FEDERAL NUCLEAR AND RADIATION SAFETY AUTHORITY OF RUSSIA
(GOSATOMNADZOR OF RUSSIA)

DECREE

29 December 2003 **MOSCOW** **No** 7

Regarding approval and putting into force the federal standards and rules in the field of use of atomic energy “Provisions on Procedure for Investigation and Recording of Events in Operation of Nuclear Fuel Cycle Facilities”.

The Federal Nuclear and Radiation Safety Authority of Russia

DECREES:

1. To approve and put into force commencing 30 April 2004 the attached federal standards and rules in the field of use of atomic energy “Provisions on Procedure for Investigation and Recording of Events in Operation of Nuclear Fuel Cycle Facilities” (NP-047-03).

2. Consider non-valid commencing 30 April 2004 the decree by Gosatomnadzor of Russia No 3 of 31.01.1996 which approved and put into force the regulatory document “Provisions on Procedure for Investigation and Recording of Events in Operation of Nuclear Fuel Cycle Facilities” (PNAE G-14-037-96).

Chairman of Gosatomnadzor of Russia **A.B.Malyshev**

FEDERAL NUCLEAR AND RADIATION SAFETY AUTHORITY OF RUSSIA (GOSATOMNADZOR OF RUSSIA)

FEDERAL STANDARDS AND RULES IN THE FIELD OF USE OF ATOMIC ENERGY

APPROVED BY
Order of
Gosatomnadzor of Russia
No 7 of 29 December 2003

PROVISIONS ON

PROCEDURE FOR INVESTIGATION AND RECORDING OF EVENTS IN OPERATION OF NUCLEAR FUEL CYCLE FACILITIES

Put into effect
from 30 April 2004

Moscow 2003

UDK 621.039

PROVISONS ON PROCEDURE FOR INVESTIGATION AND RECORDING OF EVENTS IN OPERATION OF NUCLEAR FUEL CYCLE FACILITIES. NP-047- 03

Gosatomnadzor of Russia
Moscow, 2003

These federal standards and rules "Provisions on procedure for investigation and recording of events in operation of nuclear fuel cycle facilities" establish categories of events, contents and communication procedure for the NFCF event reports, and also requirements to reporting on the event investigation. The regulatory document applies to the procedure for investigation and recording of the events occurred at nuclear fuel cycle facilities being under commissioning, in operation and under decommissioning.

The regulatory document is developed on the basis of the Russian Federation Laws, federal standards and rules approved by Gosatomnadzor of Russia, sanitary rules of radiation safety, radiation safety standards and:

INES: International Nuclear Event Scale. Users' Manual. Revised and expanded. IAEA, Vienna, 1992.

International Atomic Energy Agency. Safety of Nuclear Power, 75-ISAG-5, IAEA, Vienna, 1992.

The regulatory document has been reviewed by the RF Ministry of Justice (letter of Minjust of Russia No 07/488-YuD of 20.01.2004)

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* The regulatory document is developed in SEC NRS with participation of V.Badian (Gossanepidemnadzor subordinate to the Ministry of Public Health of Russia), Yu.Karelin, V.Kiselev (FD "Medbioextrem" subordinate to the Ministry of Public Health of Russia), A.Kozlov (FUE "Angarsk Electrolysis and Chemical Combine", A.Lavrinovitch, N.Neugodova (Gosatomnadzor of Russia), P.Porodnov (JSC "TVEL"), A.Samarkin (DNFC, Minatom of Russia), M.Sysoev (DSE, Minatom of Russia), S.Ulanov (Gosatomnadzor of Russia), V.Frolov (RF SSC IPPE), S.Tsvetkov, R.Sharafoutdinov (SEC NRS of GAN RF), M.Shvedov (DSE, Minatom of Russia).

While developing the regulatory document comments produced by the following authorities and organizations are taken into account after their discussion at meetings and agreed decisions made: Minatom of Russia, FSUE "Situation and Crisis Center" of Minatom of Russia, SE VNIINM n.a. A.A. Bochvar, RF SSC IPPE, "Kurchatov Institute", SUE VNIPIET, JSC "TVEL", the State Fire Protection Department subordinate to the Ministry of Emergencies of the Russian Federation, FD "Medbioextrem" subordinate to the Ministry of Public Health of Russia, JSC "Chepetsk Mechanical Plant", JSC "Chemical and Metallurgical Plant", SUE "Angarsk Electrolysis and Chemical Combine", FSUE "GSPI", JSC "Novosibirsk Plant for Chemical Concentrates", SUE "Ural Electro-Chemical Combine", FSUE "Siberian Chemical Combine", SE PA "Electrochemical Plant", FSUE PA "Mayak", JSC "Machine-Building plant", FSUE "Mining and Chemical Combine."

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LIST OF ACRONYMS

CR	-	Commercial Reactor
INES	-	International Nuclear Event Scale
MPC	-	Maximum Permissible Concentration
NFCF	-	Nuclear Fuel Cycle Facility
NM	-	Nuclear Materials
DAC	-	Derived Air Concentration
RS	-	Radioactive Substances
SCR	-	Self-Sustained Chain Reaction

TERMS AND DEFINITIONS

1. **Combined impact** shall mean the simultaneous impact of RS and harmful chemical substances.
2. **Direct cause of the event** shall mean the phenomenon or process conditioned the deviation from the normal development of the process caused by the system (component) failure or personnel error.
3. **Event** shall mean any event at NFCF that resulted in the accident or occurrence as defined by the Table (para 2.1 of these Provisions).
4. **Event Investigation** shall mean the set of measures targeted to detect within the established period of time the root and direct causes of the event, consequences of the NFCF operational event and also to prepare proposals to prevent recurrence of such events in future.
5. **NFCF Operational Event Recording** shall mean the recording and registering the NFCF operational events in accordance with their categories.
6. **Occurrence** shall mean the deviation from normal NFCF operation caused by the system (component) failure or personnel error, which has not resulted in an accident.
7. **Process Regulations (a procedure)** shall mean the document, which addresses nuclear safety rules and techniques, a general procedure for conducting operations related to safety and also safe operational limits and conditions.
8. **Root cause of the event** shall mean the circumstance, which has created the conditions for presence or manifestation of the direct cause of the event.

Other terms and definitions used in the document are defined in the federal standards and rules in the field of use of atomic energy.

1. PURPOSE AND SCOPE

1.1. The “Provisions on Procedures for Investigation and Recording of Events in Operation of Nuclear Fuel Cycle Facilities” (hereinafter referred to as “the Provisions”) define categories of events, content of event information, procedure for communicating such information and conduct of event investigation.

1.2. The Provisions shall apply to NFCF being under commissioning, in operation and under decommissioning.

1.3. The Provisions shall not apply to the procedure for investigation and recording of events in NM, RS and radioactive waste transport outside the NFCF sites.

2. CATEGORIES OF NFCF EVENTS

2.1. Depending on features and consequences the NFCF events are broken down under the categories (see the Table).

Event category Accident (A)	FEATURES AND CONSEQUENCES OF EVENTS
A1	Radioactive release (discharge) into the environment which resulted in exceeding Level B[*)] criteria for prompt decision-making at the initial stage of the accident outside the NFCF controlled area.
A2	Radioactive release (discharge) into the environment which resulted in exceeding Level B criteria for prompt decision-making at the initial stage of the accident within the NFCF surveillance zone while Category A1 event consequences are not manifested.
A3	Radioactive release (discharge) into the environment which resulted in exceeding Level A[*)] criteria for prompt decision-making at the initial stage of the accident or, in case of a combined impact, in exceeding MPC[**)] value of harmful chemical substances 50 times more in the atmosphere of populated areas or in open drinking and potable water reservoirs in case of combined impact outside the NFCF controlled area while Category A1 and A2 event consequences are not manifested.
A4	a) radioactive release (discharge) into the environment which resulted in exposure of some individuals from population where the whole body dose exceeded 5 mGy outside the controlled area while Category A1-A3 event consequences are not manifested; b) single-time exposure of some individuals from personnel when the whole body dose exceeded 200 mGy.
A5	a) exceeding the established CR safe operation limits and (or) occupational exposure during which the whole body dose exceeded 50 mGy and connected with: ● loss of monitoring and control over nuclear chain fissile reaction in the CR core; ● occurrence of criticality during refueling and reloading of irradiated units and materials; ● damage of fuel elements, irradiated units and materials during their reloading, as well as in case of disruption of heat removal; ● other causes which did not result in A1 – A4 accidents; b) SCR which did not result in exceeding the whole body dose of 200 mGy for members of the personnel.
A6	a) unanticipated NM and (or) RS ingress into the permanently or temporary attended premises which resulted in a combined impact to the personnel without protection equipment by harmful chemical substances where concentrations exceed 10 MPC[**] with regard to harmful chemical substances producing acute effects and (or) 20 MPC[**] as regards harmful chemical substances; b) single-time exposure of members of the personnel resulted in exceeding the whole body dose of 50 mGy but not higher than 200 mGy.

Occurrence (O)	
O1	a) Loss or theft of NM; b) Uncontrolled and unauthorized operations of NM processing, movement, transfer and transportation (more than 300g of nuclear-hazardous fissile material).
O2	a) Loss or theft of NM; b) Damage of one or several physical barriers during transport and process operations which did not result in an accident; c) Unanticipated NM and (or) RS ingress into the permanently or temporary attended premises which resulted in removable contamination of surfaces of this premise exceeding 100,000 particles/(min.cm^2) for beta-emitting nuclides and (or) 2,000 particles/(min.cm^2) for alpha-emitting nuclides; d) short-term (not more than 10 minutes) combined contamination, unforeseen by the technical regulations, of the air in the permanently or temporary attended premises by personnel without protection means which resulted in 5-10 MPC** with regard to harmful chemical substances producing acute effects and (or) 5-20 MPC** as regards harmful chemical substances*;
O3	a) Failure of engineered monitoring means for the NFCF nuclear safety parameters during the time period which exceeds the period set forth in the technical regulations; b) Failure of safety systems leading, in accordance with the technical regulations for CR operation, to actuation of the emergency protection system or rendering the reactor subcritical.
O4	Drop of and/or damage to irradiated fuel assemblies or fuel elements which did not result in an accident.
O5	Violation of safe operational limits and conditions which did not result in an accident excluding O1-O4 events.

Not: $^{*)}$ Levels "A" and "B" of criteria for prompt decision-making at the initial stage of an accident correspond to Radiation Safety Standards (NRB-99), SP 2.6.1.758-99.

$^{**)}$ MPC correspond to hygienic standards established by the Ministry of the Russian Federation for Public Health.

2.2. Control and surveillance systems operated at NFCF shall meet the criteria for detecting signs and consequences of Category A1-A6 events.

2.3. Events are rated under INES scale for communicating information to the public.

3. COMMUNICATION PROCEDURE AND CONTENTS OF THE NFCF OPERATIONAL EVENT REPORTS

3.1. The operating organization shall arrange for development and timely transmission of the following reports on NFCF operational events:

a) prompt report on the NFCF operational event;

b) preliminary report on the NFCF operational event;
c) report on the NFCF operational event investigation;
d) supplementary report on the NFCF operational event investigation.

3.2 A prompt report on the NFCF operational event.

3.2.1 The prompt report on the NFCF operational event shall contain:
name of the operating organization;
name of NFCF (a plant, facility, section);
date and time of the event (local/ Moscow time);
NFCF (a plant, facility, section) state before the event;
brief description of the event;
anticipated causes of the event;
NFCF (a plant, facility, section) state at the time of the report transmission;
information on affected individuals at the NFCF site;
information on radiation situation on the NFCF site, within the NFCF controlled area and NFCF surveillance zone;
sufficiency (insufficiency) of the NFCF own forces and means to eliminate the consequences of the NFCF operational event and to take protective measures;
position, full name, signature (for the report transmitted by fax) of an official who transmitted the report.

3.2.2 The prompt report on the NFCF operational event shall be transmitted by a NFCF official assigned with the relevant authorities by the operating organization.

3.2.3 The prompt report on the NFCF operational events with features and consequences pertaining to category A1-A6 events shall be transmitted to:

- Officer-on-duty in the FSUE "Situation and Crisis Centre" of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;
- Officer-on-duty in the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia;
- Officer-on-duty in the Regional Office for Civil Defense and Emergencies of the subject of the Russian Federation where the NFCF is located.

3.2.4 The prompt report on the NFCF operational events having signs and consequences pertaining to the events of categories O1a), O2a), O2c), O2d) shall be transmitted to:

- Officer-on-duty in the FSUE "Situation and Crisis Center" of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;

- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;
- Officer-on-duty in the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia;
- Territorial Centre of Gossanepidemnadzor of the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia.

3.2.5 The prompt report on the NFCF operational events having signs and consequences pertaining to the events of categories O1b), O2b), O3-O5 shall be transmitted to:

- Officer-on-duty in the FSUE "Situation and Crisis Center" of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;
- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety.

3.2.6 The prompt report on the NFCF operational event shall be transmitted via telephone or other means of communication which provide for receipt of information on:

- an event of Category A1-A6 – within one hour after it has been detected;
- an event of Category O1-O5 – within 24 hours after it has been detected.

3.3 The preliminary report on the NFCF operational event.

3.3.1 The preliminary report on the NFCF operational event with features and consequences pertaining to the events of categories A1-A6, O1b), O2b), O2c), O2d), O3-O5 shall contain:

name of the operating organization;
name of NFCF (a plant, facility, site);
date and time of the event (local/ Moscow time);
NFCF (a plant, facility, section) state before the event;
a brief description of the event initiation, its progression, progress in elimination of the event consequences, assumed causes of the event, violation of safe operation limits and conditions;
names of damaged systems (components) and basic information about them, place, nature and cause of the damage ;
information on affected individuals on the NFCF site, within the NFCF controlled area and NFCF surveillance zone;
information on the radiation situation inside NFCF premises, on-site and off-site (as per the data obtained through stationary and mobile

means of the radiation monitoring system or the data of the laboratory monitoring);
measures taken to confine the event;
NFCF (a plant, facility, section) state at the time of the report transmission;
sufficiency (insufficiency) of the NFCF own forces and means to eliminate the consequences of the NFCF operational event and to take protective measures;
a category, the event has been preliminary attributed to;
preliminary rating under the INES scale;
position, full name, signature (for the report transmitted by fax) of an official who transmitted the report.

3.3.2 The preliminary report on the NFCF operational event with features and consequences pertaining to the events of categories O1a), O2a) shall contain:

name of the operating organization;
name of NFCF (a plant, facility, site);
date and time of the event (local/ Moscow time);
description of circumstances led to the event occurred;
quantitative and qualitative NM and (or) RS parameters, radionuclide composition, total activity of NM and (or) RS being a target of an authorized action;
description of measures taken and the program of further actions;
position, full name, signature (for the report transmitted by fax) of an official who transmitted the report.

3.3.3 The preliminary report on the NFCF operational event with features and consequences pertaining to category A1-A6 events shall be transmitted to:

- Officer-on-duty in the FSUE “Situation and Crisis Centre” of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;
- Officer-on-duty in the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia;
- Officer-on-duty in the in the Regional Office for Civil Defense and Emergencies of the subject of the Russian Federation where the NFCF is located.

3.3.4 The preliminary report on the NFCF operational event having signs and consequences pertaining to the events of categories O1a), O2a), O2c), O2d) shall be transmitted to:

- Officer-on-duty in the FSUE “Situation and Crisis Center” of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;

- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;
- Officer-on-duty in the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia;
- Regional Center of Gossanepidemnadzor of the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia.

3.3.5 The preliminary report on the NFCF operational events having signs and consequences pertaining to the events of categories O1b), O2b), O3-O5 shall be transmitted to:

- Officer-on-duty in the FSUE "Situation and Crisis Center" of Minatom of Russia;
- Responsible officer-on-duty in Gosatomnadzor of Russia;
- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety.

3.3.6 The preliminary report on the NFCF operational event signed by the NFCF officials, who are assigned with the relevant authority by the operating organization, shall be transmitted via telephone or other means of communication, which provide for receipt of the information not later than within 24 hours after the prompt report was forwarded.

3.3.7 Upon a request, the operating organization shall arrange for submission of the preliminary report on the events of categories A1-A6, O1a), O2a) to the organizations identified by paras. 3.3.3 and 3.3.4 of these Provisions until the consequences caused by these events are completely eliminated.

3.4 NFCF operational event investigation report.

3.4.1 The NFCF operational event investigation report shall be developed by the NFCF operational event investigation commission. Requirements to the format and content of the NFCF operational event investigation report are presented in Appendixes 1 and 2.

3.4.2 The operating organization shall arrange for transmission of hard copies of NFCF Operational Event Investigation Report by mail to the following organizations within 5 days after the event investigation has been completed:

- the FSUE "Situation and Crisis Center" of Minatom of Russia;
- Gosatomnadzor of Russia;
- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;

- in the Regional Office for Civil Defense and Emergencies of the subject of the Russian Federation where the NFCF is located – for the events of categories A1-A4;
- the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia – for the events of categories A1-A6, O2c), O2d);
- the Territorial Centre of Gossanepidemnadzor of the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia - for the events of categories A1-A6, O2c), O2d);
- Divisions of the Ministry of Interior of Russia and the Federal Security Service of Russia responsible for the NFCF – about the events of categories O1a), O2a);
- Offices of Special Detachments of the State Fire Protection Service subordinate to the Ministry of the Russian Federation for Emergencies which are responsible for NFCF fire safety – about the events accompanied or conditioned by fire.

Attachments to the report shall be transmitted to FSUE "Situation and Crisis Center" of Minatom of Russia and Gosatomnadzor of Russia.

3.5 The supplementary NFCF operational event investigation report.

3.5.1 The operating organization shall develop the supplementary report, when the investigation report is incomplete or additional information about circumstances, causes and corrective measures becomes available; and also if Gosatomnadzor of Russia requires to carry out additional investigation of the event or to re-define a category of the event.
If additional NFCF operational event investigation is needed, a commission shall be established according to the procedure set forth by the para 4.17 of these Provisions.

3.5.2 Requirements to the supplementary report and its distribution are similar to those that apply to the NFCF operational event investigation report specified in para 3.4 of these Provisions.

3.6 Investigation of failures or damages of systems (components) important for safety, personnel failures which did not lead to consequences indicated in the Table (para 2.1 of these Provisions).

3.6.1 The investigation shall be carried out according to the procedure established by the operating organization.

3.6.2 The report shall be submitted to the inspection division of the Interregional Office of Gosatomnadzor of Russia.

3.6.3 The information shall be forwarded to Gosatomnadzor of Russia, if requested.

3.7. The information constituting a state secret and the confidential information shall be transmitted according to the established procedure.

4. INVESTIGATION PROCEDURE FOR NFCF OPERATIONAL EVENTS

4.1. The investigation of NFCF operational events shall be conducted with a purpose:

- to identify event causes;
- to identify an event category basing on consequences specified in the Table (para 2.1 of these Provisions);
- to develop proposals targeted to prevent reoccurrence of such the event.

4.2. A commission shall be established to investigate an NFCF operational event. The commission's activity shall be commenced not later than within 3 days after the event has been detected. An organization which established the commission shall inform Gosatomnadzor of Russia about the establishment of the commission, venue and time when the commission has begun working.

4.3 While investigating the NFCF operational event the commission shall be guided by current legal acts and regulatory documents, standards and rules, operational documents related to NFCF safety ensurance.

4.4. The commission to investigate NFCF operational events of Categories A1-A4 shall be established by Minatom of Russia. It shall include representatives of Minatom of Russia, the operating organization, Gosatomnadzor of Russia, the Ministry of Public Health of Russia, the Ministry of Emergencies of Russia, other ministries and agencies and also organizations carrying out work for and rendering services to the operating organization. If necessary, representatives of the other ministries and agencies are involved.

Should the President of the Russian Federation or the Government of the Russian Federation make his/its own decision, the commission shall be established according to this decision.

4.5. The commission to investigate NFCF operational events of Categories A5, A6, O1a), O2a) shall be established by Minatom of Russia. It shall include representatives of Minatom of Russia, the operating organization, Gosatomnadzor of Russia, the Ministry of Public Health of Russia, the Ministry of Emergencies of Russia, other ministries and agencies; and also organizations carrying out work and rendering services for the operating organization. An official of the operating organization who is responsible for NFCF safety can not be designated as Chairman of the Commission.

4.6. The commission to investigate NFCF operational events of Categories O1b), O2b) – O5 shall be established by the operating organization. Investigation of the mentioned events shall be conducted in accordance with a procedure set forth by the operating organization. An official of the operating organization who is responsible for NFCF safety shall not be designated as Chairman of the Commission.

Should more severe consequences be revealed in the course of investigation of the NFCF operational than those that revealed as a result of the events of Categories O1b), O2b) – O5, a decision regarding continuation of the commission's activity or establishment of a new one shall be made as per paras 4.4 and 4.5 of these Provisions.

The previously established commission shall continue its activity, until the newly established commission starts its work, and shall provide the latter one with all the investigation findings obtained.

4.7. The NFCF operational event investigation shall not exceed 15 days after the event has been revealed. The decision to prolong the investigation shall be made by the organization, which established the commission.

4.8. The NFCF operational event investigation commission shall have the right to receive explanations from the NFCF personnel, representatives of other organizations, which carried out work at NFCF at the time the event was revealed, and to require necessary tests, examinations, and reviews.

The commission's chairman shall define a procedure and schedule for the commission's activity.

4.9. The operating organization shall arrange for all conditions required to perform activities of the commission for investigation of the NFCF operational event, including:

- submission of all the necessary information to the commission;
- providing access to equipment and documentation relevant to the event investigation;
- submission of design, operational, manufacturing plant, regulatory and other documents needed for the commission's activity;
- performance of required technical calculations, laboratory studies, tests, and inspections, photographing the facilities and systems (components);
- involvement of experts in the work carried out by the commission, if necessary;
- providing rooms, means of communications, means of transportation;
- printing and copying investigation-related documents and papers.

4.10. Prior to establishing the investigation commission to work on NFCF operational events pertaining to categories A1-A6, the operating organisation shall undertake measures to retain the same conditions at the scene of the event as they were at the time of the event, and terminate all operations at systems (components) where the event occurred, if this does not pose hazard for human life and does not result in further development of the event; and also exclude the personnel access to the scene of the event. Should it be impossible to retain the scene conditions they shall be recorded (by drawing sketches, taking pictures, etc.).

The operating organization shall make the decision on the necessity to preserve the on-scene conditions until the Commission for investigation of the events of categories O1-O5 is established.

4.11 Unauthorized access to instrumentation and controls, making changes to settings of preventive and emergency protection systems are prohibited commencing the point of time the event was revealed and until the point of time when the event investigation commission starts its work.

4.12 Prior to the beginning of the Commission's activities, the operating organisation shall implement the following measures:

- identify the nature and scale of the event;

- provide the commission with data related to radiation situation at NFCF, NFCF site, in the NFCF controlled area and anticipated occupational and population exposure doses caused by the NFCF operational event;
- as necessary, arrange for presence of representatives of organizations carrying out work and rendering services to the operating organisation;
- take measures for keeping diagrams of recording devices, oscillograms, printouts, tape records of on-line communications, and operations logs;
- collect, if necessary, immediately after the shift turn-over the explanatory notes by the personnel who participated in the event elimination, witnesses of event, and NFCF officials;
- provide the commission with information on measures undertaken to localize and eliminate the event consequences;
- prepare and provide the commission with required design documentation; records of tests, inspections, and examinations; diagrams and operating manuals; and repair related documentation and information on similar events occurred earlier at this NFCF.

4.13. The operating organization shall submit proposals targeted to eliminate the event consequences and to work out proposals aimed at preventing the reoccurrence of such events in NFCF operation to the NFCF operational event investigation commission.

4.14. The NFCF operational event investigation results shall be compiled in a report.

The final revision of the NFCF operational event investigation report shall be discussed and approved by all members of the Commission. In the event of disagreements, the final decision on the investigation results shall be made by the Chairman of the Commission. Members of the Commission, who do not agree with the decision made, shall state in writing their individual opinions, which shall be included in the Appendix to the NFCF operational event investigation report.

The original copy of the NFCF operational event investigation report, signed by all Commission members, with all necessary attachments, shall be archived in the operational organization.

4.15. The operating organization shall arrange for transmission of the hard copies of NFCF operational event investigation report by mail within 5 days, after the commission has completed its work, to the following organizations:

- Gosatomnadzor of Russia;
- the FSUE “Situation and Crisis Center” of Minatom of Russia;
- Interregional Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;
- in the Regional Office for Civil Defense and Emergencies of the subject of the Russian Federation where the NFCF is located – for the events of categories A1-A4;
- the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russian Federation – for the events of categories A1-A6, O1a), O2a), O2c), O2d);
- the Regional Center of Gossanepidemnadzor of the Federal Directorate for Medical, Biological and Extreme Problems subordinate to the Ministry of Public Health of Russia - for the events of categories A1-A6, O1a), O2a), O2c), O2d);

- Divisions of the Ministry of Interior of Russia and the Federal Security Service of Russia responsible for the NFCF – about the events of categories A1-A6, O1a), O2a);
- Administration Offices of Special Detachments of the State Fire Service subordinate to the Ministry of the Russian Federation for Emergencies which are responsible for NFCF fire safety – about the events accompanied or conditioned by fire.

Attachments to the report are forwarded to Gosatomnadzor of Russia and the FSUE "Situation and Crisis Center" of Minatom of Russia.

4.16 The decision related to changing the category of the event previously assigned, clarifying causes of the event and corrective measures taking into account individual opinions of the Commission members and other circumstances, indicating the inconsistency of the decision made, shall be made by Gosatomnadzor of Russia.

Gosatomnadzor of Russia shall have the right to require changing the category of the event assigned in the NFCF operational event investigation report within one month upon the receipt of the report.

The operating organization shall notify all organizations submitted with the report on the changes done to the event category.

4.17 Should additional important information about circumstances and causes of the NFCF operational event becomes available, the event investigation commission established as per paras. 4.4-4.6 of these Provisions shall develop a supplementary NFCF operational event investigation report.

5. RECORDING OF THE NFCF OPERATIONAL EVENTS

5.1 The operating organization shall arrange for collection and processing of data on the NFCF operational events identified in the Table (para 2.1 of these Provisions) and data recording.

5.2 The operating organization shall arrange for recording of the NFCF operational events. The format for recording shall be defined by the operating organization.

5.3 Investigation and recording of events of all the categories shall be commenced from the date of NM and RS receipt by NFCF.

6. CORRECTIVE MEASURES

6.1. For each NFCF operational event subject to recording in accordance with these Provisions, the operating organization shall develop a plan of measures targeted to eliminate the event causes and to prevent recurrence of the event taking into account recommendations produced by the commission. The plan shall contain names of executive officers and dates for the measures' implementation.

The operating organization shall submit the plan to organizations listed in para. 3.4.2 of these Provisions, regarding the event category.

6.2. Upon the receipt of the information related to the events in NFCF operation defined in the Table (para 2.1 of these Provisions) from other operating organizations, the

operating organization shall conduct a study of possible occurrence of similar events at its NFCF. If necessary, measures targeted to prevent similar events at its NFCF shall be taken.

Appendix 1

Standard format for the title page and structure of the NFCF operational event investigation report

Title page of the report

NFCF operational event investigation report	
Report №:	Date of the report issue: _____ (date,month, year)
Date of event: _____ (date, month, year)	Time of event: «_____» «_____» (hour, min)
Name of the event:	
The event category:	
The event level under INES scale:	
The operating organization:	
NFCF (plant, facility, area) name	
Report Distribution:	
Organizations:	
NFCF (plant, facility, area)	
NFCF official for further communications	Name Address: Telephone: Fax: E-mail: Teletype:

Next pages of the report

1. Composition of the NFCF operational event investigation commission

Organization which established the commission. An Order on the commission's establishment.

The Commission Chairman:

Name, position, name of the organization.

Commission members:

Name, positions, names of organizations.

2. Event description

2.1 NFCF conditions before the event

2.2 Description of failures' sequence and personnel errors in the course of the event

2.3 Actions undertaken to identify causes of the failures and personnel errors

2.4 Similar events occurred previously.

3. Event consequences

3.1 Violation of the safe operation limits and conditions
3.2 Release of NM and (or) RS outside the established boundaries
3.3 Personnel exposure, population exposure; dead and (or) injured persons.
3.4 Contamination of systems (elements), the NFCF premises and site, and off-site area with radioactive substances
3.5 Loss or theft of NM
3.6 Equipment damage.
3.7 Time of NFCF (a plant, facility, section) outage

4. Event causes

4.1. List of failures of systems (components) and personnel errors in the course of the event
4.2. Immediate causes of failures of systems (components) and operator errors
4.3. Root causes of failures of systems (components) and personnel errors

5. Measures targeted to localize and to eliminate the event consequences

6. Evaluation of the event in terms of safety

7. Deficiencies revealed during the investigation

7.1 In NFCF personnel actions
7.2. In functioning of normal operation systems (components)
7.3. In functioning of safety systems (components)
7.4. In maintenance and repair
7.5. In operating documentation
7.6. In operations organization.
7.7. In functioning of experimental facilities and devices

8. Proposals related to corrective measures with regard to:

8.1 System (component) repair
8.2 System (component) replacement
8.3 System (component) operation
8.4 System (component) engineering
8.5 System (component) design
8.6 System (component) manufacture
8.7 System (component) construction
8.8 System (component) assembling
8.9 System (component) alignment
8.10 Changes to regulatory and operating documentation
8.11 NF F personnel
8.12 Procedures to detect and to eliminate defects in and damages to systems (components)

8.13 Experimental facilities and devices
8.14 Procedures to eliminate deficiencies found in personnel training

9. List of documents, the commission was guided by during NFCF operational event investigation

10. Attachments to the NFCF operational event investigation report

11. Signatures of the commission Chairman and memebers

Commission Chairman:
(position, name of an organisation) _____ (signature) _____ (name)

Commission members:
(positions, name of an organisation) _____ (signatures) _____ (names)

Appendix 2

Requirements for contents of NFCF operational event investigation report

The report shall contain information on all the report items specified in Appendix 2 or explanations why they are absent shall be given.

The title page of the report

The registered number of the report (report No) on the NFCF operational event investigation.

The title page shall contain a registered number of the report which is assigned according to the procedure established by the operating organization for the record-keeping purposes.

The date of the report release – the report signing date shall be indicated.

The date of the event – the date when the event has been revealed shall be indicated as follows: date, month, year (for example, 25.01.2002, i.e. 25 January 2002).

Time of the event – time when the event has been revealed shall be indicated in the following way: hour, min. (for example, 07:43, i.e. 7 h. 43 min).

Note. Local/Moscow time when the event has been revealed shall be indicated.

Name of the event – shall include indication of the event consequence (in accordance with the right column of the Table (para2.1 of these Provisions), for example, "Radioactive release (discharge) into the environment,…", " SCR initiation…", under which it has been categorized, and also indication of the direct cause resulted in this event.

The event category – shall be indicated in accordance with the left column of the Table) para 2.1 of these Provisions). If the event features the attributes of several event categories, the highest category of the given event is indicated.

Level under INES scale – the event level under INES scale shall be indicated.

Note. "INES. The International Nuclear Event Scale. User's Manual. Revised and Extended Edition. 1992, IAEA. 1993" is recommended to be used to evaluate the event level.

The operating organization – the name of the operating organization shall be indicated.

The NFCF name – the specific name of NFCF (plant, facility, part) shall be given.

Distribution of the report – abbreviations of organizations, the report is forwarded to, shall be indicated (for example, Gosatomnadzor of Russia) including NFCF structural units (divisions, service units).

The NFCF official for further communications – name of the NFF official designated as a person for further communications by the operating organization; and also his/her address, fax and telephone numbers, e-mail and cable are indicated.

1. Composition of the commission for NFCF operational event investigation

Name of the organization which established the commission, date and number of an Order on the commission's establishment shall be indicated.

Names of the organizations, which are represented by the commission Chairman and members, their names and positions shall be indicated.

2. Event description

2.1. NFCF (a plant, facility, section) state before the event.

The following information shall be presented: NFCF operating conditions, conditions of the main and auxiliary systems (components) (to indicate what systems (components) are in operation, stand-by, repair, their operating parameters), current inspections, tests, examinations, maintenance, existing damages or defects of systems (components), non-compliance with the requirements of the NFCF process regulations and operating manuals for NFCF systems (components) and justifications for such non-compliance.

While describing the events all abbreviations used for the systems (components) shall be interpreted when used for the first time.

All legends for values shall meet the established standards.

2.2. Description of sequence of systems' (components') failures and personnel errors in the course of the event

The description of sequence of systems' (components') failures and personnel errors in the course of the event shall be provided (specifying the date) to include:

- change in parameters and modes;
- actuation of protection features and interlocks;
- information on safety system performance (automatic or manual actuation); on performance of other safety related systems (components)
- information on system (component) failures; consequences of these failures
- information on personnel actions taken in the course of the event (both correct and erroneous);

Graphs and diagrams to show the dynamics of changes in the main and other parameters important for analysis of the given event, shall be attached to the description of the event. Failures, personnel errors, and the response time (failure to actuate) of protection features and interlocks shall be marked on these graphs and diagrams.

The entire event sequence, up to the stage where appropriate NFCF systems (components) are shutdown shall be described.

2.3. Actions undertaken to identify failures of systems (components) and personnel errors.

Results of the analysis of the system (component) performance and NFCF personnel actions undertaken to identify causes of failures and personnel errors shall be indicated.

2.4. Similar events occurred previously

Information on similar events occurred at NFCF shall be presented indicating the date of the event.

Previously occurred (during the facility operation) events at the given NFCF due to similar failures of similar systems (components) and similar personnel errors, with indication of the date of the event shall be provided. Information of the NFCF operational event investigation report shall be presented.

A list of compensatory measures undertaken and summary analysis of possible causes of the reoccurrence of the events shall be specified.

3. Event consequences

The data on the event consequences with regard to the NFCF safety and safe operation, including radiation consequences (if any) for the NFCE personnel, population, environment shall be given.

3.1 Violation of safe operation limits and (or) conditions

The substance of the event shall be described; and reference to the corresponding paragraph of the NFCF process regulations or NFCF operational manual shall be given.

3.2 NM and (or) RS release beyond the established boundaries

Data on total activity and radionuclide composition of the release (discharge), other needed parameters of the release (discharge) shall be presented.

3.3 Personnel exposure, population exposure; dead and (or) injured persons

Data on individual effective dose and dose equivalent received by the personnel, population (expressed in mSv) shall be indicated. For the events of Categories A1-A6 the information about the following shall be presented: paramedical aid and medical treatment to injured persons, planned preventive measures targeted to improve level of health of persons exposed to radiation, chemical or other harmful injury.

3.4 Contamination of systems (components), the NFCF premises and site, and off-site area with radioactive substances

Data on contamination of NFCF equipment, premises and site, and off-site (contaminated area and gamma-radiation dose rates from some components) shall be presented.

3.5 Theft or loss of NM and (or) RS

Description of circumstances, events and (or) series of events, unauthorized action related to, quantitative and qualitative characteristics of MN and (or) RS, radionuclide composition of NM and (or) RS, total activity of NM and (or) RS shall be given.

3.6 Damage to systems (components)

List and names of damaged systems (components) shall be presented; nature of the damage shall be indicated.

3.7 NFCF outage time

Time during which NFCF was not in operation due to the event investigation shall be indicated.

4. Event causes

Analytical results of all direct causes and associated root causes for each system (component) failure and personnel error that occurred in NFCF operation shall be presented.

4.1 List of failures of systems (components) and personnel errors in the course of the event

There shall be a list of all system (component) failures and personnel errors occurred in the course of the event including the initiating event. This list shall be chronologically structured as in Table below:

N	Time of failure of system (component), personnel error	Event (action): System (component) failure, personnel error	Cause: deviation from the process regulations, requirements of manuals; procedure deficiency
1	2	3	4

4.2. Direct causes of failures of systems (components) and personnel errors.

A direct cause is the phenomenon, process, or a state which conditions a violation of normal process sequence (for example, ingress of a solution with high concentration of U-235, operating personnel error in manipulating the protection features, change in process parameters, etc.).

The direct cause of each failure shall be indicated.

3.2.1. Direct causes of personnel failures

Direct causes of each failure of systems (components) and personnel error shall be indicated in such a sequence that corresponds to the list of these failures of systems (components) and personnel errors (following their sequential numbers.)

The following can serve as examples of the direct cause:

- mechanical damage (corrosion, deterioration, rupture, fracture, damage of engineering structures)
- loss of operability of electro-mechanical part of the system (component) (short circuit, poor contact, damage to earthing, undervoltage, damage of insulation and the like)
- loss of operability of I&C system (faulty signal, loss of signal, faulty indications of a device, parameter oscillation and the like)
- external natural impact (shower, flooding, earthquake, low temperatures and the like)
- external man-induced impact (transport accidents, fires, explosions on the territories adherent to NFCF and the like)
- human factor (faulty actions of NFCF personnel during operation, repair, test and the like).

4.3 Root causes of failures of systems (components) and personnel errors

Root causes of each failure of the system (component) and personnel error shall be indicated in such a sequence that corresponds to the list of these failures and personnel errors (following their sequential numbers.)

For each root cause deficiencies of such procedures shall be specified that did not result in detecting and (or) eliminating a hidden deficiency of the system (component) operability and personnel training.

While indicating root causes, the positions of NFCF personnel and names of NFCF service units, whose poor work resulted in the system (component) failure and personnel error shall be indicated.

The following can serve as examples of the root cause:

- deficiency in design, engineering, manufacturing, construction, assembling, alignment, repair of the systems (components)
- deficiency in operating documentation
- deficiency in operation (control, organisation or planning of work)
- non-implementation of necessary measures targeted to provide the systems with working media, spare parts, units, aggregates, and also measures to change flow diagrams and design documentation;
- poor level of control, loss of control over the personnel actions during acceptance test of the equipment, inspection of equipment to be put in operation after assembling or repair.

5. Measures targeted to confine and eliminate the event consequences

This Section shall include description of the organizational and technical measures undertaken to localize and eliminate the event consequences.

Evaluation of the measures undertaken shall be presented.

Implementation of activities on personnel and population protection in case of the event with radiation consequences shall be included.

6. Event assessment in terms of safety

This Section shall include an analysis of the event in terms of its possible radiation impacts to personnel, population and the environment; and also assessment of factors related to NFCF safety.

Consequences for safe operation of NFCF, which took place or could have taken place in case of another potential event sequence, shall be described.

Failures and personnel errors important for safety shall be selected from the list of all failures of the systems (components) and personnel errors in the course of the event which are specified in the Table of the Section 4.1. An assessment of importance and consequences of each selected failure of the system (component) and personnel error shall be presented in from the point of safety in order to determine whether this particular failure or error could have resulted in more severe consequences under the actual or other potential conditions.

7. Deficiencies revealed in the course of the event investigation

This Section should present the deficiencies which are not directly connected with this event and are not attributed to its causes, if they were revealed in the course of the investigation of events related to:

- NFCF personnel actions;
- functioning of normal operation systems (components);
- functioning of safety systems (components);
- maintenance and repair;
- operating documentation;
- operations organization;
- functioning of experimental facilities and radiation sources.

8. Corrective measures

8.1 For each direct and root cause of the system (component) failure, personnel error; and also for each deficiency revealed in the course of the event investigation, the NFCF operational event investigation commission shall propose corrective measures targeted to recover NFCF operability, to eliminate non-compliance with the requirements of federal standards and rules in the field of nuclear energy use and to prevent their reoccurrence.

The commission shall formulate the proposals on the corrective measures.

The corrective measures relate to:

8.1 System (component) repair
8.2 System (component) replacement
8.3 System (component) operation
8.4 System (component) engineering
8.5 System (component) design
8.6 System (component) manufacture
8.7 System (component) construction
8.8 System (component) assembling
8.9 System (component) alignment
8.10 Changes to regulatory and operating documentation
8.11 NF F personnel
8.12 Procedures to detect and eliminate defects in and damages to systems (components)
8.13 Experimental facilities and devices
8.14 Procedures to eliminate deficiencies detected in personnel training.

Measures targeted to recover the NFCF operability, to prevent the reoccurrence of the similar events and to implement the requirements of the regulatory documents shall be attributed to the corrective measures.

The performer (executive officer) and due date shall be indicated for each measure.

9. List of documents the commission was guided by in the course of the NFCF operational event investigation.

The list of existing legal acts, regulatory documents, federal standards and rules in the field of nuclear energy use, other standards, rules, operating documents related to safe operation of NFCF, the commission was guided by in the course of the NFCF operational event investigation, shall be presented.

10. Appendixes to the NFCF operational event investigation report

10.1 The recommended list of Appendices to the NFCF Operational Event Investigation Report comprises:

a) Diagrams of changes in the main parameters of systems (components), printouts of recorded changes in main system (component) conditions in the course of the event,
b) Data on survey of radiation situation, data on personnel exposure, medical report on the injured person (persons) resulted from the event with radiation consequences;
c) Personnel explanatory notes,
d) Required process flow diagrams and electric circuitry, or their fragments; drawings, sketches, photographs of damaged components and their locations,
e) Records and reports on post-accident inspections, results of metallographic and other investigations, and reports on uncovering (disassembling) of damaged components at NFCF,
f) Forecasts (notes) of weather stations and extracts from the forecast or calculation assessment (in the case of external natural events),
g) Other materials that confirm conclusions of the Commission concerning the causes of the event;
h) Individual opinions (if necessary) of the experts involved in the event investigation.

10.2 The following information shall be provided for each item of failed, damaged, or faulty system (components):

- Brief description of the failure of the system (component), damage, or defect,
- Type (brand),
- Serial number,
- Facility code,
- Manufacturing Organization,
- Dates of manufacturing and commissioning,
- Date and type of the latest (prior to the event) repair,
- Results of the latest (prior to the event) examination and test (compliance with the requirements of regulatory and operating documentation),
- Time of the system (component) recovery,
- Service time of the system (component) from the beginning of operations and from the date of its last failure, damage, or defect;
- Whether the similar failures, damages, or defects of this or a similar component have occurred before (to indicate the date when it has been revealed).

10.3 The decision on extension of the investigation period shall be attached to the NFCF operational event investigation report, if this period exceeds the one established by para 4.7 of these Provisions.

A specific list of the appendixes to the NFCF operational event investigation report shall be defined by the commission which conducted the investigation.

10.4 Individual opinions of the commission members (if any).

Individual opinions of the commission members (if any) shall be in writing.

11. Signatures of the commission Chairman and members.

The NFCF operational event investigation report shall be signed the Chairman of the Commission and its members with indication of their names, position and organization.