FEDERAL NUCLEAR AND RADIATION SAFETY AUTHORITY OF RUSSIA

RESOLUTION

No.7 of December 29, 2003

ON APPROVAL AND INTRODUCTION OF FEDERAL STANDARDS AND RULES IN THE FIELD OF ATOMIC ENERGY USE "PROVISIONS ON THE PROCEDURE OF INVESTIGATION AND RECORDING OF EVENTS IN OPERATION OF NUCLEAR FUEL CYCLE FACILITIES"

The Federal Nuclear and Radiation Safety Authority of Russia resolves to:

1. Approve the attached federal standards and rules in the field of atomic energy use "Provisions on the procedure of investigation and recording of events in operation of nuclear fuel cycle facilities" (NP-047-03) and put them into effect since April 30, 2004.

2. Since April 30, 2004 invalidate Resolution of Gosatomnadzor of Russia No.3 of 31.01.1996 approving and introducing the regulatory document "Provisions on the procedure of investigation and recording of events in operation of nuclear fuel cycle facilities", PNAE G-14-037-96.

Chairman of
Gosatomnadzor of Russia
A.Malyshev

Approved by
Resolution of
Gosatomnadzor of Russia
No.7 of December 29, 2004

Put into Effect

since April 30, 2004

FEDERAL STANDARDS AND RULES IN THE FIELD OF ATOMIC ENERGY USE

PROVISIONS ON THE PROCEDURE OF INVESTIGATION AND RECORDING OF EVENTS IN OPERATION OF NUCLEAR FUEL CYCLE FACILITIES

NP-047-03

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, content and procedure of communicating information about the events, procedure of investigation and accounting of events, as well as requirements for events' investigation reporting. The provisions apply 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 regulatory legal acts, federal standards and rules approved by Gosatomnadzor of Russia, sanitary rules for radiation safety assurance, radiation safety standards, etc. as well as the following documents:

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 is developed in SEC NRS of Gosatomnadzor of Russia 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 Gosatomnadzor of Russia), M.Shvedov (DSE, Minatom of Russia).

While developing the regulatory document the comments produced by the following authorities and organizations have been 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."

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

TABLE OF CONTENTS

LIST OF ACRONYMS

CR	Commercial Reactor
INES	International Nuclear Event Scale
MPC	Maximum Permissible Concentration
NFCF	Nuclear Fuel Cycle Facility
NM	Nuclear Materials
PVA	Permissible Volumetric Activity
RS	Radioactive Substances
SCR	Self-sustained Nuclear Fission Chain Reaction

TERMS AND DEFINITIONS

The following terms and definitions are used for the purposes of the present document.

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 that 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 registration of the NFCF operational events in accordance with their categories.

6. **Occurrence** shall mean a category of the event characterized by the deviation from normal NFCF operation caused by the system (component) failure or personnel error as defined by the Table (para 2.1 of these Provisions).

7. **Process Regulations (instruction)** shall mean the document, which addresses safe operation 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 the procedure of investigation and recording of the 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 transportation 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).

CATEGORIES OF NFCF EVENTS SUBJECT TO INVESTIGATION AND REPORTING

Event category designation	FEATURES AND CONSEQUENCES OF EVENTS
Accident (A)	

Event category designation	FEATURES AND CONSEQUENCES OF EVENTS
Accident (A)	
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 radiation control 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 radiation control area 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 ex-

Event category designation	FEATURES AND CONSEQUENCES OF EVENTS
Accident (A)	
	ceeded 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, which 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;

Event category designation Accident (A)	FEATURES AND CONSEQUENCES OF EVENTS
	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 process regulations; b) Failure of safety systems leading, in accordance with the process 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

Event category designation	FEATURES AND CONSEQUENCES OF EVENTS
Accident (A)	
	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.

Note: *) 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 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;

probable 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 control area and NFCF radiation control area;

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 administration office for civil defense affairs 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 Territorial 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 event 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 Territorial 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, probable 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 of the administration office for civil defense affairs 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 Territorial 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 Territorial 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 report shall be developed by the NFCF operational event investigation commission. Requirements to the format and content of the report are presented in Appendixes 1 and 2.

3.4.2 The operating organization shall arrange for submitting of hard copies of NFCF Operational Event Investigation Report 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 Territorial Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;
- Administration Office for civil defense affairs 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);
- Administration 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 protection – 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 important 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.

If additional NFCF operational event investigation is needed, a commission shall be established according to the procedure set forth by the paragraphs 4.4-4.6 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 errors 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 Territorial 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 an 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 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 regulatory legal acts, standards and rules, operational documents related to NFCF safety assurance.

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 as well as 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; as well as organizations carrying out work and rendering services for the operating organization. An official of the operating organization who is responsible for assuring NFCF safety cannot 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 assuring 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 events 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 with all the investigation findings obtained.

4.7. The NFCF operational event investigation shall not exceed 15 days. The decision to prolong the investigation period 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 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 including:

- submission of all the necessary information to the commission;
- providing access to the territory and premises, as well as equipment and documentation relevant to the event investigation;
- submission of design, operational, factory, 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 working rooms, means of communications, means of transportation;
- providing for printing and copying of investigation-related materials.

4.10. Prior to establishing the investigation commission to work on NFCF operational events pertaining to categories A1-A6, the operating organization shall take 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 the location 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 set-points of preventive and emergency protections are prohibited since 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 NFCF operational event investigation 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 as well as to 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 for the operating organization;
- take measures for keeping diagrams of recording devices, oscillograms, tape records of on-line communications, operations logs and computer printouts;
- collect, if necessary, immediately after the shift turn-over the explanatory notes by the shift personnel who participated in the event elimination, witnesses of event, and NFCF administration;
- provide the commission with information on measures taken to confine and eliminate the event consequences;
- prepare and provide the commission with required design documentation; records of tests, inspections, and examinations; operating manuals; repair-related documentation, as well as information on similar events occurred earlier at this NFCF.

4.13. The operating organization shall submit proposals to the commission targeted to eliminate the event causes and to work out proposals to prevent recurrence of such events in NFCF operation.

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

The final revision of the 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 special opinions, which shall be included in the Appendix to the report.

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

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

- Gosatomnadzor of Russia;
- FSUE "Situation and Crisis Center" of Minatom of Russia;
- Interregional Territorial Office of Gosatomnadzor of Russia which is responsible for direct supervision over NFCF nuclear and radiation safety;
- Administration office for Civil Defense Affairs 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);
- Administration Offices of Special Detachments of the State Fire Prevention Service subordinate to the Ministry of the Russian Federation for Emergencies which are responsible for NFCF fire protection – for the events accompanied or conditioned by fire.

Attachments to the report are forwarded to Gosatomnadzor of Russia and 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 provided 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 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 logging and 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 specific names of executors and dates for the measures' implementation.

The operating organization shall submit the plan to organizations listed in para. 3.4.2 of these Provisions according to 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 NFCFs. If necessary, measures targeted to prevent similar events at its NFCFs shall be taken.

Appendix 1

(Sample)

TITLE PAGE AND STRUCTURE OF THE NFCF OPERATIONAL EVENT INVESTIGATION REPORT

Title page of the report

<table>
<tr><td colspan="2">NFCF operational event investigation report</td></tr>
<tr><td>Report №:</td><td>Date of the report issue: _____
(day, month, year)</td></tr>
<tr><td>Date of event: _____
(day, month, year)</td><td>Time of event: «_____» «_____»
(hour, min)</td></tr>
<tr><td colspan="2">Name of the event:</td></tr>
<tr><td colspan="2">The event category:</td></tr>
<tr><td colspan="2">The event level under INES scale:</td></tr>
<tr><td colspan="2">The operating organization:</td></tr>
<tr><td colspan="2">NFCF (plant, facility, area) name</td></tr>
<tr><td colspan="2">Report Distribution:</td></tr>
<tr><td colspan="2">Organizations:</td></tr>
<tr><td colspan="2">NFCF (plant, facility, area)</td></tr>
<tr><td>NFCF official for further communications</td><td>Name:
Address:
Telephone:
Fax:
E-mail:
Teletype:</td></tr>
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Next pages of the report

1. Composition of the NFCF operational event investigation commission

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

The Commission Chairman:

Full name, position, name of the organization.

Commission members:

Full names, positions, names of organizations.

2. Event description

2.1 NFCF (plant, facility, area) conditions before the event.

2.2 Description of the system (component) failures' sequence, and personnel errors in the course of the event

2.3 Actions undertaken to identify causes of the system (component) 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 (components), the NFCF premises and site, and off-site area with radioactive substances

3.5 Loss or theft of NM and (or) RS.

3.6 Damage of systems (components).

3.7 Time of NFCF (a plant, facility, area) 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 personnel errors.

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

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

6. Evaluation of the event in terms of safety

7. Deficiencies revealed during the event 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 arrangement.

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 NFCF 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 members

Commission Chairman: (position, name of organization)	_____ (signature)	_____ (name)
Commission members: (positions, names of organizations)	_____ (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 this Appendix or explanations why they are absent shall be given.

The title page of the report

The title page shall contain a registered number of the report (report No) 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: day, 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 (para 2.1 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.

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 indicated.

Distribution of the report – abbreviated names 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; as well as his/her address, fax and telephone numbers, e-mail and teletype are indicated.

1. Composition of the commission for NFCF operational event investigation

The 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 (plant, facility, section) state before the event.

The following information shall be presented: NFCF (plant, facility, section) operating conditions, conditions of the main and auxiliary systems (components) (in operation, stand-by, repair; operating parameters), current inspections, examinations and maintenance of systems (components), tests, repairs, existing damages or defects of systems (components), deviations from the requirements of the NFCF process regulations and operating manuals for NFCF systems (components) and justifications for such deviations.

While describing the events all abbreviated names of 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) and include the information on:

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

Graphs and diagrams to show the dynamics of changes in the parameters important for analysis of the given event, shall be attached to the description of the event. The starting points for such events as failures of systems (components), personnel errors, and ac-

tuation (failure to actuate) of protections and interlocks shall be marked on these graphs and diagrams.

The event sequence, up to shutdown of the appropriate systems (components) shall be described.

2.3. Actions undertaken to identify causes of 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 the systems' (components') failures and personnel errors shall be indicated.

2.4. Similar events occurred previously

Previously occurred events at the given NFCF due to 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 event recurrence 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, and 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 and equivalent doses received by the personnel and population (expressed in mSv) shall be indicated. For the events of Categories A1-A6 the information about the following measures shall be presented: paramedical aid and medical treatment to injured persons, planned preventive measures targeted to improve the 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 the off-site area with radioactive substances

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

3.5 Theft or loss of NM and (or) RS

Description of circumstances, events and (or) series of events, with reference to which unauthorized action has been taken, quantitative and qualitative characteristics of NM 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 (plant, facility, section) outage time.

Time during which NFCF (plant, facility, section) 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 in a table form (the table format is presented below).

Pos. No.	Time of failure of system (component), personnel	Event (action): System (component) failure, personnel error	Cause: deviation from the process regulations, requirements of manuals; procedure deficiency

	error		
1	2	3	4

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

Direct causes of each failure of systems (components) and personnel errors 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);
- malfunction of electro-mechanical part of the system (component) (short circuit, poor contact, damage to earthing, undervoltage, damage of insulation and the like);
- fault of the 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 personnel during operation, repair, testing 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 (management, arrangement or planning of work);
- non-implementation of necessary measures targeted to provide the systems with working media, spare parts, units, aggregates, as well as measures to change flow diagrams and design documentation;
- poor level of control, loss of control over the personnel actions during receiving inspection of equipment, acceptance 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 confine 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 on personnel, population and the environment; as well as assessment of the factors affecting the 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 (the table format is given in Section 4.1 of the present Appendix). 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.

The event level according to the INES scale shall be justified in detail.

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 arrangement;
- functioning of experimental facilities and radiation sources.

8. Corrective measures

For each direct and root cause of the system (component) failure, personnel error, as well as 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 atomic energy use and to prevent their recurrence.

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, prevent the recurrence of the similar events and implement the requirements of the regulatory documents shall be attributed to the corrective measures.

The performer (executor) 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 regulatory legal acts, federal standards and rules in the field of atomic energy use, other regulations, rules, standards, operating documents related to assurance of the NFCF safe operation, 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 state of health of 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 opening (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,
- Assigned designation for the specific NFCF (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 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 by the Chairman of the Commission and its members with indication of their names, position and organization.