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INTERNATIONAL ATOMIC ENERGY AGENCY

REPORT OF THE CONSULTANT MEETING FOR

**REVIEW OF  
PROCEDURE FOR NPP  
OPERATIONAL EVENTS  
REPORTING AND  
INVESTIGATION**

FOR THE

**NUCLEAR REGULATORY  
ADMINISTRATION OF UKRAINE**

IN

**VIENNA, AUSTRIA**

**18-20 DECEMBER 1995**

DIVISION OF NUCLEAR INSTALLATION SAFETY

UNDER TC PROJECT (RER/9/035)  
DIVISION OF TECHNICAL CO-OPERATION PROGRAMMES

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## 1. INTRODUCTION

In response to a request from Mr. A. Smyshlyayev, Head of Nuclear Regulatory Administration of Ukraine, from 28 August 1995, the IAEA carried out an expert review of the Procedure for NPP operational events reporting and investigation. The Procedure is being developed by the Scientific and Technical Centre on Nuclear and Radiation Safety of Nuclear Regulatory Administration. This activity was initiated on the basis of the decision of Nuclear Regulatory Administration and State Committee on Nuclear Energy Utilization (Goskomatom) issued in 1992.

The Procedure for NPP operational events reporting and investigation (PNAE-G-005-91), which is currently in force in the Ukraine, was issued in 1991 by the authorities of the former Soviet Union. After the disintegration of the former Soviet Union and the establishment of independent Ukraine state, it was decided by the Ukrainian government, in 1992, that all existing legal documents have to be revised during the three years period of time (1992-1995).

The Nuclear Regulatory Authority of the Ukraine is revising the regulation governing reporting and investigation of operational events at nuclear power plants for the following principal reasons:

- organizational changes in the state administration of Ukraine;
- establishment of new central bodies in the nuclear energy sector (regulatory body, Goskomatom) with newly defined authorities and responsibilities including the fact that NPPs are fully responsible for safe operation;
- intention of the Ukraine to adopt the international practices in the area of event reporting and investigation which are expressed in the IAEA recommendations such as IRS, INES, ASSET and INSAG.

All Ukrainian NPPs were subject of various IAEA's Safety Services (ASSET, OSART, ASCOT) during the last several years and ASSET methodology has become the official tool for investigation of the unusual events and for identification of their direct and root causes and corrective actions.

In November 1995, the Scientific and Technical Centre on Nuclear and Radiation Safety provided the IAEA and the experts with the English translation of the original document (45 pages) which was the subject of the review. The quality of translation was sufficient for the consultants' review. It was noted that for official distribution the English translation left much to be desired and should be revisited by some persons who have a good knowledge of ASSET, INES and IRS terminology.

The proposed modification to the Terms and Definitions (chapter 1) were prepared for consideration of the Ukrainian authorities. In particular it is understood that words "anomaly event" means "occurrence" and "violation" used as a noun means "event" according to the ASSET terminology. "Violation" as a verb means "infringement" or "contravention". The term "accounting" ("utshot" in Russian) means "recording". The terms "different regimes" and "any regime of the unit operation" should be replaced by those used by the NUSS programme namely "operational states" (normal operation plus anticipated operational occurrences).

The Consultants Meeting drew attention to the potential problems created by the use of diverse terminology. They recommended that the Ukrainian authorities pay particular attention to the terminology to be adopted.

It was suggested that a schedule should be produced giving the Ukrainian terminology and showing the international common usage equivalent.

The reporting process proposed in the Procedure is provided in the flow chart in Attachment 1.

The recruitment of the consultants for the review of the above-mentioned document was initiated in September 1995. The aim of the recruitment was to achieve a good balance of operator/regulator side and Eastern/Western experience in the area of the reporting and investigation of unusual events.

The Consultants Meeting was held from 18-20 December 1995 in Vienna and was funded under TC project RER/9/035. Two Ukrainian experts from the Scientific and Technical Centre on Nuclear and Radiation Safety participated in the Consultants Meeting. Their presence in the meeting was very important since the proposed recommendations and suggestions were discussed and prepared using the justification and clarification of the authors of the text of the reviewed regulation.

## 2. RECOMMENDATIONS AND SUGGESTIONS

### 2.1. GENERAL RECOMMENDATIONS

1. It is suggested that the Introduction (chapter 1) should be expanded to cover the purpose and scope of the intended regulation. It should mention that reporting in the INES framework is to be dealt with in a separate regulation or document.
2. The experts are of the opinion that the proposed categorization of the events is inadequate to ensure that all safety related events are reported, recorded and scrutinized. The experts recommended that a separate register of safety related events, which do not fall into the categorization shown in Table I, should be established. To this end it is suggested that chapter 2.3 should read:

"Safety relevant events which are such that they would not be categorized under Table I, shall be recorded at the plant in a register of "uncategorized" safety relevant events. The plant manager shall ensure that this event register is routinely scrutinized to enable trends in failure rates to be detected. A quarterly summary report should be made available to the regulatory body".

3. The regulation as drafted (chapters 3 and 4) requires the setting up of a commission of investigation for every event reported which is categorized in Table I. The experts consider that this demands on considerable administrative overhead which could easily be avoided. For example, a commission could be called for the events categorized as A01-A04 and P01. It is suggested that a "standing" committee centered on the plant should be set up to deal with the remainder of the events which are more frequent and have a lower safety significance. However, if a particular event reviewed by the standing committee is deemed of sufficient importance by either the committee or the regulatory body, then it should be referred to a commission for further investigation.
4. Chapter 3.1.2.1 - It is recommended that the regulation should restrict itself to reporting and investigation relating to operational feedback. Matters concerning emergency management should be excluded from the regulation.
5. General comments to Table I

The table should be extended to include events relating to

- fire;
  - dropping of objects into primary circuit;
  - loss of natural circulation;
  - events of high public interest;
  - events especially requested by regulatory body;
  - any violation of licence conditions not covered by existing categories.
6. Chapter 4.7 - It is suggested that this clause should be made more flexible to avoid a plant being held shutdown for longer than is necessary. For example, it would be reasonable to apply the clause as written to events categorized as accidents (A01-A-4). For less severe events the chairman of the investigating commission (or of the standing committee) should be required to ensure that necessary steps have been taken to preserve evidence (such as reserving samples of fluids, taking photographs, storing broken parts

and debris, etc.) and, once satisfied in this respect, to clear the equipment or building for return to operational control. The chairman may require hold points during restoration work to ensure further evidence is gained.

## 2.2. DETAILED/EDITORIAL RECOMMENDATIONS AND SUGGESTIONS

1. Table I - It is recommended that attention be given to the consistent use of SI units (Bequerel instead of Curie as a unit of radioactivity.)

2. Category A03 - The last sentence to read:

"Considerable extent of core disruption caused by mechanical forces or melting that results in the exceeding of the maximum limits of fuel damage defined in PBYa RUAS-89".

3. Category P01/2 - The last sentence to read:

"There is no off site release of radioactivity".

4. Category P02 to read:

"The violation of limits and/or conditions in any operational regime which did not lead to an accident or which are not categorized as category P03 or P04".

5. Category P03 to read:

"Loss of redundancy in any safety system or safety system channel in any operational state".

6. Category P04 to read:

"Inoperability of a safety system channel for a period in excess of that permitted in the operating limits and/or conditions".

7. Category P05 to read:

"Reactor scram or any disconnection from the grid as a result of equipment failure and/or personnel error or an external (to the plant) impact either natural or man-made. Reactor shutdown as a result of the requirement of the Technical Specification".

8. Category P06 to read:

"Damage or potential damage due to dropping or other impact involving fuel assemblies, fuel rods (pins), absorbers, dummy fuel assemblies, cask containing spent fuel which does not result in an event reportable under categories P01-P02 or A01-A04".

9. Category P08 - Delete "caused by"; insert "as a result of"; insert after "origin" the text "or as a result of the requirements of the Technical Specification".

10. Category P09 to read:  
"Any spurious actuation of a safety system".
11. Category P10 - Delete "succeeded"; insert "exceeding".
12. Chapter 2.2.1 to read:  
"Planned power reduction to accommodate planned work".
13. Chapter 2.2.2. to read:  
"Unplanned power reduction to accommodate maintenance, repairs and defect elimination and post maintenance testing".
14. Chapter 2.2.3 to read:  
"Power reduction in response to power system requirements".
15. Chapter 2.4 to read:  
"The final categorization of the event .....".
16. Chapter 2.5. - It is suggested that this clause should be simplified to read:  
"The regulation shall become effective for any reactor from the date of the receipt of the first nuclear fuel (intended for that reactor) on the site".
17. Chapter 2.7 to read:  
"Events followed by injury to personnel are to be investigated according .....".
18. Chapter 3 - Replace "an operative report" by "initial notification of an event"; replace "a log book on an event estimation" by "INES rating form".
19. Chapter 3.2.1 (page 9) - Replace "the nomination and ....." by "event title and .....".
20. Chapter 3.3 - Note that the supplementary report also has to be sent to the chairman of the investigating commission.
21. Chapter 3.4 - Change title to "INES rating form"; change position in report to present 3.3 which then will be renumbered to 3.4.

The proposed text to read:

"The INES rating form will be completed and distributed according to the INES regulation".

22. Chapter 4.1 - Suggest rewording to read:

"The target time for the completion of the investigation of any event subject to this regulation shall be 15 days from the date of the initial notification. The chairman of the investigating commission (or of the standing committee) may seek an extension of time from chief engineer of NPP and authorized representative of SAI NEPNSU acting in consort".

23. Chapter 4.2 - It is recommended that for clarity and ease of application this section should be expanded to show who (or which office holder) has the responsibility in each case, i.e.

- Category A01 - Minister of .....  
(advised by Head of .....)
- Category A02-P01 - Head of ..... in Goskatom with Head of ..... in NEPNSU (specify position + specify which organization)
- Category P02-P06 - Specify with whom in Goskatom the NPP directorate agree

24. Chapter 4.3 - Suggested rewording:

"The chairman and members of the investigation committee (or the standing committee) should be appointed by the officer responsible as defined in chapter 4.2.

Representative of SAI and NAR NEPNSU have a right to nominate representatives as members of investigation commissions.

In addition, representatives of design, construction, manufacturing, contracting or research organizations may be invited to give evidence or expert advice to assist the commission in its work".

25. Chapter 4.6 - It is suggested that this clause be modified to express the sentiment that it is preferable or desirable that members of an investigation commission be released from their normal duties for the duration of the commissions' work.

26. Proposal to change ordering of paragraphs 4.1 - 4.7 in the following way:

- 4.1. deals with setting up (old 4.2)
- 4.2. deals with the structure of the commission (old 4.3)
- 4.3. old 4.4
- 4.4. old 4.5
- 4.5. new paragraph to read:  
"The chairman of the investigation commission should begin work on the day of his appointment, an early duty being described in old 4.7 (revised text)".
- 4.6. old 4.6 but revised text
- 4.7. old 4.7 but revised text, note that old 4.8 is now in new text of 4.7
- 4.9. as written except reference to "log book" should be by "INES rating form"  
(Note this will be number as 4.8.)

27. Supplement 1 (page 15) to be changed in the following way:

1. Description of the event
  - 1.1. The status of the unit before an event
  - 1.2. The description of a sequence of occurrences in development of the event
2. Consequences of the event
3. Cause analysis of the event
  - 3.2. List of occurrences in the event development
  - 3.3. Actions taken to clarify causes of the event
  - 3.5. The type of failures (personnel errors)
  - 3.6. Cause of occurrences, contributing factors, corrective measures
4. Safety assessment
  - 4.1. Importance of the occurrences during development of the event
  - 4.2. INES rating and justification

28. Supplement 2

Change the titles according to Supplement 1.

29. Supplement 2 (point 3.6)

Use the following definitions of direct and root causes according to ASSET:

*Direct cause:* is the latent weakness (the potential for an occurrence) plus the contributors to the existence of the latent weakness (deficiency of quality control or preventive maintenance).

*Root cause:* is the deficiency to eliminate timely the latent weakness (surveillance programme: failure to detect, or feedback programme: failure to correct) plus the contributors to the existence of the deficiency (management policy for surveillance and feedback).

30. Supplement 2 (point 4.2) to read:

"Final INES rating".

31. Supplement 2 (point 6) to read:

"A list of supplement documents is provided in this section. The recommended list of support documents to the "Report ....." is the following:"

## 2.3. GOOD PRACTICES

The experts noted a number of good practices in the draft regulation. The main ones being:

1. The recording and reporting of process of corrective actions are codified.

2. The extension of the coding system to include the results (direct and root causes) of the event investigation (group 9).
3. The extension of the coding system to include corrective actions (group 10).
4. The extension of the coding system to include modes of operation of system (group 11) and equipment (group 12).

The Consultants Meeting commended Ukraine on their effort to adopt international practice relating to operational experience feedback to become a basis to their national regulations.

### 3. CONCLUSION

The consultants conclude that the draft regulation submitted for review represented a major step forward in systematizing the reporting and investigation of operating events occurring at the Ukrainian nuclear power plants.

In order to facilitate future international co-operation, for example, in the field of peer reviews of the management of nuclear safety or of the effectiveness of the operational feedback procedure, the consultants commend the adoption of the internationally established methodology and terminology but stress the need for competent translation of the documents into English.

The consultants particularly draw attention to the need to give proper weight to the practicality of the implementation of the revised regulations. They have drawn attention to the high administrative overhead implicit in the draft. It is suggested that a user group having representatives from the organizations involved in applying these regulations should be established with the remit to review the arrangements for implementation and make suggestions to maximize the efficiency of application.

#### 4. CONTRIBUTORS TO DRAFTING AND REVIEW

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## **ATTACHMENT**



