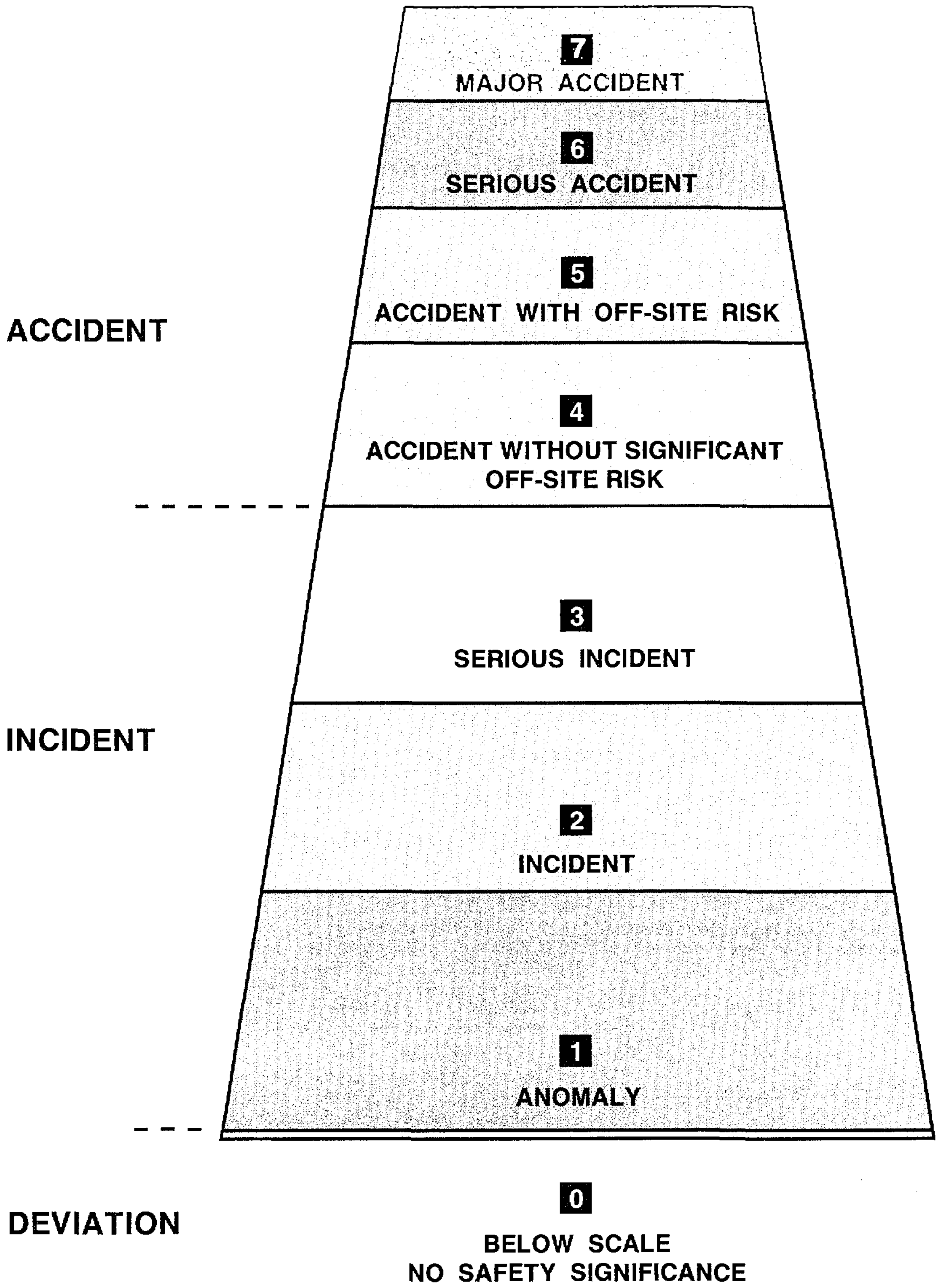
7. Since it went into operation, in 1990, the INES Information System has received 132 notifications of operational events (status as of 31 May 1992). Of the 86 events "on-scale" (i.e. above the threshold of safety significance), six were of level 3, 40 of level 2 and 40 of level 1; 83 of them were rated on the basis of defence-in-depth degradation, three were rated on the basis of on-site impacts and none was associated with off-site impacts; 43 were "below scale" and three were "out of scale".

8. There is still reluctance in some countries about reporting nuclear events to the INES Information System. Efforts will have to be made to increase reporting, so that all relevant nuclear events are covered.

9. The event rating procedure has been computerized, and the Secretariat makes software available free of charge. The software is at present being enhanced so as to permit the rating of nuclear events at other types of nuclear facilities.

The International Nuclear Event Scale

For prompt communication of safety significance



General description of the scale

The International Nuclear Event Scale (INES) is a tool to promptly and consistently communicate to the public the safety significance of reported events at nuclear installations By putting events into proper perspective, the Scale can ease common understanding among the nuclear community, the media, and the public. It was designed by an international group of experts convened jointly by the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development. The group was guided in its work by the findings of a series of international meetings held to discuss general principles underlying such a scale. The Scale also reflects the experience gained from the use of similar scales in France and Japan as well as from consideration of possible scales in several other countries.

Initially applied for a trial period to classify events at nuclear power plants, 32 countries participated in the trial and international agencies and user countries monitored progress The Scale operated successfully and now has been made available for formal adoption by each country. The Scale also has been extended and adapted to enable it to be applied to all nuclear installations associated with the civil nuclear industry and to any events occurring during the transport of radioactive materials to and from those facilities

Events are classified on the Scale at seven levels. Their descriptors and criteria are shown opposite with examples of the classification of nuclear events which have occurred in the past at nuclear installations. The lower levels (1–3) are termed incidents, and the upper levels (4–7) accidents Events which have no safety significance are classified as level 0/ below scale and are termed deviations. Events which have no safety relevance are termed out of scale.

The structure of the Scale is shown opposite, in the form of a matrix with key words. The words used are not intended to be precise or definitive. Each criterion is defined in detail within an **INES Users' Manual**. Events are considered in terms of three safety attributes or criteria represented by each of the columns: off-site impact, on-site impact, and defence in depth degradation.

The second column in the matrix relates to events resulting in off-site releases of radioactivity. Since this is the only consequence having a direct effect on the public, such releases are understandably of particular concern. Thus, the lowest point in this column represents a release giving the most exposed person off-site an estimated radiation dose numerically equivalent to about one-tenth of the annual dose limit for the public; this is classified as level 3. Such a dose is also typically about one-tenth of the average annual dose received from natural background radiation. The highest level is a major nuclear accident with widespread health and environmental consequences.

The third column considers the on-site impact of the event. This category covers a range from level 2 (contamination and/or overexposure of a worker) to level 5 (severe plant damage such as a core melt).

All nuclear facilities are designed so that a succession of safety layers act to prevent major on-site or off-site impact and the extent of the safety layers provided generally will be commensurate with the potential for on and off-site impact. These safety layers must all fail before substantial off-site or on-site consequences occur. The provision of these safety layers is termed "defence in depth". The fourth column of the matrix relates to incidents at nuclear installations or during the transportation of radioactive materials in which these defence in depth provisions have been degraded. This column spans the incident levels 1–3.

An event which has characteristics represented by more than one criterion is always classified at the highest level according to any one criterion.

Using the Scale

- Although the Scale is designed for prompt use following an event, there will be occasions when a longer time-scale is required to understand and rate the consequences of an event In these rare circumstances, a provisional rating will be given with confirmation at a later date. It is also possible that as a result of further information, an event may require reclassification.

- If a radiological emergency were to occur in the vicinity of a nuclear installation or during the transport of radioactive materials, existing national emergency planning arrangements would be implemented. The Scale should not be used as part of the formal emergency arrangements

- Although the same scale is used for all installations, it is physically impossible for events to occur which involve the release to the environment of considerable quantities of radioactive material at some types of installation. For these installations, the upper levels of the scale would not be applicable. These include research reactors, unirradiated nuclear fuel treatment facilities, and waste storage sites.

- Industrial accidents or other events which are not related to nuclear or radiological operations are not classified and are termed "out of scale". For example, although events associated with a turbine or generator can affect safety related equipment, faults affecting only the availability of a turbine or generator would be classified as out of scale Similarly, events such as fires are to be considered out of scale when they do not involve any possible radiological hazard and do not affect the safety layers.

- The Scale is not appropriate as the basis for selecting events for feedback of operational experience, as important lessons can often be learnt from events of relatively minor significance

- It is not appropriate to use the Scale to compare safety performance among countries. Each country has different arrangements for reporting minor events to the public, and it is difficult to ensure precise international consistency in rating events at the boundary between level 0 and level 1 The statistically small number of such events, with variability from year to year, makes it difficult to provide meaningful international comparisons.

- Although broadly comparable, nuclear and radiological safety criteria and the terminology used to describe them vary from country to country The INES has been designed to take account of this fact.

Examples of classified nuclear events

- The 1986 accident at the Chernobyl nuclear power plant in the Soviet Union (now in the Ukraine) had widespread environmental and human health effects It is thus classified as Level 7

- The 1957 accident at the Kyshtym reprocessing plant in the Soviet Union (now in Russia) led to a large off-site release. Emergency measures including evacuation of the population were taken to limit serious health effects. Based on the off-site impact of this event it is classified as Level 6

- The 1957 accident at the air-cooled graphite reactor pile at Windscale (now Sellafield) facility in the United Kingdom involved an external release of radioactive fission products. Based on the off-site impact, it is classified as Level 5.

- The 1979 accident at Three Mile Island in the United States resulted in a severely damaged reactor core. The off-site release of radioactivity was very limited. The event is classified as Level 5, based on the on-site impact

- The 1973 accident at the Windscale reprocessing plant in the United Kingdom (now Sellafield) involved a release of radioactive material into a plant operating area as a result of an exothermic reaction in . process vessel. It is classified as Level 4, based on the on-site impact.

- The 1980 accident at the Saint-Laurent nuclear power plant in France resulted in partial damage to the reactor core, but there was no external release of radioactivity. It is classified as Level 4, based on the on-site impact.

- The 1983 accident at the RA-2 critical assembly in Buenos Aires, Argentina, an accidental power excursion due to nonobservance of safety rules during a core modification sequence, resulted in the death of the operator, who was probably 3 or 4 metres away. Assessments of the doses absorbed by the victim indicate 21 Gy for the gamma dose together with 22 Gy for the neutron dose. The event is classified as Level 4, based on the on-site impact.

- The 1989 incident at the Vandellos nuclear power plant in Spain did not result in an external release of radioactivity, nor was there damage to the reactor core or contamination on site. However, the damage to the plant's safety systems due to fire degraded the defence-in-depth significantly. The event is classified as Level 3, based on the defence-in-depth criterion.

- The vast majority of reported events are found to be below Level 3. Although no examples of these events are given here, countries using the Scale may individually wish to provide examples of events at these lower levels.

Basic structure of the scale

(Criteria given in matrix are broad indicators only)
Detailed definitions are provided in the INES users' manual

	CRITERIA OR SAFETY ATTRIBUTES		
	OFF-SITE IMPACT	ON-SITE IMPACT	DEFENCE IN DEPTH DEGRADATION
7 MAJOR ACCIDENT	MAJOR RELEASE: WIDESPREAD HEALTH AND ENVIRONMENTAL EFFECTS		
6 SERIOUS ACCIDENT	SIGNIFICANT RELEASE: LIKELY TO REQUIRE FULL IMPLEMENTATION OF PLANNED COUNTERMEASURES		
5 ACCIDENT WITH OFF-SITE RISK	LIMITED RELEASE: LIKELY TO REQUIRE PARTIAL IMPLEMENTATION OF PLANNED COUNTERMEASURES	SEVERE DAMAGE TO REACTOR CORE/ RADIOLOGICAL BARRIERS	
4 ACCIDENT WITHOUT SIGNIFICANT OFF-SITE RISK	MINOR RELEASE: PUBLIC EXPOSURE OF THE ORDER OF PRESCRIBED LIMITS	SIGNIFICANT DAMAGE TO REACTOR CORE/RADIOLOGICAL BARRIERS/FATAL EXPOSURE OF A WORKER	
3 SERIOUS INCIDENT	VERY SMALL RELEASE: PUBLIC EXPOSURE AT A FRACTION OF PRESCRIBED LIMITS	SEVERE SPREAD OF CONTAMINATION/ACUTE HEALTH EFFECTS TO A WORKER	NEAR ACCIDENT- NO SAFETY LAYERS REMAINING
2 INCIDENT		SIGNIFICANT SPREAD OF CONTAMINATION/ OVEREXPOSURE OF A WORKER	INCIDENTS WITH SIGNIFICANT FAILURES IN SAFETY PROVISIONS
1 ANOMALY			ANOMALY BEYOND THE AUTHORISED OPERATING REGIME
0 BELOW SCALE EVENT DEVIATION	NO SAFETY SIGNIFICANCE		
OUT OF SCALE EVENT	NO SAFETY RELEVANCE		

THE INTERNATIONAL NUCLEAR EVENT SCALE

for prompt communication of safety significance

LEVEL	DESCRIPTOR	CRITERIA	EXAMPLES
ACCIDENTS 7	**MAJOR ACCIDENT**	• External release of a large fraction of the radioactive material in a large facility (e.g. the core of a power reactor). This would typically involve a mixture of short and long-lived radioactive fission products (in quantities radiologically equivalent to more than tens of thousands terabecquerels of iodine-131). Such a release would result in the possibility of acute health effects; delayed health effects over a wide area, possibly involving more than one country; long-term environmental consequences.	Chernobyl NPP, USSR (now in Ukraine), 1986
6	**SERIOUS ACCIDENT**	• External release of radioactive material (in quantities radiologically equivalent to the order of thousands to tens of thousands of terabecquerels of iodine-131). Such a release would be likely to result in full implementation of countermeasures covered by local emergency plans to limit serious health effects.	Kyshtym Reprocessing Plant, USSR (now in Russia), 1957
5	**ACCIDENT WITH OFF-SITE RISK**	• External release of radioactive material (in quantities radiologically equivalent to the order of hundreds to thousands of terabecquerels of iodine-131). Such a release would be likely to result in partial implementation of countermeasures covered by emergency plans to lessen the likelihood of health effects. • Severe damage to the nuclear facility. This may involve severe damage to a large fraction of the core of a power reactor, a major criticality accident or a major fire or explosion releasing large quantities of radioactivity within the installation.	Windscale Pile, UK, 1957 Three Mile Island, USA, 1979
4	**ACCIDENT WITHOUT SIGNIFICANT OFF-SITE RISK**	• External release of radioactivity resulting in a dose to the most exposed individual off-site of the order of a few milisieverts.* With such a release the need for off-site protective actions would be generally unlikely except possibly for local food control. • Significant damage to the nuclear facility. Such an accident might include damage to nuclear plant leading to major on-site recovery problems such as partial core melt in a power reactor and comparable events at non-reactor installations. • Irradiation of one or more workers which result in an overexposure where a high probability of early death occurs.	Windscale Reprocessing Plant, UK, 1973 Saint-Laurent NPP, France, 1980 Buenos Aires Critical Assembly, Argentina, 1983
INCIDENTS 3	**SERIOUS INCIDENT**	• External release of radioactivity above authorised limits, resulting in a dose to the most exposed individual off site of the order of tenths of millisievert.* With such a release, off-site protective measures may not be needed. • On-site events resulting in doses to workers sufficient to cause acute health effects and/or an event resulting in a severe spread of contamination for example a few thousand terabecquerels of activity released in a secondary containment where the material can be returned to a satisfactory storage area. • Incidents in which a further failure of safety systems could lead to accident conditions, or a situation in which safety systems would be unable to prevent an accident if certain initiators were to occur.	Vandellos NPP, Spain, 1989
2	**INCIDENT**	• Incidents with significant failure in safety provisions but with sufficient defence in depth remaining to cope with additional failures. • An event resulting in a dose to a worker exceeding a statutory annual dose limit and/or an event which leads to the presence of significant quantities of radioactivity in the installation in areas not expected by design and which require corrective action.	
1	**ANOMALY**	• Anomaly beyond the authorised operating regime. This may be due to equipment failure, human error or procedural inadequacies. (Such anomalies should be distinguished from situations where operational limits and conditions are not exceeded and which are properly managed in accordance with adequate procedures. These are typically "below scale").	
BELOW SCALE/ ZERO	**DEVIATION**	NO SAFETY SIGNIFICANCE	

** The doses are expressed in terms of effective dose equivalent (whole body dose). Those criteria where appropriate can also be expressed in terms of corresponding annual effluent discharge limits authorised by National authorities.*

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PARTICIPANTS IN THE INTERNATIONAL NUCLEAR EVENT SCALE (INES) INFORMATION SYSTEM
As of 20 May 1992

COUNTRY	STARTING DATE	INES NATIONAL OFFICER	FAX NUMBER
Argentina	January 1991	TOUZET, R	0054 1 544 92 52
Austria	March 1991	SCHEFFENEGGER, R.	43 1 713 79 52
Belgium	June 1990	VAN BINNEBEEK, J.J.	0032 253 74 619
Brazil	January 1991	GASPARIAN, A	0055 21 546 23 79
Bulgaria	January 1991	GANCHEV, T.	0035 92 70 21 43
Canada	October 1990	ANDERSEN, W.	001 416 592 28 93
China	March 1991	CAO, G.	0086 1 801 37 17
Czechoslovakia	October 1990	BRANDEJS, P	0042 2 215 24 67
Denmark	October 1990	KAMPMANN, D	0045 458 20 876
Egypt	October 1990	RASHAD, S. (Mrs.)	0020 2 354 09 82
Finland	June 1990	TOSSAVAINEN, K. (Mrs)	00358 0 708 23 92
France	May 1990	BREUIL, J.	0033 1 455 64 869
Germany	January 1991	KOTTHOFF, K	0049 221 206 84 42
Hungary	January 1991	CZOCH, I. (Mrs.)	0036 11 42 75 98
India	January 1991	KUMAR, V.	0091 22 556 07 50
Italy	January 1991	MUSSAPI, R.	0039 6 500 72 916
Japan	July 1991	SHIMOMURA, K. & NAKAMURA,S.	0081 3 3581 24 87 & 3503 73 66
Korea, Republic of	January 1991	HONG, S-B.	0082 2 503 76 73
Lithuania	March 1992	VORONTSOV, B.	007 01266 29350
Mexico	January 1991	DELGADO GUARDADO, J.L.	0052 5 534 14 05
Netherlands	August 1990	VAN IDDEKINGE, F.W.	0031 70 333 40 18
Pakistan	October 1990	MAQBOOL, N.	0092 51 82 49 08
Romania	April 1991	SERBANESCU, D.	0040 0 31 64 86
Russian Federation	September 1990	ANDREEV V.I. & ZHUK Y.K.	007 095 274 00 71
South Africa	March 1991	HENDERSON, N.R.	0027 12 663 55 13
Spain	October 1990	GIL, J.	0034 1 346 05 88
Sweden	October 1990	REISCH, F.	0046 8 661 90 86
Switzerland	October 1990	DEUTSCHMANN, H.	0041 56 99 39 07
Turkey	April 1991	YALTIRIK, M.	0090 4 127 28 34
Ukraine	March 1992	DEMYANENKO, A.I.	007 044 559 53 44
UK	November 1990	LUDLOW, J.J.	0044 272 44 33 33
Yugoslavia	October 1990	LEVSTEK, M.	030 61 343 667
ORGANIZATION	**STARTING DATE**	**INES LIAISON OFFICER**	**FAX NUMBER**
CEC Luxembourg	September 1990	FRASER, G.	00432 4301 46 46 (Lux)
NucNet Berne	December 1991	FEUZ, P.	0041 31 212 758
OECD Paris	March 1990	ILARI, O.	0033 1 45 24 96 24
USCEA	February 1992	BRYANT, P. (Mrs.)	001 202 785 40 19
WANO London	September 1990	NAKAZONO, R.	0044 71 351 96 78
Chairman INES Committee		TAYLOR, R.H.	0044 272 64 84 95
INES Co-ordinator (IAEA)		THOMAS, B.A.	43 1 23 09 723

NB: USA is expected to join the INES Information System in the course of 1992.