

INTERNATIONAL LEGAL INTERACTION BETWEEN THE STATE OF MANUFACTURE AND THE HOST STATE ON THE USE OF FLOATING SMALL MODULAR REACTORS, INCLUDING IAEA SAFEGUARDS

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Abstract

The paper addresses an optimal model of relations between the state where a floating nuclear power unit (FNPU) is manufactured and fueled and the host State where it operates. It is in some ways similar to the build-own-operate model used for land based nuclear power plants with high-capacity nuclear reactor design. Using this model, the authors propose "manufacture-own-deliver-operate-return" model. It is assumed that the FNPU is constructed, loaded with nuclear fuel, and delivered to the host State for the operation, then removed back to the manufacturing State. The manufacturing State or its authorized organization remains the legal owner and operator of the FNPU at every phase of its life cycle. At the same time under the terms of the Comprehensive Safeguards Agreements, the host State must notify the IAEA of all nuclear material under its jurisdiction and of all its peaceful nuclear activities. To achieve this, the manufacturing State can provide all relevant information to the host State at each stage of manufacturing the FNPU. However, the centrally manufactured FNPU contains a sealed reactor unit that is already loaded with fuel and is ready for operation when it arrives in the host State. That creates certain difficulties for the host State and the IAEA inspectors in arranging physical access to nuclear material for the purpose of IAEA safeguards implementation. This issue can be resolved if the manufacturing State and the host State sign an intergovernmental agreement that outlines each party's responsibilities. Such an agreement shall also accommodate the parties' international commitments on nuclear safety, nuclear security, nuclear nonproliferation, and civil liability for nuclear damage. The paper discusses the possible structure and content of such an agreement.

1. INTRODUCTION

The finite nature of hydrocarbons resources, the growing environmental and climate problems, as well as the natural restrictions on the global development of alternative energy sources such as solar and wind are stimulating a growing international interest in nuclear power plants (NPPs) with an installed capacity of 600 MW(e), as well as small modular nuclear reactors (SMRs). Within the adopted classification SMRs have an installed capacity of less than 300 MW(e). There are currently about 50 projects of such reactors in the world [1]. The world's first floating nuclear power unit (FNPU) "Akademik Lomonosov", which is based in Pevek, a Russian port in the eastern Arctic, is an example of such technology.

Based on the experience of the construction and operation of the FNPU "Akademik Lomonosov", the possibility of building a new optimized floating power unit with the RITM-200 small modular reactor is being considered in Russia. It is planned to build a ground-based nuclear power plant using small modular RITM-200 reactors modified for ground use in Yakutia in eastern part of Russia [2].

Long experience shows that the emergence of new technologies especially those for series production, requires an appropriate legal regulation of the relationship between the State of manufacture of such new technology and the host State (consumer) at the national and international levels.

For the existing high-power thermal nuclear reactors such legal regulation is provided by international regimes with a series of conventions or other documents that form the body of the modern international nuclear

law. These regimes deal with nuclear safety and security, civil liability for nuclear damage and nuclear nonproliferation, including nuclear export regulation.

Legal regulation of SMRs which will be used as part of low-power NPPs onshore will not differ from traditional land-based NPPs.

In contrast there might be obvious gaps in the rules of international nuclear law when FNPU is manufactured, loaded with fuel, and then transported to another country for operation. In 2013 the IAEA issued "Legal and Institutional Issues of Transportable Nuclear Power Plants: a Preliminary Study" [3]. It came to the conclusion that existing rules of international law and, in particular, rules of the law of the sea as well as of liability for civil damage and some norms of nuclear safety and security may not fully apply to FNPUs. Legal and organizational issues may also arise in the implementation of agreements between the State in which the FNPU operates and the IAEA on the application of safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

At the same time, considering the transportation of FNPU "Akademik Lomonosov" to the place of operation and the start of its operation, it is possible to model options for solving the problems in the field of international nuclear law referred to in the above-mentioned IAEA study. To do this, first, it is necessary to outline emerging legal problems and determine the model of interaction between the State in which FNPU is manufactured, loaded with nuclear fuel, tested, and prepared for operation, and the State in which FNPU will be operated. Let us refer to them below as the manufacturing State and the host State.

2. BASIC LEGAL PROBLEMS

2.1. Legal problems related to FNPU's transportation

FNPU "Akademik Lomonosov" was transported using tugboats from Murmansk along Russian Arctic waters to the final destination in Pevek in the Far East of Russia. It seems that moving a non-self-propelled vessel with a loaded nuclear reactor using tugs is advisable either for short distances or in its own territorial waters, as in the case of the FNPU "Akademik Lomonosov". To move an FNPU over long distances in the open ocean, it is advisable to use special dock self-propelled vessels of the Transshelf type, designed to transport oversized cargo. However, even in this case, it will be difficult to talk about literal compliance with the norms of international law, since an FNPU is not, indeed, a container intended for the carriage of radioactive materials and meeting the relevant nuclear safety criteria. If towing involves entry into territorial waters of foreign States, it would be necessary to conclude intergovernmental agreements with the transit States, if the current legal framework for ensuring transit is not sufficient.

2.2. FNPUs and Nuclear Safety Convention

Based on the design features, an FNPU is operated not on land but afloat moored to onshore facilities. In this regard, the 1994 Convention on Nuclear Safety does not apply to such a nuclear unit, since its definition of a "nuclear installation" applies to "ground civilian nuclear power plants". However, the 2013 IAEA study concluded that "there is a field for arguments in favor of including FNPU in the scope of the Convention under "certain circumstances". Indeed, as experience shows, the FNPU "Akademik Lomonosov" is firmly moored to onshore facilities and its operation is largely similar to the operation of a "ground-based" nuclear power plant. Such "certain circumstances" can be envisaged in the bilateral intergovernmental agreement which can stipulate that the authorized organization of the manufacturing State, which is the operator of FNPU, is responsible for the nuclear safety of FNPU in the sense of the Convention on Nuclear Safety and operates on a license obtained from the regulatory authority of the host State. In the same way, provisions could be added to grant the right to the host State to assess the nuclear safety of FNPU and to monitor compliance with the license during the entire period of the FNPU's presence in the host State. The agreement should also specify the responsibility of the host State for emergency plans for the area of the FNPU location, which should be periodically reviewed and should cover all activities to be carried out in the event of an accident.

2.3. FNPUs and notifications on nuclear accidents

The 1986 Convention on Early Notification of a Nuclear Accident establishes mechanisms for immediate notification to the States Parties to the Convention and IAEA in the event of nuclear accidents at "any" nuclear installation and nuclear reactor. FNPU will be within the scope of existing mechanisms that do not require any other executive arrangements.

2.4. FNPUs and spent nuclear fuel

After the end of the operational period, FNPU returns to the manufacturing State for reloading of nuclear fuel and maintenance. In this case issues related to management of spent nuclear fuel and radioactive waste and the corresponding responsibilities are relevant only to the manufacturing State.

3. A MODEL BILATERAL LEGAL AGREEMENT

As we see, quite a number of issues come up in connection with the FNPU operation and its delivery to the host State.

Still, it seems possible to mitigate and resolve most of the legal problems with respect to FNPUs. To this end, the manufacturing State and the host State should conclude before the physical transfer of FNPU to the host State an intergovernmental agreement or possibly a series of such agreements regulating the rights and responsibilities of the parties in connection with the use of FNPU in the host State.

As a model it is possible to use some elements of the "Agreement between the Government of the Russian Federation and the Government of the Republic of Turkey on cooperation in the construction and operation of a nuclear power plant at the Akkuyu site in the Republic of Turkey" of May 12, 2010. It is based on the "build-own-operate" relation model between the manufacturing State and the host State.

In case of an FNPU, this model could be modified to the "manufacture-own-deliver-operate-return" (MODOR) model [4].

Under this modified model, the manufacturing State, represented by its authorized organization, remains the full-fledged owner and operator of the FNPU at each stage of the manufacture-own-delivery-operate-return cycle. With this in mind, in accordance with international law, the responsibility for nuclear safety lies with the operator of the nuclear installation, i.e., the authorized organization of the manufacturing State. In the same context, this authorized organization can also be considered as the operator responsible for the relocation of FNPU from the State of manufacture to the host State. At the same time, there are issues related to emergency response measures in the event of a nuclear accident at an FNPU involving release of radioactivity into the environment, as well as issues related to the physical protection of the FNPU. In such an event, the responsibility for proper legal and operational actions again lies with the operator.

An intergovernmental agreement between the manufacturing State and the host State should formalize the MODOR principle. It should also identify the type of FNPU and the time for its delivery; competent authorities of the parties responsible for the implementation of the agreement; responsibilities of the manufacturing State and its authorized organization responsible for the manufacture, transfer and operation of FNPU; and the terms of the return of the FNPU to the manufacturing State. The obligations of the host State should include the provision of water areas and mooring infrastructure, necessary electrical and heating networks, and the provision of external physical protection, including protection and constant guarding of the FNPU, the water area in which the FNPU is placed, and the related infrastructure using armed guards.

The agreement should also address the issue of financial compensations in case of a civil liability for nuclear damage. It would be logical that the liability rests with the authorized organization of the manufacturing State which owns the FNPU at all stages and which is fully responsible for its whole life cycle including manufacture, delivery, operation and return of the of FNPU to the manufacturing State. However, with this in mind, it would be important to stipulate in the intergovernmental agreement that the FNPU should be immune from local jurisdiction. In this case, the entry of local personnel on board of the FNPU should be strictly limited for purposes specified in the agreement.

The intergovernmental agreement or a separate agreement should certainly address commercial issues such as the price of heat and electricity produced by FNPU.

4. FNPU AND IAEA SAFEGUARDS

One of the key issues would be the implementation of a Comprehensive Safeguards Agreement as stipulated by the Nuclear Non-proliferation Treaty, between the host State and the IAEA and, if applicable, the Additional Protocol to this Agreement.

Under that agreement the host State is required to accept IAEA safeguards in accordance with the provisions of that agreement in respect of all source or special fissionable material in all peaceful nuclear activities within its territory, under its jurisdiction or under its control anywhere, solely for the purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive device. Thus, once the FNPU reaches that State it must take all necessary measures to comply with its obligations under the abovementioned agreement with the IAEA, regardless of the fact that legal ownership of this installation and nuclear material in it belongs to the authorized organization of the manufacturing State.

The host State must, firstly, accept IAEA safeguards in respect of these nuclear materials, and, secondly, cooperate with the Agency in order to facilitate the implementation of the safeguards provided for by the agreement on the application of safeguards in the host State. Such cooperation implies the timely provision of information to the IAEA on nuclear materials and new nuclear facilities to be subject to the IAEA safeguards, as well as granting the Agency's inspectors access to nuclear materials and facilities for the performance of their functions under the safeguards agreement. The issue would be complicated by the fact that after its manufacture and loading with nuclear fuel the FNPU reactor is sealed and is ready to operate upon arrival in the host State. This may create some difficulties for the host State in providing physical access to IAEA inspectors to carry out actions related to verifying the design information and correctness of the operator's and host State's declarations about the amount and composition of nuclear material in the FNPU reactor.

In this regard, the intergovernmental agreement between the manufacturing State and the host State should address issues related to the application of IAEA safeguards in the host State, as well as the procedure for visiting FNPU by representatives of the host State and IAEA inspectors.

5. CONCLUSION

Summing up, new technologies for small modular reactors including FNPU will be one of the promising areas for the global nuclear energy market. Once these technologies enter the market, the international nuclear law should be prepared to adapt itself to close the current legal gaps regarding FNPU. The best way to start would be through thoroughly designed models of bilateral cooperation based on new types of intergovernmental agreements.

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