CZECHOSLOVAK APPROACH TO LICENSING OF NUCLEAR MATERIALS TRANSPORT

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Abstract

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The paper discusses the Czechoslovak approach to the licensing and regulation of nuclear materials transport, especially the transport of spent nuclear fuel from Czechoslovakia to the USSR. Legal aspects of these transports are also discussed. The containers used for transport, as well as the operators' experience gained from the transportation of spent fuel, according to Czechoslovak Atomic Energy Commission provisions, are briefly described.

Czechoslovakia is an industrialized country without corresponding power resources of its own. The increasing demand for energy in Czechoslovakia during the 1970s led to an increase in the use of nuclear energy, which facilitated large scale construction of nuclear power plants, especially after the construction of fossil fuel power plants was terminated. Thus, all growth in power production is now being met by nuclear energy.

In accordance with the Agreement Concerning the Provisions of Assistance by the Union of Soviet Socialist Republics to the Czechoslovak Republic in Connection with the Development of Research into the Physics of the Atomic Nucleus and the Utilization of Atomic Energy for the Needs of the National Economy, Czechoslovakia started construction of nuclear power plants equipped with 440 MW PWR (light water cooled and moderated power reactors of WWER type) developed in the USSR. At the present time, there are six units equipped with WWER-440 reactors, each fully operational. The power generated by these nuclear power plants covers about 17% of total electricity production. Another six 440 MW reactors of the WWER type are under construction and the first nuclear power plant with four reactors, WWER-1000 MW, has been under construction in southern Bohemia since 1985. Suitable locations for other WWER-1000 MW power plants have already been chosen.

The large scale use of nuclear energy has raised the problem of the safe transportation of both fresh and spent fuel within Czechoslovak territory and the consequent need for its licensing and regulation. Czechoslovakia is a country with

an open nuclear fuel cycle and it owns neither reprocessing plants nor enrichment facilities. All fresh nuclear fuel assemblies are imported from the USSR and, according to the agreement between Czechoslovakia and the USSR, the nuclear spent fuel is, after a three- or five-year cooling period, transported back to the USSR. The safe transportation of nuclear materials has become an important part of the national programme for the use of nuclear materials and the generation of nuclear power.

There are two competent authorities approving and regulating this type of transport in Czechoslovakia. One is the Ministry of Transport, which monitors compliance with all international (e.g. Agreement on International Railroad Freight Traffic (SMGS) and Regulations Concerning the Carriage of Dangerous Goods by Rail (RID)) or national regulations related to transportation safety. The second is the Czechoslovak Atomic Energy Commission (CsAEC). The CsAEC is, by Act. No. 28/1984 concerning state supervision of the nuclear safety of nuclear facilities, authorized as the regulatory body for all aspects of nuclear safety. Thus it regulates the transport of nuclear materials from the point of view of nuclear safety and it also ensures that the provisions to assure safety in the course of transportation are met in practice.

The licensing procedure applied by the CsAEC to transportation has two components:

(1) Approval of the package design
(2) Approval of the shipment.

(1) *Approval of the package design.* This first step complies fully with the IAEA Regulations for the Safe Transport of Radioactive Materials. An application for approval must be submitted to the CsAEC by the operator of the nuclear facility, the receiver or the shipper of nuclear materials. The content of the technical documentation supporting the applicant's request for approval differs according to package origin. If the container was manufactured abroad, then the following documents have to be presented to the competent authority (CsAEC):

(a) Package design approval certificate issued by the competent authority of the country of origin.
(b) Instructions for the use and maintenance of the container and of auxiliary devices.
(c) Description of actions carried out during the handling of the nuclear fuel.
(d) Assessment of accident possibilities during transport and handling.

If the container was produced in Czechoslovakia, the application for approval should comply with the requirements stated in paragraphs 705 and 711 of the 1985 Edition of the Regulations for the Safe Transport of Radioactive Material [1] and with the requirements listed in (b)–(d) above.

(2) *Approval of shipment.* An application for shipment has to be submitted by the carrier and should include:

(i) Package design approval certificate
(ii) Transport provisions and regulations
(iii) Vehicle test assessments
(iv) Transport route and timetable description
(v) Accident emergency provisions
(vi) Statement issued by the radiation protection authority.

All information included in the applications for approval is subject to careful checking. Also, the quality assurance programme for engineering of the packagings is analysed in detail. Furthermore, approval certificates issued by the CsAEC can stipulate relevant supplementary, temporary or permanent conditions related to operational requirements, radiation protection, etc.

All Czechoslovak transports of spent nuclear fuel are carried out by rail and thus must also meet all requirements stated in the Regulations for the Safe Transport of Spent Nuclear Fuel from Nuclear Power Plants in the Council for Mutual Economic Assistance (CMEA) Member Countries, Part 1 — Transport by Rail. These regulations, based on the regulations in IAEA Safety Series No. 6, were formulated under a programme for scientific and technical co-operation among CMEA member countries and are co-ordinated by Scientific and Technical Council No. 2 of the CMEA Permanent Commission. They were approved by the CMEA Permanent Commission on Co-operation in the Peaceful Uses of Atomic Energy. The CMEA Executive Committee certified these regulations in November 1977 and they were later adopted by the CMEA member countries as national regulatory standards.

Spent nuclear fuel transported under the requirements of these CMEA regulations must fully comply with the Technical Conditions for Spent Fuel Elements and Assemblies from Nuclear Power Plants of the Corresponding Types, which were also formulated by Scientific and Technical Council No. 2. The Technical Conditions contain provisions related to the condition of the spent fuel (e.g. burnup and residual thermal output), as well as the required accompanying documentation (e.g. tests assessment and radiation dose measurements).

At the present time, both the CMEA regulations and the Technical Conditions are being revised by Scientific and Technical Council No. 2 and new standards are being developed taking into consideration the 1985 Edition of IAEA Safety Series No. 6.

In the interim, CsAEC shipment approval certificates are being issued for a limited period of time regardless of the number of transports. Transports may be made according to specified conditions without separate application prior to each movement.

The CsAEC carries out inspections to ensure that all requirements specified in the approval certificates and the relevant provisions related to the transport have been satisfied. In particular, CsAEC inspectors examine:

(a) Compliance of the package design with the approval certificate;
(b) Fulfillment of state authority approval provisions;

(c) Full operability of loading, unloading, stowage and handling facilities;
(d) Proofs attesting to the appropriate training of the transport workers.

Based on these inspections, the CsAEC can levy a fine or withdraw the approval certificate.

The following describes experience gained during the transportation of spent fuel from Czechoslovak nuclear power plants to the USSR. There are two different types of nuclear spent fuel assemblies that are transported from Czechoslovakia to the USSR. One of them is spent fuel from the KS-150 reactor, which is now subject to decommissioning. A spent fuel transport container (T-15) was developed and manufactured at the Škoda works, Plzeň, Czechoslovakia. The container was tested according to the requirements in the IAEA Regulations and the CsAEC has issued the appropriate package design approval certificate, as well as a shipment approval certificate for a Type B(U) design. The certificate is valid until 1988. The container also complies fully with the requirements of the 1985 version of the IAEA Regulations. The certificate is of limited validity because periodic controls are requested by the national authority. The capacity of the container is 16 assemblies, with the assemblies being loaded in the vertical position, filled with nitrogen, checked and then moved to the horizontal position for transport.

The other container, of Soviet origin, was fabricated as a special container for the safe transport of spent fuel assemblies from the WWER-440 reactor. The container designation is TK-6 and its capacity is 30 spent fuel assemblies. The fuel elements are loaded and transported in a vertical position. Spent fuel assemblies during transportation can be cooled by water (wet method) or by nitrogen (dry method) according to the burnup and residual thermal output. The container is of Type B(U) for 'dry' transport and Type B(M) for 'wet' transport. The CsAEC shipment approval certificates for both types of shipments have already been issued.

Each consignment should be made up of eight TK-6 containers or two T-15 containers and the transport should be made under exclusive-use conditions. During loading, transport preparation and transportation, all provisions stated in the package design and shipment approval certificates issued by the CsAEC have to be observed. At the present time there are ten conditions included in the shipment approval certificate. The most important ones are those provisions that apply to nuclear fuel integrity, to the maximum value of burnup of each separate assembly, to the total residual thermal output in each container, to the full operability of the stowage and handling facilities and to the leaktightness of the closed containers, as well as others relating to radiation safety.

Compliance with the provisions concerning nitrogen purity and oxygen content in the container during transport preparation and transportation, the leaktightness test of the closed container using nitrogen overpressure and tests of the integrity of the fuel assembly cladding using activity measurements of ^{131}I in dry residue are most important matters for both nuclear power plant operators and regulatory bodies. This compliance with all provisions is verified by CsAEC inspections carried out by

inspectors prior to each transportation. The inspections are also carried out in co-operation with the state radiation protection authority.

Experience gained so far, and the results of the spent fuel shipments already carried out, show that if all package design and shipment approval certificate provisions and all the regulations are observed, then safety of spent fuel transport is fully assured.

REFERENCE

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of Radioactive Material, 1985 Edition, Safety Series No. 6, IAEA, Vienna (1985).