

**COMPLIANCE ASSESSMENT FOR THE SAFE TRANSPORT  
OF RADIOACTIVE MATERIAL IN THE RUSSIAN FEDERATION**

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**ABSTRACT**

Compliance assessment (CA) system that is system of the direct or oblique determination of carrying-out the requirements for the regulated object in the field of radioactive material (RM) transportation in the Russian Federation consist of the whole number of specific forms and appropriate rules. In general the forms of compliance assessment for RM transport include: licensing activities in RM transport field (designing, fabricating, shipping, emergency activities and others), certification of designs and fabricated equipment (packages and packagings, transport vehicles and other), issuing the sanitary-epidemiological conclusions for equipment and conditions of radiation dangerous works, certification and permissions for shipments, approval of consignor emergency response plans, approval of routes for road shipments, general state control for safety at shipments and other forms of CA.

The principal form of compliance assessment in this field, used in the state according to recommendations of the IAEA transport regulations, is safety examination of some RM and the package designs used for RM shipments and safety expertise of shipment conditions being made by the empowered expert organizations under authority of the State atomic energy corporation “ROSATOM” as the state competent authority for safe transport of radioactive material in the Russia. In the results of expertise the corporation issues the certificates of approval (certificate-permit) for designs and shipments.

The paper presents information of legislative basis and appropriate legislative and normative documents of this compliance assessment system, main details of the CA forms and rules, connection of various forms used, experience and general results of functioning the this CA system, as well as the some problems, tasks, possible ways for development and improving the system in future. Requirements and practice concerning applications and procedures of application expertise for various types of designs and shipment conditions are considered in the paper. Some statistical information of certificates of approval issued by the state corporation in the last years is presented as well.

## **1. INTRODUCTION**

Compliance assessment (CA) system, that is system of direct or oblique determination of carrying-out the requirements for the regulated object in the field of radioactive material (RM) transportation in the Russia, consist of the whole number of specific forms and appropriate rules. There is enough large and positive experience of this CA system functioning. The paper present information on normative legislative basis of CA system at transport of RM in Russia, experience of the system functioning, practically complete list of CA forms applied at RM transport in the state, some of the CA forms are considered more extended. One of the task of presentation is to initiate more active international collaboration in this field and some reason are presented as well.

## **2. NORMATIVE LEGISLATIVE BASIS AND FORMS OF COMPLIANCE ASSESSMENT AT RM TRASPORT**

In the Russian Federation there are common regulatory framework and general requirements for CA virtually for all technical sectors (industry, transport, energy), which are covered by the Federal Law "On Technical Regulation" [1], issued in 2002. The law indicates some possible forms of CA, such as: state control (supervision), accreditation, testing, registration, acceptance and commissioning of the facility, whose construction is completed, and the law does not restrict the use of other forms of CA.

In 2007, mentioned law was amended to take account of the existing system of control and regulation of safety at using nuclear energy on the basis of the federal "atomic" laws [2], [3], [4]. In particular, in accordance with the amendment to the law [1], the government was entrusted to establish particularities of CA system for products (works, services) and facilities in atomic area, including process of designing, manufacturing, construction, installation, commissioning, operation, storage, transportation, utilization, disposal of such products (Article 5, paragraph 4). As well area of state control was expanded (as a form of CA), which can be carried out not only in respect of products at the stage of treatment, but also on the processes of its designing, manufacturing, etc. (see above) (Article 33, paragraph 1). Such an approach for control at all working stages, beginning from designing, was applied right from the start of the nuclear industry.

At transportation of RM, besides such CA forms other ones are used as well according to the laws and other normative legislative acts in the field of transport, emergency response, and others.

Table 1 presents the list of the CA forms used for the transport of RM, governmental bodies and/or authorized organizations responsible for the implementation of these CA forms as well as the legislations which directly and/or through the normative legislative acts of lower level (government decrees, federal regulations or rules, etc.), establish some form of CA for the transport of RM.

As the table shows CA for transportation of RM in Russia includes many forms at all stages of the transport works: designing, fabrication, shipment, including the provision of emergency preparedness.

A detailed examination of each of these forms CA would require too much time. Such a review is made on the subject of issuing certificates-permissions in Section 3 of the report. It should be noted that virtually all organizations involved with work on RM transport including subcontractors must be licensed for a specific activity before starting the work in RM transport field. Licenses activity in the field of atomic energy for peaceful purposes and for the relevant transport of RM issued by the Federal Service for Ecological, Technological and Nuclear Supervision (Rostekhnadzor). Compliance of expert organization and certification bodies with established requirements is confirmed in the framework of licensing or accreditation process.

**Table. Forms of compliance assessment for the transport of RM**

<b>No</b>	<b>Compliance assessment requirements</b>	<b>Responsible Body (organization)</b>	<b>Federal Law</b>
1.	Licensing of the designing SFRM, LDRM, packagings	Rostekhnadzor	FL [2]
2.	Licensing of expert organizations	Rostekhnadzor	FL [2]
3.	Conclusion on criticality safety of package design	ROSATOM	FL [2]
4.	Certificate-permit for design of SFRM, LDRM, package	ROSATOM Rostekhnadzor, MoH	FL [2], FL [5]
5.	Sanitary- epidemiological conclusion on SFRM, LDRM, packaging	MoH	FL [4]
6.	Licensing of manufacturing SFRM, LDRM, packaging	Rostekhnadzor	FL [2]
7.	Conformity certification (SFRM, LDRM, packaging fabricatio)	Certification bodies	FL [1], FL [2]
8.	Accreditation of certification bodies	ROSATOM Rostekhnadzor Rostechregulation	FL [1], FL [2]
9.	Licensing carrier of DG	MoT	FL [7]
10.	Licensing carrier of RM	Rostekhnadzor	FL [2]
11.	Sanitary-epidemiological conclusion on special vehicle	MoH	FL [4]
13.	Agreement ion of emergency plan of consignor	ROSATOM ERC	FL [2]
14.	Certificate-permit for shipment	ROSATOM	FL [2], FL [5]
15.	Permission for roadshipment, agreeing the route (3000A1/A2)	MoT	FL [6]
16.	Permission for heads of organizations (consignor, carrier)	Rostekhnadzor	FL [2]
17.	Attestation of emergency response units	MoEmergency ROSATOM	FL [8]
18.	Licensing of the regional staff emergency response units	Rostekhnadzor	FL [2]
19.	Consignor's declaration	consignor	FL [2]

### 3. SAFETY EXAMINATION AND ISSUING CERTIFICATES-PERMITS

The main form of CA, considering recommendations adopted by the IAEA [8], is safety examination conducted under aegis of competent authority and issuing the certificate-permit for designs and conditions of RM shipments of competent authority.

This form of CA is a kind of final confirmation by the applicant the federal requirements for the safe transport of the RM. With the appropriate certificate-permit, there are not required other documents of the federal bodies of executive power to confirm safety and compliance of RM, packages and transport conditions with federal norms rules and regulations (and/or the IAEA regulations, for the international transport)

In Russia (former USSR), practice of issuance of certificates-permission of the state competent authority for the transportation of various types of RM was introduced into the practices of the nuclear industry in the 70s of the last century after the release of one side comprehensively revised edition of the IAEA Regulations 1973, which determined the general provisions on the issuance of certificates of approval, and on the other hand - due to the widespread introduction of Russian radiation technology abroad, including nuclear power. Thus the first certificate-permits were issued for package designs and shipments of fresh nuclear fuel. The first certificate-permit to transport spent nuclear fuel was issued in 1979 for design on of the cask TK-6 and shipment of SNF from VVER-440 reactors, built with technical assistance of the Soviet Union.

The first normative document regulating the conditions and procedure for the examination and issuing certificate-permits of the national competent authority, was developed in 1993, PVSR-93, and approved by the Ministry of Atomic Energy and the Gosatomnadzor of Russia. At present, the detailed requirements and procedures for the safety examination and processing of certificate-permits issuing are set in the Administrative Regulations [9], as required in the state for providing public services.

The list of expert organizations (working bodies of SCA), conducting safety examination includes five organizations:

- FSUE ERC of Rosatom (St.-Petersburg);
- OJSC «Leading institute VNIPIET», St.-Petersburg);
- FSUE RFNC — VNIIEF (Sarov, Nizhny Novgorod region);
- JSC Isotope (Moscow);
- FSUE RFNC — VNIITF (Snezhinsk, Chelyabinsk region);

The first three organizations conduct safety examination and developments of certificate-permits for the transport of fissile materials. These materials are also required to obtain a separate conclusion on nuclear (criticality) safety conducted by the FSC IPPE (Obninsk, Kaluga region.) and approved by the State corporation “Rosatom”. The presence of this conclusion is necessarily reflected in the certificate-permit.

The latter two organizations, as well as ERC conduct an examination of safety and development of certificate-permit for the transport of non-fissile RM and small quantities of nuclear (fissile) materials that pose no risk of criticality (so named fissile-excepted material).

The overall objective of the safety examination as established in FL "On Technical Regulation" [1], is to assess compliance with requirements to the object of regulation, namely, the requirements of the applicable Russian regulations on safety transport of RM and relevant international documents (IAEA Regulations etc.) for international shipments.

Certificates-permits in Russia in contrast to the IAEA Regulations are required not only for SFRM, LDRM, designs of types B, C, and UF6 packages and packages containing fissile material, but also for Type A packages.

Also, unlike the IAEA Regulations, the certificates-permits are required practically for all shipments (transport of excepted packages and industrial packages Type IP-I). Transport by special arrangement is also in use and certificates–permits are issued for such shipments.

Requirements for applications to certificates for designs practically coincide with the analogous requirements of the IAEA Regulations. Applications for transport certificate are required to provide full information on compliance with the conditions of transport requirements. The list of submitted documents (information) is large enough, differs of IAEA regulations, and allows some way to define the tasks of safety examination of shipment conditions and issuing certificates-permissions for shipments. So, this list includes:

- a) name of the consignor and consignee planned routes, places of transit operations and storage;
- b) certificate-permits for package design or short description of package and data on the safety analysis of package and its radioactive content if not is required to obtain a certificate-permit for design;
- c) real radioactive content of the package(s) or a range of possible radioactive contents for shipment series under this certificate-permit;
- d) UN number, proper shipping name (-s), category of the package (-s), the transport index (TI), criticality safety index (CSI), the information on the marks, labels for consignment and vehicle (TC);
- e) mode of transport, type and description of the conveyance, the number of packages on the conveyance, the specific layout and mount packages. If a special conveyance is also provided by the sanitary-epidemiological conclusion for special conveyance;
- f) total criticality safety index and the total transport index of cargo of RM on the conveyance indicating the methods of their determination;
- g) calculation and/or experimental data on levels of radiation on the outer surface of the vehicle and at a distance of 2 m from the vehicle with a RM consignment;
- h) expected environmental conditions (temperature, insolation);
- i) methods of the precautions and administrative or operational controls, referred to certificates for package designs;
- j) indication of the category of transport (for transportation covered by categorization of railway transportation), as well as about whether the consignment is transported under exclusive use, is whether the consignment accompany;
- k) emergency card number;
- l) plan of the consignor in case of an accident during transportation;
- m) number of the agreementcontract to provide emergency response with ERC of the State Corporation "Rosatom";
- n) quality assurance program for transportation and for manufacture of packagings (if the last has not been presented in the application for a package design certificate);
- o) radiation protection program during the transport;
- p) the serial numbers of the packaging, for which the certificate of approval is required (or an indication that certificate is in force for all numbers of the packaging design);
- q) information of the assigned service time SFRM, LDRM, packagings transported and the timing of operation over its service time;

- r) provisions for the transport of empty packaging with the residual of the RM (the radioactive contents), and/or empty packaging in the design of which radioactive materials are used, for example, with the radiation protection of depleted uranium;
- s) for Type IP-2 and IP-3 package drawing (must be on a separate sheet of A4 format with no more than a cut to visualize the internal structure of packing and specification basic units);
- t) the term for which requesting the certificate.

The amounts produced by various working bodies and approved by the SCA certificate-permits for RM and packages, as well as certificates for shipments currently in force is about 1,400. However, some design certificates and transport combined into a single document, and therefore the number of documents is slightly less.

About 360 certificates are elaborated by the working bodies annually and approved by SCA. Then again part of the certificates for the design and transport are combined into a single document and the total number of documents annually draw somewhat less.

An approximate distribution of certificates-permits of approval:

for designs of packages - Type B – 44%, Type A – 43 %, the rest – Type C, UF<sub>6</sub>, IP (fissile nuclear materials);

for designs of packages - RM (non-fissile) 74 %, fissile nuclear materials – 26%;

for shipments - Type B – 41%, Type A - 42 %, IP – 12 %, special arrangement - 4,5 %;

for shipments - RM (non-fissile) 81 %, fissile nuclear materials – 19%.

#### **4. EXPERIENCE OF COMPLIANCE ASSESSMENT AND OPTIMIZATION FOR RM TRANSPORT**

It is rather difficult to assess objectively the effectiveness of the current system of CA for transport of RM. On the one hand the direct executor of the transport always assume that there are too many checks and required permits from the relevant government agencies and authorized organizations. On the other hand the relevant bodies (organizations) operate in accordance with the general statements and the tasks assigned to them by Government for which they are responsible, and they set the requirements for CA in accordance with the laws.

There is no doubt, there is some overlap in the forms of CA on some issues, which is difficult to avoid. On the other hand duplication on safety issues is often seen as justified. However, appropriate works on optimizing and minimizing duplication are conducted. For example, concerning state control as a form of CA, changes in federal law [1] directly establish the requirement of "the inadmissibility of the simultaneous laying the same supervision function on two or more body of state supervision over observance of technical regulations".

Addressing optimization and possible softening the CA requirements in RM transport field it should be noted that such requirements is the part of general approach to the management and regulation of safety in the field of nuclear energy use. The changes made in 2011 to the Federal Law [2] with respect to the registration of (instead of licensing) in the application of radiation sources 4 and 5 categories cover at present the RM transport as well.

As adequate indicators of the current system of CA for RM transport in our opinion are two followings facts. First of all - not only the absence of serious accidents with radiological consequences transportation of RM, but the virtual absence of serious violations that could lead to accidents with radiological consequences. The second - there are the virtual absence of denial and even delays of RM shipments in the state. That is, despite the enough numerous requirements for licensing, certification, and other forms of CA, executors are able to work efficiently in practice and carry out the relevant requirements in this area.

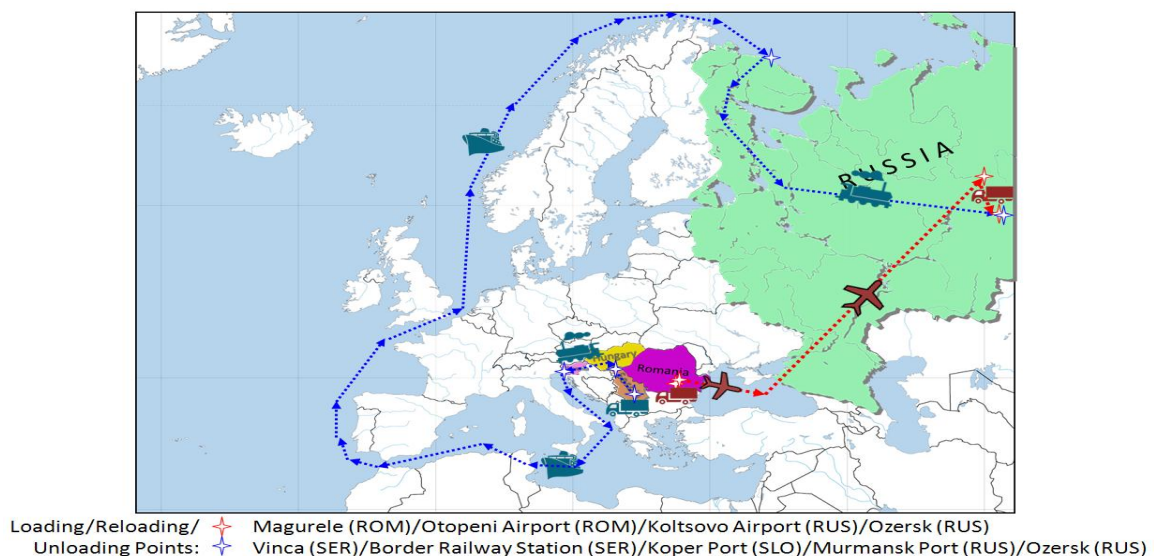
## 5. INTERNATIONAL COOPERATION IN THE FIELD OF COMPLIANCE ASSESSMENT FOR RM TRANSPORT

It is obvious that optimization or harmonization of CA systems for the transport of RM on the international level is much difficult than harmonization or practically unification of technical requirements for RM

transport achieved throughout the world. CA systems in the states for the RM transport are based and should fit into the existing general management and safety regulation systems in the states, taking into account the number and the structural organization of concerned government agencies, national experience, traditions, mentality, etc.

At the same time, we can say that on some issues the approaches and requirements for CA systems for the transport of RM are harmonized. This applies primarily to the international practice of issuing competent authorities certificate of approval for the RM and package designs.

However, in our opinion at the international level, the problem of optimization of approaches and requirements for CA for RM transport takes place and international cooperation is necessary both from the point of view of the safety and economic point as well. This is confirmed for example by experience of the organization of shipments in the framework of the international program for the repatriation of nuclear fuel from research reactors. It seems that it is due to a lack of harmonization and experience of interaction on CA it was more cost effective to carry out shipment of fuel from Serbia to Russia by sea around Europe (more than 15 thousand kilometers with the additional use of road and rail transport) rather than to use the direct road and rail route, many times smaller (about 2.5 thousand km) but through the territories (borders) of a few states (see figure).



## 6. CONCLUSION

It should be again noted the importance of international cooperation and harmonization of approaches and requirements for CA in RM transport field. At a meeting of the IAEA transport committee (TRANSSC-26) in June this year the similar report from the Russian side has been presented, as well as a proposal for initiation of the relevant work in the framework of the IAEA activity. It is seen that the proposal was a response. At least, reports on the experience of the states in the field of CA will be considered at the next meetings IAEA TRANSSC. We hope that in results of addressing the experience of the states works on harmonization in this field will be initiated.

## 7. REFERENCES

- [1] The Federal Law "On Technical Regulation» № 184 FL of 27.12.2002 (as amended).
- [2] The Federal Law "On the Use of Atomic Energy» № 190 FL of 21.11.1995 (as amended).
- [3] The Federal Law "On Sanitary and Epidemiological Welfare» № 52-FL of 30.03.1999 (as amended)
- [4] The Federal Law "On the State Atomic Energy Corporation" Rosatom» № 317-FL of 01.12.2007.
- [5] Federal law "Charter of road transport and urban land-electric transport" № 272-FL of 15.04.2011.
- [6] The Federal Law "On Licensing Certain Types of Activities" № 99-FL of 04.05.2011 (as amended).
- [7] The Federal Law "On the emergency services and the status of rescuers» № 151-FL of 22.08.1995 (as amended).
- [8] "Regulations for the Safe Transport of Radioactive Material", IAEA, Vienna, 2009.
- [9] Administrative Regulations of the Federal Atomic Energy Agency on the state function "Issuing certificates (permits) for the transport of radioactive materials and maintaining their registry" (Order of 10.10.2007 № 527)
- [10] S.V. Komarov, M.E. Budua, D.V. Derganov, O.A. Savina, I.M. Bolshinsky, S.D. Moses, L. Biro «Licensing Air and Transboundary Shipments of Spent Nuclear Fuel». International Conference on the Safe and Secure Transport of Radioactive Materials: The Next Fifty Years – Creating a Safe, Secure and Sustainable Framework, Vienna, Austria, 17 - 21 October 2011