

# **An overview of the event/incident reporting categorisation used in the majority of UK plants, identifying the links to relevant UK legislation.**

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## **Summary**

British legislation requires formal reporting of several types of radiological event. These requirements, as well as internal Company reporting requirements, have been met by grouping events into types in approximate order of significance. This offers a common structured approach which has been adopted by three principal Nuclear Generators in the UK. Related inspections have identified the need for underlying harmonisation of processes and assumptions when trying to make comparisons against the event categories.

## **Legislation**

Health and Safety legislation in Britain is controlled under the Health and Safety at Work Act (1974). This requires all employers and employees to be responsible for their own safety arrangements.

The principal legislation covering British nuclear sites is the Nuclear Installations Act 1965. This act requires all nuclear installations to be licensed from commencement of construction to completion of de-commissioning. All licences contain 36 generic conditions which require the licensees to make "Adequate Arrangements" in line with the principles of the Health and Safety at Work Act. Licence Conditions 18, 32, 33 and 34 incorporate specific radiological reporting requirements. Licence Condition 7 requires the licensee to:-

‘Make and implement adequate arrangements for the notification, recording, investigation and reporting of incidents occurring on the site:-

- a) as is required by any other condition attached to this licence;
- b) as the Executive (NII) may specify;
- c) as the Licensee considers necessary’.

This condition covers all aspects of nuclear generation. It is convenient to incorporate all facets of radiological reporting, from all sources including the Site Licence, within arrangements to meet this condition. These arrangements are furnished to, but not "Approved" by the Nuclear Installations Inspectorate (NII). To be compliant with the Site Licence we must report in accordance with the requirements of these arrangements.

Secondly radiological protection control used to be exercised by specific conditions attached to Site Licences, but now this control is covered under the Ionising Radiation Regulations (1999) (was IRRs1985). These Regulations incorporate EC Directive 96/29 into British law as a Statutory Instrument under the Health and Safety at Work Act. The Ionising Radiation Regulations incorporate some formal requirements for reporting exceeding of certain dose or contamination levels. The Company uses its Radiological Safety Rules as a means of putting the dose control aspects of the IRRs into practice.

Thirdly radioactive discharges are authorised under the Radioactive Substances Act (1993). Under this act quantitative and qualitative limits are specified along with notifications levels. It is a legal requirement to report breaching of an authorised limit, or indeed discharging in an incorrect manner. It is noteworthy that this legislation is controlled by the Environment Agency whereas all other related legislation is controlled by the Nuclear Installations Inspectorate.

## Other Formal Requirements

Historically the British Nuclear Industry was always Government owned and controlled. To ensure open reporting, revisions to arrangements for reporting of nuclear incidents were announced to Parliament in 1987. This required certain significant events to be formally reported to Government Departments, with lesser events reported in a widely distributed fortnightly newsletter. With detailed modifications these requirements are still in place, although responsibility for collating the reports has passed from the Department of Trade and Industry to the Health and Safety Executive and is carried out by the NII. This is not legislation, but failure to voluntarily report by the now independent Licensees would almost certainly invoke a Direction under the Licence to enforce reporting. The majority of the Government requirements relate to radiological matters, but need updating because they refer to quantitative limits in superseded legislation. Approaches to the relevant Government Department have so far failed to generate an update.

## Integrating Reporting Requirements and the Reporting Process

As noted above, Licence Condition 7 requires structured event reporting arrangements covering items which must be reported down to items which the Licensee wishes to report. The opportunity has been taken to include all aspects of event reporting into a single Company Specification. The Categories for Radiological events form a significant part of this specification, but other areas covered are:-

Nuclear Plant Events	(eg Reactor trip)
Industrial Safety Events	(eg Personal injury)
Abnormal Occurrences	(eg Non-nuclear fire)
Security Incidents	(eg Illegal entry to site)
Non radiological Environmental Events	(eg Oil spillage)
Transport Events	(eg Transport Flask event)

I was asked to update the Radiological Categories in time to comply with the requirements of IRR 1999 which was due to take effect in January 2000. In carrying out such an exercise it is essential to have the full support of all potential stakeholders, in particular the power stations who are the Licensees. I therefore asked for nominations from the power station Health Physicists and Operational Experience Feedback Engineers. The former had radiological expertise, the latter expertise in the company reporting and event follow up process. These people were supplemented by headquarters experts in radiological processes and discharges. The resulting reporting requirements are attached as Appendix 1.

Events were split into four groupings:-

1. Disposal, Release, or Spillage of Radioactive Materials.
2. Radiation or Contamination Events Affecting a Worker.
3. Breakdown of Radiological Control.
4. Other Radiological Events

Within these groupings all the statutory and voluntary categories are listed in an approximate order of significance. Where an identical or similar category definition had been used previously, the category number was retained to preserve compatibility with historical event databases. Significance tends to range from breaches of statutory requirements down to effectively low significance near misses. Experience showed that there was value in reporting intermediate level events in order to help detect trends. Hence the significance levels could be summarised as:-

- i. Failure to comply with a Statutory Requirement
- ii. Failure to comply with a Company Requirement
- iii. Events where no compliance failure was involved.

The Categories are presented in tabular form. For each Category we provide:-

a) Description

This is as precise a definition as possible of the Category. Several iterations were completed before satisfactory solutions were obtained.

b) Station Notification Requirements

This specifies, for every Category, who the Station should report the incident too and on what timescale. Whilst we would always encourage informal contact between the Station and the regulators it is essential to report formally in a consistent manner. This is achieved by utilising the round the clock cover provided by the Health Safety and Environment Division Duty Officer. To alert this Duty Officer a telecoms paging Site Event Reporting system (SERS) is used. This triggers a response from the Duty Officer who after briefing from the Station has the responsibility of agreeing the Category and if appropriate allocating an INES rating. Longer term reporting may include a Matter of Special Report (MSR) to the Nuclear Safety Committee and a NUPER (Nuclear Plant Event Report) report to alert other sites to lessons learned. For less significant events the Stations draw issues to the attention of the regulator by briefing their local NII or Environment Agency Site Inspector.

c) Duty Officer Notifications

This specifies who the Duty Officer should formally report to and on what time-scales. Initial notification is via a timed telephone call, with a written follow-up within 7 days. The Duty Officer will also make internal company reports, for example to the Chief Medical Officer (CMO) for events where an individual may have received a high dose. The Duty Officer completes the process by filling in an Abnormal Event Report form (AER) which is circulated to Senior Managers and addresses the underlying significance of events.

d) Illustrative Guidance

In earlier versions some Stations had augmented the basic reporting requirements with their own illustrative guidance. This was seen to be helpful, but with each station producing their own guidance, could be a cause of inconsistency. Hence to improve consistency agreed guidance has been produced as part of the Company Specification. It must be stressed that as this is only guidance it is not mandatory. It may well arise that the Station and Duty Officer agree to a final category that does not exactly fit the guidance.

e) Prime Source

This identifies the source of the requirement for the Category, whether statutory or self-imposed.

It is noted that although the latest categories were derived within the two British Energy Licensees, identical categories are used by BNFL/Magnox. It is the policy of the co-ordinating group to work towards harmonisation of reporting throughout the British Nuclear Industry, hence the categories are freely available to all for their use.

### **Inspections on Radiological Event Reporting**

As part of their commitment to self-regulation British Energy employ a Site Inspector for each of their Nuclear Power Stations. I am the Inspector for Hartlepool. As well as specific station responsibilities each Inspector has generic responsibilities. Mine include both Health Physics and Event Reporting. Each year all Site Inspectors carry out an inspection at all sites covering an area of potential concern. My inspection for 1998/9 covered Radiological Event Reporting.

Having identified consistent categories it is inevitable that Senior management will wish to use these for inter-site comparisons. These comparisons should be valid but are they? To investigate this a series of identical inspections on radiological event reporting was undertaken at all British Energy sites.

The station response against a wide range of hypothetical events was assessed in order to compare processes in a consistent manner. Actual events were also reviewed. Areas covered by the inspection included:-

The process for recording and investigating events.  
An analysis of the accuracy of previous reporting,  
Assumptions used, e.g probe efficiency,  
The calculation process.

The findings revealed significant differences across the Company. There was a different process on each site with little evidence of review. There was a big variation in the number of significant events. For example results for 1997 gave a range from 5 to 24 events across the 8 sites in the company. There was a big difference in the distribution of events at some sites. For example at one site all events had been reported by the then current category of REC020, a radiological near miss. Why these differences?

Two sites were considered to have consistently under-reported event categories due to interpretation differences.

One site had a few events which I would challenge as being incorrectly reported.

There were big differences in the assumed probe efficiencies. Taking a BP4/C probe as standard the assumed efficiencies for sulphur-35 ranged from 2.5% to 15%, and for cobalt-60 efficiencies ranged from 5% to 25%. It is easy to see that stations assuming the higher efficiencies will be able to tolerate much bigger spreads of contaminated material before crossing reporting levels. Such variations in efficiency render comparisons of reportable events meaningless. BE Health Physicists are now actioned to come up with consistent efficiencies to be applied across the company.

In contrast there was excellent consistency in applying area averaging to handle single particle events. Do we have confidence that the gamma spectrometry used to count the particles is consistent though?

There is variability in how contamination found in the course of routine work is handled. For example if a task is being performed in line with a procedure which requires monitoring to be done, and that monitoring detects a spread of contamination, some stations would not regard this as an event. Others would take a more conservative line.

It was encouraging that no Stations invoked occupancy time as a way of getting around reporting high radiation events.

Hence it can be seen that obtaining consistency in the way events are analysed is just as important as providing consistent definitions if valid comparisons are to be made.

## **Conclusions**

1. A consistent set of reporting categories has been developed which covers all legislative requirements as well as internal company standards.
2. These criteria have been adopted by three major UK Utilities, BE Gen (Nuclear Electric), BE Gen (UK) (Scottish Nuclear), and BNFL/Magnox.
3. Inspections at BE Sites have revealed differences in working methods which must be eliminated before valid cross site, and indeed cross company comparisons can be made.

## **Appendix 1**

Below are reproduced the current radiological event Categories worked to by British Energy. When using these tables guidance should be sought from the Station Health Physics staff on the interpretation of the REC categories. Within the sections of the tables, the categories are listed in approximate order of significance.

Category	Description	Station Notification Requirements	HSED Duty Officer Notifications	Illustrative / Optional Guidance		Prime source
				APPROPRIATE	INAPPROPRIATE	
<b>DISPOSAL, RELEASE, OR SPILLAGE OF RADIOACTIVE MATERIALS</b>						
REC 01 (A)	Reasonable grounds for believing that disposal of radioactive waste is occurring or has occurred which fails to comply with a quantitative limit specified in RSA authorisation.	<b>SERS(I)</b> MSR NUPER News ADJ ( C )	<b>EA/SEPA (I) NII(I) Report Gov(I) Report</b>  INES	Exceeding periodic (e.g. annual) discharge limits. (Note this may be a small discharge which has taken the cumulative total above the limit)	On-site spillage / release is more likely to be covered under another category such as REC03, REC08, REC05 or REC23/24.	RSA (Authn.) and SoS (3)
REC 01 (B)	Reasonable grounds for believing that disposal of radioactive waste is occurring or has occurred which fails to comply with a condition specified in RSA authorisation.	<b>SERS(I)</b> MSR NUPER News ADJ ( C )	<b>EA/SEPA (I) NII(I) Report</b>  INES	Where a radiologically significant quantity of material has been discharged through a route which has not been approved in an authorisation issued under RSA 93.	On-site spillage / release is more likely to be covered under another category such as REC03, REC08, REC05, or REC23/24.	RSA (Authn.)
REC 01 (C)	Minor breach of a condition with negligible radiological significance and where informal reporting to EA/SEPA is sufficient, as specified in RSA authorisation.	EA/SEPA (D) NII (SI) NUPER HSED(SI)(D)		Breach of a condition with no or negligible radiological implications, e.g. finding an aerosol can in a consignment to Drigg.	Seek advice. Where the breach involves a quantity of radioactive material that is significant.	RSA (Authn.)
REC 08	Uncontrolled release or spillage of radioactive substance that is likely to exceed the quantity level in Column 4 of Schedule 8 of IRR on or off site.	<b>SERS(I)</b> MSR NUPER News ADJ ( C )	<b>EA/SEPA (I) NII (I) Report Gov (I) Report</b>  INES	Includes liquids, dusts or materials containing radioactive substances both on and off site. (IRR 30 (1), ACOP 460 to 463. Confirm quantity involved with RPA.	Where spillage is contained within a designed and maintained enclosure or other facility, or is in accordance with an RSA 93 Authorisation.	IRR 30 (1), SLC (34) and SoS (4a)
REC 05	Abnormal occurrence leading to a release or suspected release or spread of radioactivity on or off site that requires special action or formal investigation.	<b>SERS(I)</b> MSR ( C ) NUPER ( C ) News ADJ ( C )	<b>EA/SEPA (I) NII (I) Report Gov (I) Report</b>  INES	Any unplanned event that significantly increases radiation, surface or airborne contamination, for which an investigation report was prepared. Any formal investigation into a suspected event outside the station boundary, even if a written report was not required.	Events involving radwaste, which should be REC01 (A or B). Events categorised REC23 or 24. Investigation of a personal contamination event.	SoS (5) and SLC (34)
REC 04	Unusual discharge or environmental monitoring result considered worth reporting to EA/SEPA	EA/SEPA (D) <del>MAFF(D) (C)</del> NII(SI) HSED (SI) (D)		An event which does not breach an authorisation but was considered necessary to discuss with the EA/SEPA	An event which breached an authorisation.	Other
REC 03	Exceeding a Notification Level as specified in RSA authorisation.	EA (D) HSED (SI) (D)		For example a QNL. Note, this may be a very small event which takes the cumulative discharge above the notification level.	Does not apply in Scotland	RSA

The Company Safety Rules ( Radiological), Table 1, (Ref.10) provides the Statutory Personnel Dose Limits from IRR.1999.

Category	Description	Station Notification Requirements	HSED Duty Officer Notifications	Illustrative / Optional Guidance		Prime source
				APPROPRIATE	INAPPROPRIATE	
<b>RADIATION OR CONTAMINATION EVENTS AFFECTING A WORKER</b>						
REC 06	Reasonable grounds, following a preliminary investigation that any person is likely to have received an overexposure as identified in the IRR.	<b>SERS (I)</b> MSR NUPER ( C ) News	<b>NII (I) Report</b> <b>Gov (I) Report</b> <b>CMO (I)</b>  INES	Person has received or is likely to have received exposure above statutory limits. This applies to both a single incident and to accumulated exposure, including working abroad for the company. The RPA needs to categorise this.	Immediate investigation showed that no over-exposure occurred.  Medical exposure.	IRR 25 (1)  SoS (2a) if confirmed
REC 26	Where an individual has exceeded a Company Dose Restriction Level.	SERS (D) MSR NUPER ( C ) News	NII ( D ) Notify CMO ( D )  INES	Applies to a single event or a very a small event which may have taken the cumulative dose to an individual above the restriction level.	If authorised in advance by the Director of HSED.	IRR 8 (7)
REC 14	Any incident, instance or event where any person has received or might have received a significant unplanned exposure to radiation.	SERS (D) MSR ( C ) NUPER ( C ) News	NII (D) Notify HSED (D) INES	Any dose which was more than twice that authorised for the task , or if no specific dose was authorised, any dose greater than 500 micro-Sieverts received during one day.	Where exposure has been planned. Cumulative dose.	OEF
REC 22	Discovery of skin or clothing contamination <b>outside</b> a contamination controlled area or any sub-changeroom above levels specified in the radiological safety rules.	NII (SI) NUPER ( C )		Determined by Accredited Health Physicist.		Other

Category	Description	Station Notification Requirements	HSED Duty Officer Notifications	Illustrative / Optional Guidance		Prime source
				APPROPRIATE	INAPPROPRIATE	
<b>BREAKDOWN OF RADIOLOGICAL CONTROL</b>						
REC 09	Actual or suspected loss or theft of a radioactive substance greater than the quantity levels specified in Column 5 of Schedule 8 of IRR. (Also refer to table 6, SSI 04.)	SERS (D) MSR ( C ) News NUPER ( C )	NII (D) - Report Security (D) INES	Anything containing radioactivity, including contaminated items and waste, the location of which should be known, but which cannot be located within 24 hours from being reported missing.	Discharge, spillage, or release of radioactivity.	IRR 30 (3)
ISE 11 / REC 21	The malfunction of a radiography source or radiation generator which causes it to fail to return to its shielded position or to de-energise at the end of the intended exposure period.	As ISE 11	As ISE 11	See RIDDOR guidance, referenced in Table 4, Industrial Safety Events, viz HSE Guide to RIDDOR 95 page 41, paragraphs 121-126.		RIDDOR
REC 23	Discovery outside the controlled area boundary, of radiation or contamination that would require the area to be designated as a radiation or contamination controlled area under the radiological safety rules.	SERS (D) if 10 times the lower C2 level or >R2 News ----- Otherwise NII (SI) NUPER (C)	NII (D) Notify  INES  ----- None	Determined by Accredited Health Physicist.		Other
REC24	Unplanned event, within the controlled area boundary, where contamination or radiation is found that exceeds the lower level of the next higher designation area, but excluding events where less than 10 times the lower contamination controlled area C2 level is found in a radiation controlled area.	NII (SI) NUPER ( C )		Determined by Accredited Health Physicist.	Where a step in a procedure instructs action to look for spillage at the time of task completion.	Other
REC 16	Unplanned event within the controlled area boundary where contamination is found to exceed the lower levels for a contamination controlled area C2.	Database as a separate category on Ops Feedback		Discovery of loose contamination in a radiation controlled area (R2 area or above, but not C2 or above) in which contamination is found which exceeds the lower level in the Safety Rules but does not exceed ten times that C2 level.	Where a step in a procedure instructs action to look for spillage at the time of task completion.  Fixed contamination or contamination within a vacuum cleaner.	Other

Category	Description	Station Notification requirements	HSED Duty Officer Notifications	ILLUSTRATIVE / OPTIONAL GUIDANCE		Prime source
				APPROPRIATE	INAPPROPRIATE	
<b>OTHER RADIOLOGICAL EVENTS</b>						
REC 19	Confirmed or suspected failure to meet a requirement of an IRR or approvals made under those regulations and not covered in another category.	NII (SI) NUPER ( C )		Refer to RPA before using this category.  Medical expired		IRR other
REC 27	Confirmed or suspected failure to meet a requirement of a Company Radiological Safety Rule not covered in another category.	Database as a separate category on Ops Feedback		Refer to an Accredited Health Physicist.  Person without a valid RCD.		
REC 15	Average effective dose (including equivalent dose) to a group of workers that exceed dose levels specified by HSE.	Approved Dosimetry Service to inform Site(D) & HSED(D). Station Report to NII in accordance with local procedure.		If reported by Approved Dosimetry Service and dealt with by Health Physics.		SLC (18)
REC 99	A radiological event or near miss which merits recording but does not fit any of the above categories.	Discretionary		Discuss with Accredited Health Physicist.		Other