SEC NRS Activities in Support to Rostechnadzor's Information and Analytical Centre

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International Conference on Challenges Faced by Technical and Scientific Support Organizations (TSOs) in Enhancing Nuclear Safety and Security: Ensuring Effective and Sustainable Expertise

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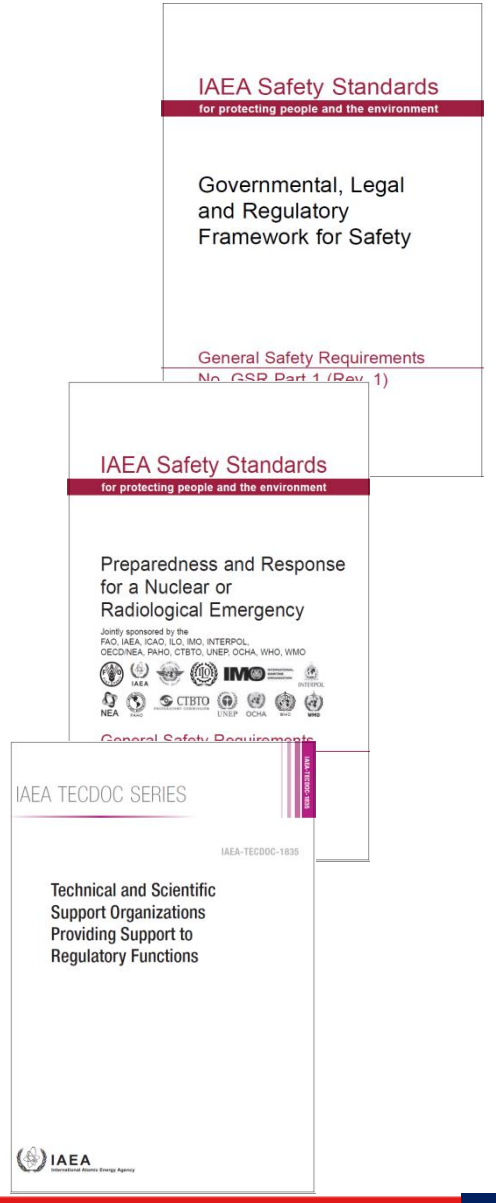
TSO Involvement in EPR Activities in Accordance with IAEA Documents

- ✓ Provision for EPR is such important within regulatory framework as traditional provisions for promulgating of regulations, granting authorizations, facilities' review, assessment & inspections
- ✓ TSOs play important role in these provisions
- ✓ Regulatory body and TSO evaluate parties' emergency preparedness
- ✓ Typically this done by means of training, exercises, drills and inspections



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Rostechnadzor Mandate under Unified State System for Prevention of and Response on Emergencies

Government Decree 30.12.2003 № 794 «On unified state system for prevention of and response on emergencies»

- ✓ Control of radiologically hazardous facilities
- ✓ Control of chemical and fire hazardous facilities

Government Decree 30.07.2004 № 401 «On Federal Environmental, Industrial and Nuclear Supervision Service»

- ✓ Manage activities of functional subsystem for control of radiologically hazardous facilities (as a part of unified state system for prevention of and response on emergencies)
- ✓ Enact federal rules and regulations in the field of atomic energy use

Rostechnadzor's decree 17.08.2015 №318 «On functional subsystem for control of radiation hazardous facilities of unified state system for prevention of and response on emergencies»

- ✓ Control on preparedness of facilities management and personnel for response to nuclear and radiological emergencies
- ✓ Provision of Rostechnadzor's preparedness for emergencies

Organizational Structure of Functional Subsystem for Control of Radiologically Hazardous Facilities

Rostechnadzor Commission on prevention of and response on emergencies

Dpt. for safety of nuclear power plants and research reactors

Dpt. for nuclear security and accounting & control of radioactive materials

Dpt. for regulation of nuclear fuel cycle facilities and nuclear floating vessels

24/7 operational dispatch service

Rostechnadzor Information and Analytical Centre (Rostechnadzor IAC)

Control bodies – subdivisions in regional departments

- Central
- Northern-europe
- Ural
- Volga
- Siberia and Far east
- Don

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Rostechnadzor IAC. Tasks and Activation

Routine activity

- 24/7 preparedness for reception of information on emergencies
- Preparedness to inform Rostecnadzor IAC working group members
- Maintenance of operability of evaluation codes and up-to-dateness of documents
- Developing of emergency assessment tools

Emergency (exercises and real emergencies)

- Informing and calling of members of Rostechnadzor IAC working groups
- Informing of authorirties, media public
- Carrying out dose assesment and prognosis (SEC NRS)
- Carrying out assessment and prognosis of integrity of physical barriers and performance of safety functions (SEC NRS)
- Control over compliance with safety regulations and emergency response plans & instructions

Emergency Assessment in Rostechnadzor IAC: Overall Methodology

Comparison with operators assessment

- ✓ Receiving results of dose assessment
- ✓ Harmonization of assessment (if feasible)

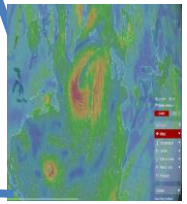
Diagnosis

- ✓ Collecting info on the accident
- ✓ Assessment of the plant status
- ✓ Evaluation of the radiological consequences
- ✓ Assessment of the compliance of operator response actions with regulatory requirements, emergency plans and procedures

Installation parameters

Radioactivity measurements

Meteorological forecast



Predictive assessment tools & Methods

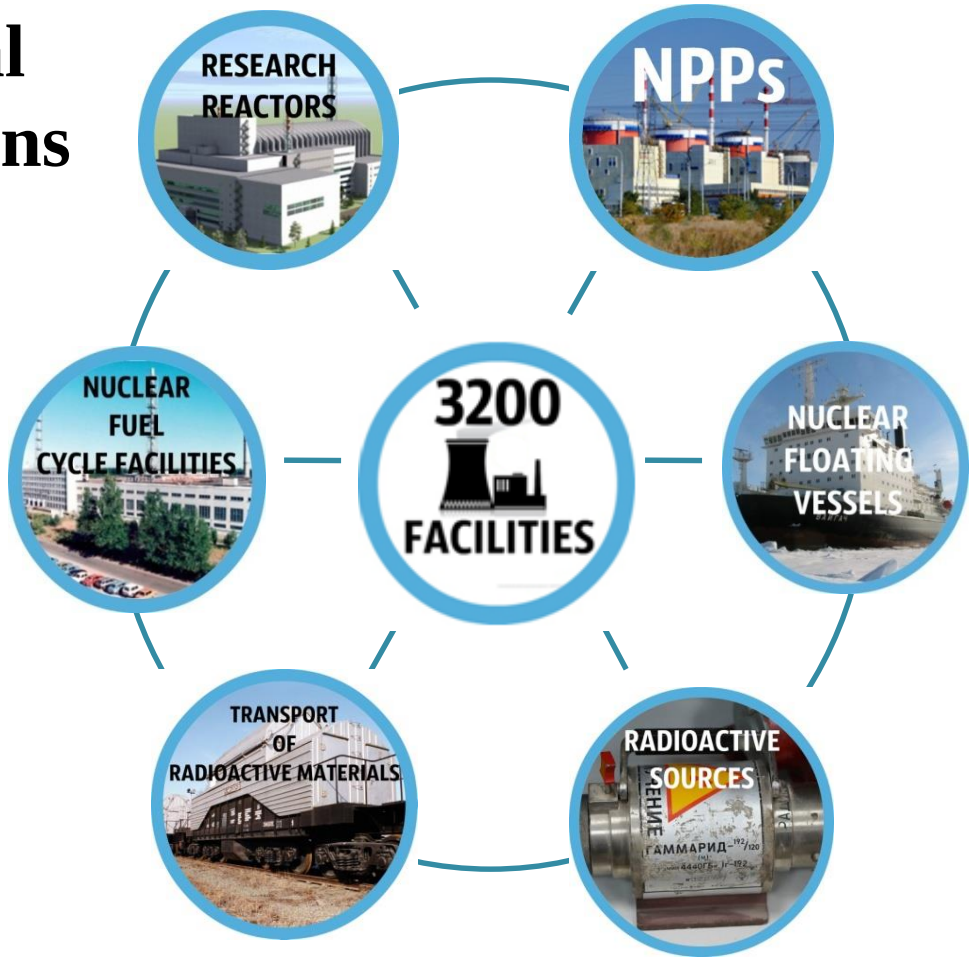
Prognosis

- ✓ Considering possible/planned actions
- ✓ Evaluation of potential radiological consequences and protective actions
- ✓ Prognosis of accident evolution

Federal Rules and Regulations in the Field of Atomic Energy Use as a Basis for Control of Radiologically Hazardous Facilities

19 federal regulations

- ✓ *Emergency planning zones*
- ✓ *Classification and notification of an emergency*
- ✓ *Initiation of emergency response*
- ✓ *Investigation of the causes of the emergency & developing of measures to prevent occurrence of similar ones*
- ✓ *Requirements for emergency plans, instructions and guides content*



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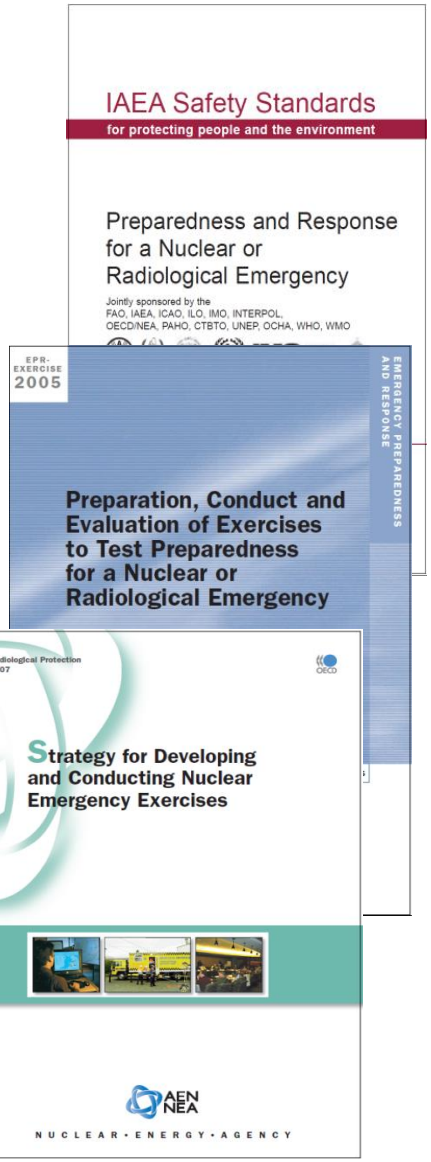
Best Practice of Evaluation of Emergency Drills and Exercises. Approach Recommended by IAEA and NEA

- ✓ Performance-based approach for emergency drills and exercises evaluation unlike prescriptive one implies:
  - clearly established goals of the drill or exercise
  - verifiable criteria for defining whether these goals are accomplished
  - taking into account that every system is more than the sum of its parts, and that the different response elements can function together to achieve the overall objectives



- ✓ Based on published results of IRRS missions (including one follow-up held in Russian Federation) even regulators already fulfilling exercise evaluation on a regular basis are face challenge to formalize their approach for the evaluation

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Methodology for Performance-Based Evaluation of Emergency Drills and Exercises. Approach Used by Rostechnadzor and SECNRS

Evaluation of NPP operators' emergency response actions against separate criterion (total amount of criteria N = 15):

insufficient – -1 point; *acceptable* – 0 points; *sufficient* – 1 points;

Aggregate evaluation of NPP operators' emergency response actions

$$\varepsilon = \Sigma_{\text{insufficient}} + \Sigma_{\text{acceptable}} + \Sigma_{\text{sufficient}}$$

insufficient	*acceptable*	*sufficient*
($\varepsilon < N/2$)	($N/2 \leq \varepsilon < N$)	($\varepsilon = N$)

Sending results of the evaluation to NPP operator

Taking into account results of evaluation in NPP report on enhancement of emergency preparedness

Unified Information System

NPP

- Balakovo
- Beloyarsk
- Bilibin
- Kalinin
- Kola
- Kursk
- Leningrad
- Novovoronezh
- Rostov
- Smolensk

National crisis center of EMERCOM

Accident center of Ministry of energy

Technical Support Centers

- VNIIAES
- Gidropress
- NIKIET
- OKBM
- Kurchatov institute
- IPPE
- Medical response cntr.
- RPA Typhoon
- IBRAE
- Atomproject
- NIAEP
- Atomenergoremont
- Atomtehenergo

Crisis center of Rosatom

Crisis center of Rosenergoatom

Command post

ERC of Rosatom

Analytical center of SEC NRS

Rostechnadzor IAC

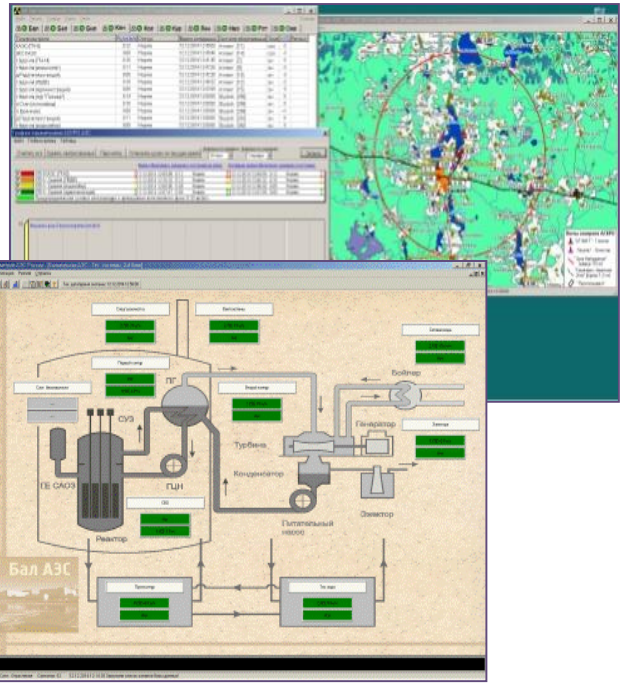
Regional departments of Rostechnadzor

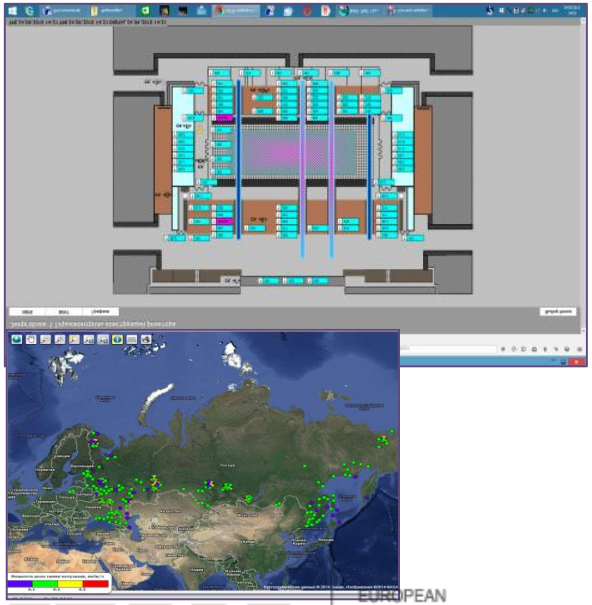
Data transfer

Video conference

Monitoring Data Received by Rostechnadzor IAC

- ✓ Within the framework of a unified information system:
  - dose rates on site and inside of buildings
  - off site dose rates
  - activity concentrations of process streams
  - non radiological process parameters





- ✓ Other data sources:
  - gross-beta and alpha activity concentrations off-site (SARSMS)
  - messages from operator under procedures of investigation of causes of emergency

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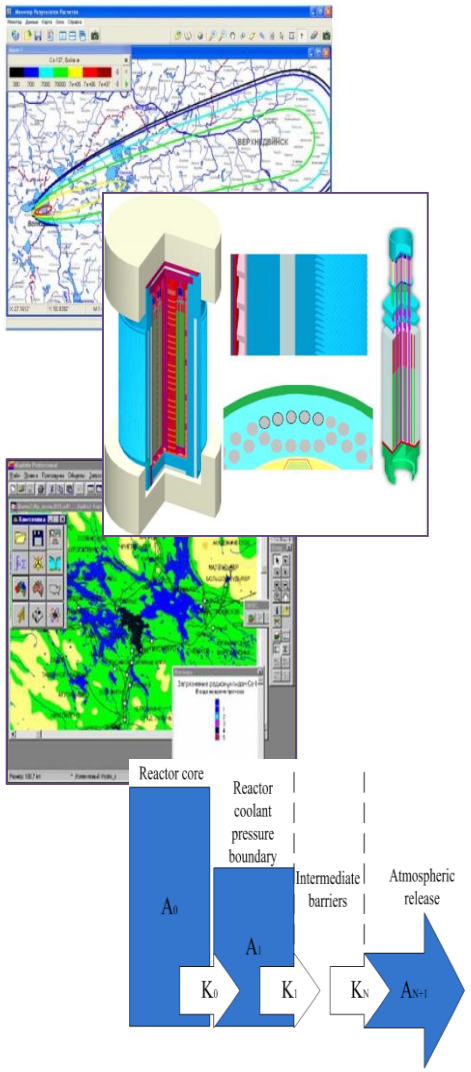
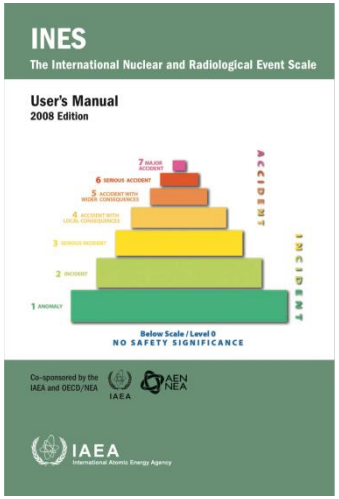
Assessment Tools Used by SEC NRS Experts in Support to Rostechnadzor IAC to Assess Radiological Consequences

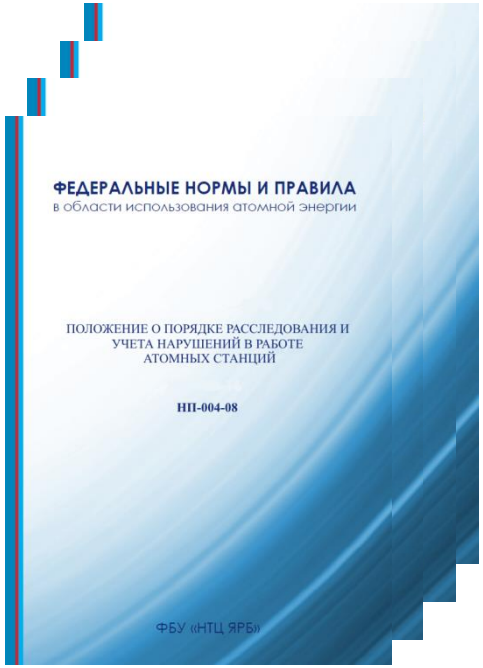
- ✓ NOSTRADAMUS – dose assessment due to accidental airborne releases (current meteorological conditions)
- ✓ RECASS NT – dose assessment due to accidental airborne and waterborne releases (based on meteorological forecast)
- ✓ Methodologies for generic assessment of accidental releases (similar to that of established in IAEA TECDOC-955)
- ✓ CASSANDRA – dose assessment due to accidental waterborne releases
- ✓ SCALE – core inventory calculations



INES Scale as a Key Element for Risk Communication in Russian Federation

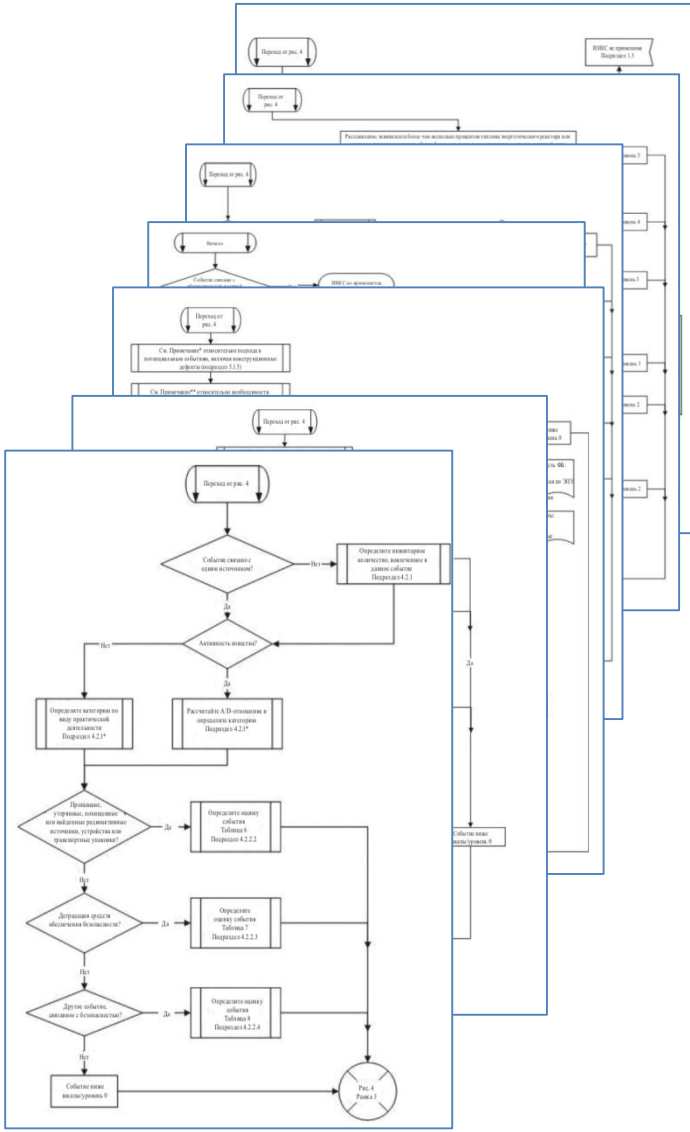
- ✓ Information on nuclear and radiological emergency INES level have to be transferred within emergency communications not only abroad but even as a part of internal communications in the Russian Federation
- ✓ INES level is a crucial information to use within procedures of investigation of incidents and developing measures to prevent new ones
- ✓ INES level which communicated to Rostechnadzor IAC by operator have to be promptly reviewed by Rostechnadzor IAC experts
  - validity of operators' INES level assessment is one of criteria for performance-based evaluation of emergency drills and exercises within Rostechnadzor's methododlogy



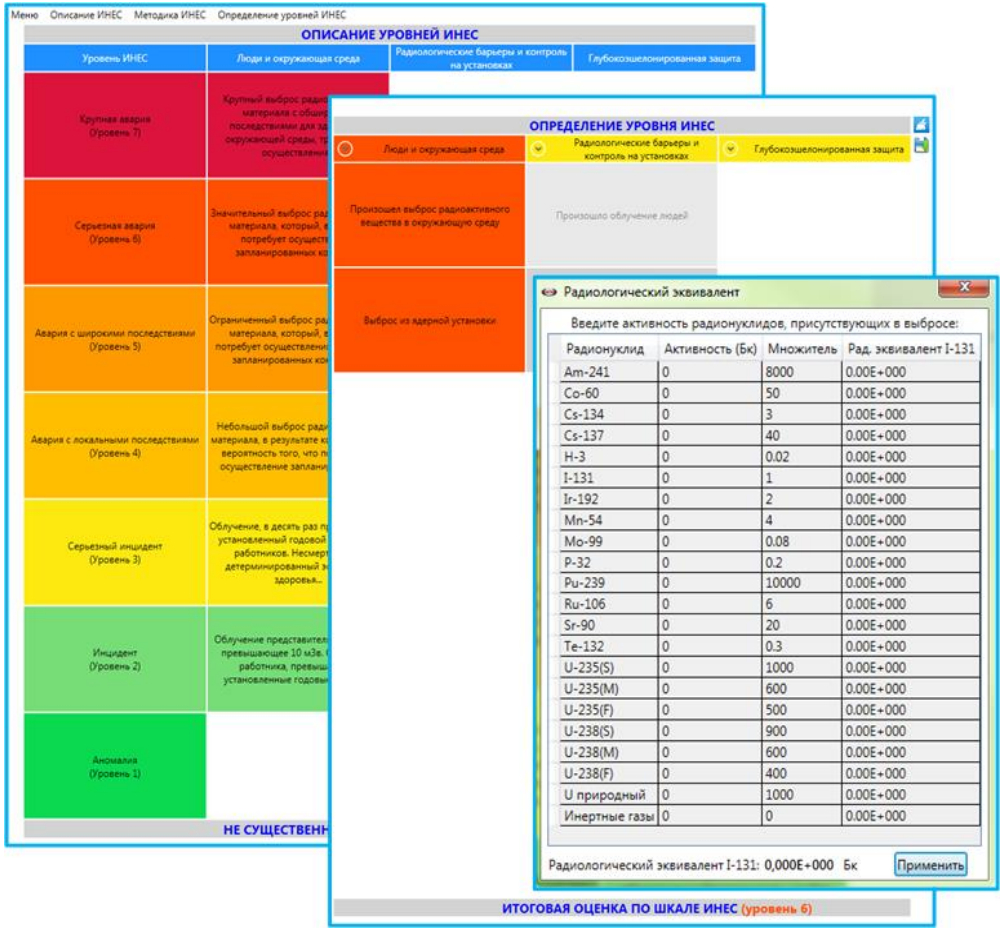


Challenges for Practical Use of INES Methodology

- ✓ Difficulties which inherent for the methodology itself
  - *the methodology consists of a number of quite complicated interconnected subprocedures, which account for aspects of impact on people and the environment, impact on radiological barriers & impact on defence in depth*
- ✓ Possibility of human errors in the assessment
  - *short terms to assess INES level as in real accidents and during emergency drills and exercises*
- ✓ Human resources consumption & time consumption
  - *limited number of Rostechnadzor IAC working group members*
- ✓ Absence of automation of evaluation process



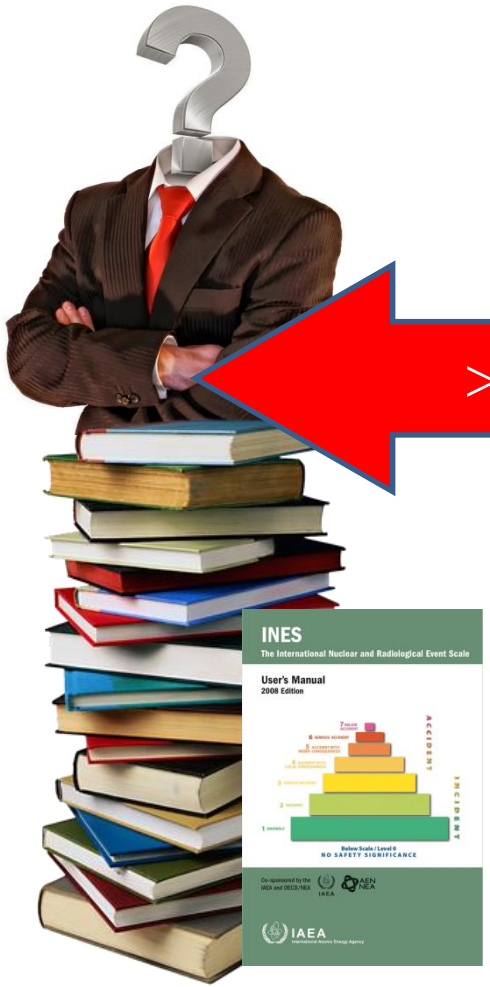
INES Classifier Evaluation Tool



- ✓ User-friendly interface
- ✓ Userguide integrated into INES classifier
- ✓ Mnemonic visualization of INES levels
- ✓ Prompt change of output INES level upon change of input data
- ✓ Color solutions which commensurate with severity of INES level
- ✓ Automatically generated report containing characteristic of event

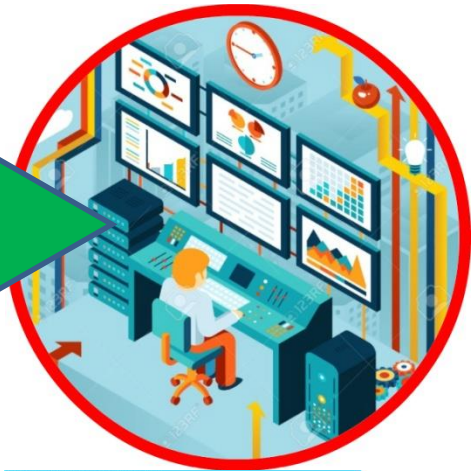
Effect of INES Classifier on INES Level Evaluation

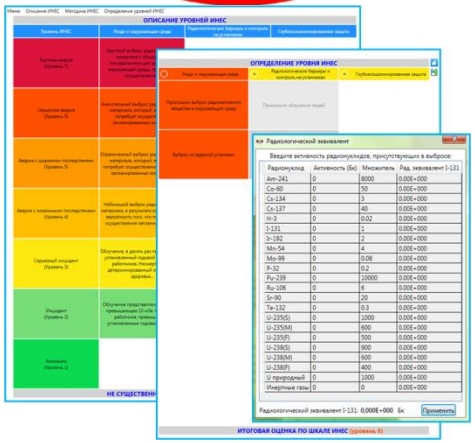
Tested during emergency drills and exercises held in Rostechnadzor IAC



> 2 hours

~15 min





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CONCLUSIONS

Level of SEC NRS involvement in Rostechnadzor activity on operators' EPR control generally corresponds to the one established in IAEA TECDOC-1835 "Technical and Scientific Support Organization Providing Support to Regulatory Functions"

TSO participation in regulatory activities is a crucial factor to overcome the challenges faced both regulatory body and TSO

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