

Turkey's Future With Nuclear Fuel And Radioactive Waste: Transport Safety And Security

Dolunay Özbek

Assistant Professor of Public International Law, Faculty of Law, Istanbul Bilgi University

Nilsu Gören

Post-Doctoral Research Scholar, Center for International and Security Studies at Maryland

1. INTRODUCTION

Embarking on a nuclear energy journey, Turkey has to be prepared for ensuring the safe and secure transportation of nuclear and radioactive material on domestic and international air and sea routes. Transshipment safety and security covers the stages of importing nuclear fuel, transferring it to interim storage, shipping spent fuel and radioactive waste, and decommissioning the nuclear power plant. However, the terms of the additional agreement on nuclear fuel and waste have not been concluded in the May 2010 intergovernmental agreement (IGA) between Russia and Turkey on the construction and operation of a nuclear power plant in Akkuyu, Mersin.

Turkey will be outsourcing nuclear fuel and does not appear to have any plans for generating a national reprocessing capability. Hence, Turkey will likely ship spent fuel to Russia, in which case the national plans and procedures for secure interim storage and transportation of spent fuel and radioactive waste should be agreed upon by all stakeholders (i.e. Ankara, Russia's Rosatom State Atomic Energy Corporation, and the private security company).

This chapter first identifies the international and domestic legislative and regulatory frameworks on the safety and security of the transportation of radioactive material in a descriptive manner. It then takes a close look at transport safety by mapping out the operational and legal role of each stakeholder in ensuring the physical protection of the cargo and public safety. Recognizing the high security risks associated with the transport of nuclear and radioactive material (e.g. protests, terrorist attacks, theft, or sabotage) the chapter then provides an overview of the security measures and the roles of respective Turkish authorities in response mechanisms. It is clear that the "build-own-operate" (BOO) mechanism for the Akkuyu power plant creates less incentives for the Turkish government, especially since the intergovernmental agreement is expected to address Turkey's concerns, whilst giving the weight of responsibilities in transport safety and security to the Russian side. Akkuyu is frequently referred to as a Russian nuclear power plant in Turkey. However, it is crucial to remember that the agreement is political and that it needs to be negotiated based on the premises of Russia's legislature. Additionally, the BOO mechanism does not address Turkey's need for an independent regulatory body and the indigenous capability to oversee Russia's actions on Turkish soil. Hence, the central recommendations in this chapter are, specifying the detailed action and contingency plans for nuclear fuel and waste transport with Russian authorities through a separate agreement in a timely fashion, and identifying a clear coordination mechanism among Turkish law enforcement authorities with clear responsibility areas.

2. LEGISLATIVE AND REGULATORY FRAMEWORK

While Turkey has taken steps towards establishing a domestic framework for the legislation and regulation of the nuclear energy program, the overarching legislative and regulatory framework is set by international codes of conduct and regulations that Turkey abides by. Domestic efforts reveal that, in addition to the absence of an independent regulatory authority, the level of customization of international regimes to circumstances unique to Turkey's geopolitical considerations in the Akkuyu case remain insufficient in the legislation. What further complicates the legislative and regulatory framework is the uncertainty arising from the incomplete aspects of the intergovernmental agreement between the Russian Federation and Turkey. Given the volatility of political relations between Turkey and Russia following the November 2015 Turkish downing of the Russian warplane and the subsequent rapprochement mid-2016, it is questionable whether the terms of these side agreements will be acceptable to Russia. Despite Turkey's reference on Russian expertise in exporting nuclear technology, Turkey still remains responsible in adopting international norms and best practices to be able to audit Russian activity in Akkuyu.

2.1. International Framework for Transport Security

The international regimes, codes, and regulations that Turkey abides by can be broadly categorized under the United Nations (UN) and the International Atomic Energy Agency (IAEA). Akkuyu Environmental Impact Assessment (EIA) report, as well as the Turkish legislation refer to Turkey's membership to these regimes. In reality, the Turkish legislation has mostly derived from these documents with no customization, which are most frequently referred to as constituting a sufficient framework for Akkuyu. Since Russia is an exporter of nuclear energy, Turkish documents also refer to the Russian experience in providing nuclear technology safely and securely. Despite the fact that the Akkuyu plant will be built, owned, and operated (BOO) by the Russian Federation, Turkish authorities are responsible for the safety and security of the nuclear cargo within Turkish territory.

2.1.1. United Nations International Maritime Organization (IMO) Conventions

Along with the "International Ship and Port Facility Security Code," IMO provides an overarching framework for nuclear transport security in seas, with the following codes:

2.1.1.1. International Maritime Dangerous Goods (IMDG) Code

The implementation of this 2000 code is mandatory, in conjunction with Chapter 7 of the 1974 International Convention for the Safety of Life at Sea (SOLAS)

and Ships International Convention for the Prevention of Pollution (MARPOL 73/78).¹ Chapter 2.7 of the IMDG code applies to radioactive materials that have been labeled as Class 7.² Similarly, the UN Recommendations on the Transport of Dangerous Goods, developed by the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labeling of Chemicals, Chapter 2.7 defines Class 7 radioactive material and assigns unique UN numbers to radionuclides.³ The code distinguishes *low specific activity* material for limited specific radioactivity of natural and depleted uranium and thorium as well as their solid waste.⁴ The package needs to be tested for shielding under impact and heat, measured for transport index (TI), i.e. maximum radiation level at 1 meter distance, and the criticality safety index (CSI) for fissile material, and classified according to the radionuclide. Radioactive material that is not classified as *low dispersible* cannot be transported by air, albeit some of these limitations do not apply to sea transport.⁵ The authority on the IMDG code in Turkey is the Ministry of Transport, Maritime Affairs and Communication, Directorate General for Dangerous Goods and Organization of Combined Transport.⁶ The Turkish authority is responsible for the implementation of the code, including the following:

1. Training and certification of all personnel for the handling and transportation of dangerous cargo,
2. Implementing and inspecting a radiation protection program in coordination with the Turkish Atomic Energy Agency (TAEK),
3. Executing a quality inspection of packaging and ensuring adherence to international standards (i.e. IMO and IAEA) in coordination with relevant Turkish authorities on these measures,
4. Authorizing the special transportation of radioactive materials in coordination with TAEK, following the stacking regulations in IMDG,
5. Testing and certifying the packages along with the Turkish Standards Institution,
6. Informing relevant Turkish authorities in case of accidents, theft or sabotage.⁷

Since the Turkish authority is clearly defined, the application of the IMDG code to Turkey is likely to be successful. However, each area of responsibility should be supplemented by detailed plans particular to the transport of nuclear material.

2.1.1.2. INF - International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel Plutonium and High-Level Radioactive Wastes on Board Ships

The implementation of the 2001 code is mandatory in conjunction with Chapter 7 of the 1974 International Convention for the Safety of Life at Sea (SOLAS). According to their aggregate level of radioactivity, the code divides classes of vessels into three as follows:

- Class INF 1: Ships certified to carry materials with aggregate radioactivity less than 4000 tera-becquerels (TBq.)
- Class INF 2: Ships certified to carry irradiated nuclear fuel or high-level radioactive waste with aggregate radioactivity less than 2×10^6 TBq and plutonium with aggregate radioactivity less than 2×10^5 TBq.

- Class INF 3: Ships certified to carry irradiated nuclear fuel, high-level radioactive waste, and plutonium with no restriction.⁸

In the Akkuyu case, the ships that will carry the nuclear fuel, spent fuel, and radioactive waste will be Class INF 1 and INF 2.

2.1.2. IAEA Regulations, Code of Conduct

Historically, the focus of IAEA regulations, addressing the transport of radioactive material, has been on safety (i.e. the IAEA Safety Standard Series; in particular, the 1996 Regulations for the Safe Transport of Radioactive Material, TS-R-1, the latest 2005 version referred to in the Turkish Ministry of Energy and Natural Resources, “Regulation on Safe Transportation of Radioactive Materials”). Additional publications on transport safety include the following:

- NP-061-05 Safety rules at nuclear fuel storage and transporting at nuclear power utilization facilities,
- NP-073-11 Rules for physical protection of radioactive substances and ionization sources during transportation,
- PBYa-06-09-90 Nuclear safety rules for storage and transportation of nuclear hazardous and fission materials.
- NRP-93 Standards for strength computation of transportation packing sets for nuclear fission materials.

IAEA established a network of arrangements regarding the protection of radioactive materials, most notably its INFCIRC/225/Rev.4 from 1999, entitled “Physical Protection of Nuclear Material and Nuclear Facilities” (originally published in 1975 as INFCIRC/225), which complements the 1980 Convention on the Physical Protection of Nuclear Material (CPPNM).⁹ Turkey became party to the INFCIRC/225 in 1986.

In 2004, IAEA published its Code of Conduct on the Safety and Security of Radioactive Sources (IAEA/CODEOC/2004). This revised version of a code originally dated 2001, mostly reflected the concerns following 9/11, of the *deliberate* acquisition of radioactive sources for malicious use, whereas previously the central concerns revolved around theft out of ignorance.¹⁰ According to the code, states should assign transport security levels based on the D-value (i.e. the operational definition of the dangerous source).

In addition, IAEA Board of Governors, GOV/2004/40, identified “Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management” and created international action plans for strengthening the preparedness as well as the response system to nuclear and radiological emergencies.¹¹

Despite this historical focus on safety, IAEA acknowledged the need for an integrated approach to nuclear security against terrorism, as a result of which IAEA Nuclear Security Series, Implementing Guide, Security in the Transport of Radioactive Material was published in 2008. While IAEA’s instructions help to identify the threats and vulnerabilities in transit, it is the State’s responsibility to ensure transport security, designate an independent competent authority to

implement and inspect the legislative and regulatory framework, and establish criminal penalties for non-compliance with the requirements for security in transport.¹² The operator is only responsible for implementing security measures for radioactive material in accordance with national requirements.¹³

Within the international nuclear security regime, Turkey has taken steps to adopt best practices in Akkuyu. After the 2012 Seoul Nuclear Security Summit (NSS), Turkey participated in IAEA technical meetings in July 2012, October 2013, and February 2014 to contribute to the “Draft Implementation Guide on Physical Protection of Nuclear Materials During Transport,” “Implementing the Legislative and Regulatory Framework for Nuclear Security,” and “Draft Implementing Guide on Physical Protection of Nuclear Facilities” respectively in October 2013. The IAEA also organized a workshop on the physical protection of nuclear materials and facilities for newcomers to nuclear power in Ankara.¹⁴ Turkey has also committed to the IAEA “International Physical Protection Advisory Service” follow-up mission.¹⁵ However, Turkey should continue to customize the IAEA resources based on the BOO model with Russia at Akkuyu.

2.1.3. International Civil Aviation Organization (ICAO)

ICAO develops standards and publishes the “Technical Instructions for the Safe Transport of Dangerous Goods by Air”, which contains a list of dangerous goods and the requirements for packing, labeling, and documenting radioactive materials.¹⁶ ICAO also co-sponsors the 2013 IAEA Joint Radiation Emergency Management Plan to be implemented by the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) ad-hoc Working Group on Air and Maritime Transportation to respond to radiation emergencies.¹⁷

In line with the ICAO and IAEA technical regulations, the International Air Transport Association (IATA) publishes annually the “Dangerous Goods Regulations” (DGR).¹⁸ In the Turkish case, the relevant competent authority is the Turkish Civil Aviation Authority.

2.1.4. United Nations Economic Commission for Europe (UNECE)

The commission is the owner of the European Agreement on the International Carriage of Dangerous Goods by Road (ADR), defining the classification, labeling, and packaging of dangerous goods by road in accordance with IAEA regulations.¹⁹ In line with other UN codes, Chapter 2.7 of the agreement is dedicated to Class 7 radioactive materials.²⁰ UNECE also publishes the “Recommendations on the Transport of Dangerous Goods,” known as the *‘orange book.’*²¹

The main competent Turkish authority that is responsible for UNECE is the Ministry of Transport, Maritime Affairs, and Communications, Directorate General for Regulation of Dangerous Goods and Combined Transport.

2.1.5. Convention on the Physical Protection of Nuclear Material (CPPNM)

Signed in 1980, CPPNM covers nuclear materials used for peaceful purposes while they are transported internationally and is the only international legally binding agreement for the physical protection of nuclear materials.²² An amendment, named “Nuclear Security- Measures to Protect Against Nuclear Terrorism,” which was adopted in 2005 however is not yet in full effect, extends its scope to include the domestic use, storage and transportation of nuclear materials and the protection of nuclear materials and facilities against theft and sabotage.²³

Turkey is a member of the CPPNM and fully implements its provisions. Turkey has also ratified its 2005 Amendment in July 2015. Turkish documents usually refer to the international regimes and documents as being sufficient. However, according to Article 2A of the amended convention; “each state party shall establish, implement, and maintain an appropriate physical protection regime applicable to nuclear material and nuclear facilities under its jurisdiction with the aim of protecting against theft and other unlawful taking of nuclear material in use, storage, and transport.”²⁴ Hence the State party, which is Turkey in the Akkuyu case, is responsible for establishing and maintaining a legislative and regulatory framework that covers transport. However, “the responsibility of a state for ensuring that nuclear material is adequately protected extends to the international transport thereof, until that responsibility is properly transferred to another State, as appropriate.”²⁵ Thus, Turkey cannot solely rely on Russian authorities for ensuring physical protection.

3. DOMESTIC FRAMEWORK FOR TRANSPORT SECURITY

National-level measures consist of laws on nuclear security in the national legislature and criminal penalties for law enforcement.

The current nuclear regulatory framework consists of the Turkish legislation and regulations, IAEA safety fundamentals and requirements, and the regulations of the vendor country, being the Russian Federation in the Akkuyu case. The Law on Construction and Operation of Nuclear Power Plants and Energy Sale (5710) passed in 2007, states that the nuclear power plant investment may be based on public, private, or public-private partnerships. The legal framework is built on the Law on Turkish Atomic Energy Authority (2690) of 1982, the Draft Nuclear Energy Law on Waste Management and Decommissioning, and the Environmental Law (2872) which requires an Environmental Impact Assessment (EIA) report.²⁶

One common element in these regulations is that there is no customization for the Turkish system and almost no role for Turkish authorities except inspections by TAEK when necessary. There is heavy emphasis on the operator's responsibility in creating management mechanisms, complying with relevant regulations, bearing all costs, and ensuring the safety and security of transportation.

3.1. Turkish Ministry of Energy and Natural Resources, Regulation on Safe Transportation of Radioactive Materials, No: 25869, 8/7/2005 (Enerji Bakanlığı, Radyoaktif Maddelerin Emniyetli Taşınması Yönetmeliği)

Published on the Official Gazette on July 8, 2005, this regulation covers the protection of individuals and the environment during all stages of the transportation of radioactive material with concentrations of radioactivity exceeding 10 folds of the values referred to in the Annex, based on the 1996 IAEA Regulations for the Safe Transport of Radioactive Material.²⁷ The regulation, under the Turkish Atomic Energy Authority, identifies the numerical limits to radioactivity for each radionuclide and radioisotopes, material quantity per package and per package type (Articles 17-32). It also defines the transport and criticality indexes (TI and CI accordingly) based on the measurement of maximum radiation level at any point within 1 meter distance from the package (Articles 54-58). The packages have to be identified using the appropriate UN labels and an exclusive identification number (Article 63). The packages also have to be tested against water immersion, drops, thermal changes and other factors to test their

containment and shielding (Articles 200-221). Each package containing more than 5 grams of fissile material in 10 liters is subject to multilateral approval (Article 232).

However, the regulation does not specify relevant national and international authorities in response to accidents and the details of an emergency plan (Articles 12 and 13). Inspections on request are referred to the “relevant competent authority” (Article 222).

3.2. Maritime Traffic Regulations for the Turkish Straits²⁸

Pursuant to Article 26 of the Regulation dated 1998, vessels carrying nuclear cargo or waste are required to give notice 72 hours prior to passage and present documents certifying their conformity with IMO standards and other relevant international treaties.²⁹ Passage of such vessels have been subject to the “permission” of the Undersecretariat of Maritime Affairs under the 1994 Regulations,³⁰ which were subsequently amended to its current version taken into account the IMO Maritime Safety Committee Recommendations.³¹ The Implementation Instructions, signed into effect by the Ministry of Transport, Maritime Affairs and Communications on October 16, 2012 provides in its Article 9 that vessels carrying nuclear cargo or waste are to transit through in day time, with a pilot and accompanied by towage and with vessel traffic allowed for that single direction.³²

3.3. Turkish Law No: 5710 Concerning the Construction and Operation of Nuclear Power Plants and Sale of Energy, Draft Nuclear Energy Law (Nükleer Güç Santrallarının Kurulması ve İşletilmesi ile Enerji Satışına İlişkin Kanun)

Entered into force on November 21, 2007, Article 5-4 of the law states that the establishment of a national radioactive waste fund and decommissioning accounts to finance the interim storage and transport of the radioactive material.

According to Article 5-5 of the law, in case of an accident during the transport of radioactive material or waste, the provisions of the 1960 Paris Convention on Nuclear Third Party Liability apply.

Turkey’s Draft Nuclear Energy Law states that the operator will contribute to the waste management fund, through which the Turkish government will establish a national radioactive waste management infrastructure. The contribution of the operator will be proportional to the type, status, and amount of radioactive waste, which the operator may choose to transfer to the national management organization. Nevertheless, since neither the draft law nor its details are publicly available, it is difficult to assess its effectiveness.

3.4. Turkish Atomic Energy Agency, Regulation on Radioactive Waste Management (Türkiye Atom Enerjisi Kurumu, Radyoaktif Atık Yönetimi Yönetmeliği)

Entered into force on March 9, 2013, this regulation covers the safe management of radioactive waste within the scope of nuclear energy and ionizing radiation sources for other purposes.³³ According to the regulation, the costs and management of radioactive waste are under the responsibility of the “person carrying out this activity” (Article 5). Article 6-5 states that “radioactive wastes which are generated as a result of activities carried out outside the boundaries of the Republic of Turkey cannot be transported inside the boundaries for processing, storage or disposal purposes.” Several clauses in the regulation refer to a very broad (i.e. “all necessary measures shall be taken by the authorized person”) approach, which does not designate clear tasks and responsibilities, particularly in case of criticality accidents (Article 10). However, for the safety and security of the radioactive waste facility, it is stated in Article 14 that the “authorized person” for the facility will establish and apply a management system covering all phases, including decommissioning. Characterization and classification of radioactive waste based on radioactivity level are left to the generator of the waste (Articles 19 and 20). Article 26 states that “radioactive wastes shall be collected in the places where they are produced.” However, spent nuclear fuel is only temporarily stored on-site before being transferred to an off-site spent fuel storage facility or radioactive waste facility for reprocessing or disposal, including in another country (Article 52-4). In the Akkuyu case, the spent fuel will be kept for several years in interim storage until it is shipped to Russia.

Regarding transportation, the regulation refers to the “Regulation on Safe Transportation of Radioactive Materials” and renders the “person authorized with operation or decommissioning of the facility” the responsible actor in developing “quality management, radiation protection and on-site emergency procedures for on-site transportation” (Article 27).

3.5. Ministry of Transport, Maritime Affairs and Communication, Regulation on the Transport of Hazardous Materials by Sea (Ulaştırma, Denizcilik ve Haberleşme Bakanlığı, Tehlikeli Maddelerin Deniz Yoluyla Taşınması Hakkında Yönetmelik)

This regulation entered into force on March 3, 2015, and covers the loading, stacking, transportation, unloading, and transport from the ship of hazardous cargo, as party to the International Convention for the Safety of Life at Sea (SOLAS) and Ships International Convention for the Prevention of Pollution (MARPOL 73/78).³⁴

According to the regulation, hazardous cargo carrying ships and vessels have to notify the port administration 24 hours prior to entry, and the hazardous materials brought into the port overland or by rail should be notified at least 3

hours in advance (Article 6). The cargo official is responsible for providing the necessary documents, classification, identification, packaging, and labeling of the cargo in accordance with regulations on hazardous materials, training the relevant personnel on safety and security as well as providing support in case of emergencies and notifying relevant authorities (Article 11-2). The port operator is responsible for the safe mooring of the vessel, loading, handling, and unloading of the hazardous cargo, keeping an up-to-date inventory of the materials, proper packaging and documentation of the cargo, prompt transfer of materials that cannot be temporarily stored in the port, and preparing an evacuation plan (Article 11-3). The captain of the vessel is responsible for requesting all necessary documents and escorts to the hazardous material, conducting safety checks and controls, ensuring safe entry and exit from the port, and notifying relevant authorities in case of an accident (Article 11-4).

The regulation does define monetary fines for violating the provisions in Article 16, however the fines are very minimal (i.e. 1,000 Turkish Liras for lack of appropriate notifications and a maximum of 75,000 Turkish Liras for continued noncompliance with the “Hazardous Substances Compliance Certificate” for three months). Moreover, this regulation has no reference to radioactive materials and special conditions that would apply.

The Akkuyu EIA report refers to the Straits as being already in use for radioactive materials, but states that the issue is out of the scope of the assessment.³⁵ Hence, there is no detailed account of nuclear cargo originating from the Akkuyu plant. The report also almost entirely ignores the possibility of sea accidents, arguing that in the 12 years between 2001 and 2012, the total sea activity in the Antalya, Mersin, Iskenderun, and Taşucu area indicates no risk for explosive and flammable cargo.³⁶ The reference to a “close to ignorable risk” in the report proves that the Turkish government is unprepared and unconcerned towards accidents at sea. On the Russian side, main regulations on the transport of nuclear materials are approved by the Ministry of Natural Resources and Environment of the Russian Federation (Minprirody of Russia), mainly the “Procedure for Companies and Organizations Transporting Nuclear Materials, Radioactive Substances or Associated Products” (July 22, 2009, No. 222).³⁷ According to the Akkuyu EIA report, the Russian procedures that are comparable with the IAEA procedures are covered by these rules, also called as the NP-053-04 on the transport of radioactive materials.³⁸ However, Pekar points to Article 50 of the Russian Environmental Protection Law prohibiting the “import for storing or burying of radioactive waste and materials from abroad.”³⁹ While there are amendments in the Russian legislation to allow temporary storage of spent fuel and waste from reprocessing, Rosatom has not signed any contracts to import spent fuel. Furthermore, Russia currently does not have a facility for reprocessing the Akkuyu plant’s VVER 1200 type spent fuel.⁴⁰

4. TRANSPORT SAFETY

According to a Turkish Ministry of Environment and Urbanization statement, transport and handling of nuclear fuel and analyses of accident scenarios are covered in the Akkuyu EIA report, Section V.2.12.7.11 and the Preliminary Safety Analysis Report, subject to TAEK's approval.⁴¹ Both TAEK and the Turkish Ministry of Transport, Maritime Affairs and Communication are responsible for inspecting the transport of radioactive materials.

In the Akkuyu case, most of the information regarding the routes are publicly available in the EIA report. The highways that are connected to Akkuyu include the Mersin-Antalya highway and the connection road from Akkuyu to Büyükeceli. There are no railroads connected to Akkuyu, nor any commercial or military airports in Mersin. The 10-km air space around the Akkuyu plant is expected to be closed to overflights.⁴² Since there are no other modes of transport nearby Akkuyu, there is heavy emphasis in the report on the responsibilities for the Turkish General Directorate of Highways.

One common objective in the transport of nuclear materials is aiming for short and simple routes to minimize risks. In terms of maritime transport, 80% of the construction material for Akkuyu will be shipped through the Taşucu port in Silifke, and only 20% will be carried by land.⁴³ Taşucu is the closest customs point to Akkuyu. According to the EIA report, there will be one ship coming to Taşucu from Russia each week.⁴⁴ However, once the construction is complete, the Akkuyu project site will include two piers in the east and the west, with no access for third party use.⁴⁵ Turkey aims to minimize land transport in order to optimize its road use.

Turkey does not possess a nuclear waste management facility. According to the IGA with Russia, waste management should be the responsibility of the Akkuyu project company. Furthermore, all spent fuel will have to be shipped back to Russia for storage and possible reprocessing, contingent upon an agreement, which has yet to be negotiated. Currently, there is no plan for handling and transporting spent fuel. The EIA refers to a possibility that the storage units for spent fuel could also be shipped to Russia.⁴⁶ However, it is not clear whether Russia will agree to these terms. Under the assumption that Russia will accept Turkey's terms, the main risks associated with the spent fuel that will come out of Akkuyu concerning Turkey, will be its temporary storage at or near the nuclear plant as well as its transportation from fuel cooling ponds to permanent storage.

4.1. Physical Protection of the Cargo

According to TAEK's Regulation on the Physical Protection of Nuclear Facilities and Nuclear Materials "nuclear materials cannot be transported unless a physical protection plan including the physical protection measures to be taken with regard to the transportation of nuclear materials as well as an emergency action plan is submitted for the approval of the Authority with a confidentiality level of "Top

Secret” and approved by the Authority⁴⁷ (Article 11-3). The “transport physical protection plan” (Article 12-1) notes:

“Before the transportation, the shipper shall submit the transport physical protection plan including the route, alternative routes, resting areas, delivery arrangements at destination, transport transfer transactions; the identifications of the carrier, the receiver and the authorized persons who will accept the delivery; the transport procedures, accident procedures, emergency action plan, identification information and duties of other responsible personnel, information and documents related to reporting, and any other information or document that the Authority may request, to the Authority for approval, with a confidentiality level of “Top Secret”. If it deems necessary, the Authority shall grant approval after carrying out an actual inspection on-site. Transportation cannot be done unless approved by the Authority⁴⁸.

Article 31 calls for the establishment of a temporary transport control center (TCC) to provide communication. The location of this center has not been made public.

Article 32 states that the responsibilities for the physical protection of the cargo shall be determined by an agreement between the shipper and the receiver. This agreement has not been finalized between Turkey and Russia.

While the EIA report also refers to this national physical protection plan for the Akkuyu plant, it is not clear whether this plan is comprehensive and is ready to address possible issues that could arise from the contents of the agreement between Turkey and Russia.

4.2. Public Safety

While the financial risks associated with the storage and removal of spent fuel, as well as decommissioning are under the direct responsibility of the operator, the environmental risks associated with any malfunction in the safe handling of radioactive waste has direct consequences on the Turkish population in the vicinity of the facility and throughout the country. Due to the geographical setting of the facility, any accident at a nuclear power plant would result in cross-border contamination, potentially reaching countries throughout the Middle East, the Mediterranean Sea and the Black Sea in the Turkish case.^s

The EIA submitted initially by Rosatom in June 2013 did not meet the Turkish Energy Ministry’s safety criteria and was re-submitted in 2014 due to “deficient information”.⁴⁹ In April 2014, Akkuyu NPP JSC, filed for the third time with the Turkish Ministry of Environment and Urbanization, the EIA report on the construction project.^{50 51} The report was authorized by the Turkish government in December 2014, however it was later claimed that there was a forged signature of a nuclear engineer on the report.⁵²

According to the EIA, the on-site storage unit at Akkuyu is planned to be used for spent fuel from 4 units for 4 years.⁵³ However, the spent fuel pool is sufficient for 10 years of operation, with the capacity for additional interim storage in case of need.⁵⁴

The EIA states that, historically, there has not been any radiological accident during

the transport of nuclear material with industrial purposes.⁵⁵ It is argued that this success is due to the excellence in international norms and the quantity of nuclear fuel being less than other forms of fuel. Hence, in the Turkish case, it is argued that the emergency plans designed by the IAEA will be sufficient.

TAEK has not been able to select a company to evaluate the Rosatom reactor plans for safety standards. This report is the prerequisite for obtaining a construction license, launching tenders for subcontracts valued at approximately \$8 billion, and starting the construction in 2016.⁵⁶ According to the IGA with Russia, the Turkish side is responsible for facilitating the insurance of licenses and the required permits. In 2014, Turkey finalized the tender required to grant the "Procurement of Technical Support Services for Review and Assessment of Construction License Application of Akkuyu NPP" construction license and TAEK signed the contract with the UJV Rez, a.s. of Czech Republic.⁵⁷

In consideration of possible routes to radiation exposure, the IAEA has established a Q system methodology for each radionuclide considering stochastic health effects in a probabilistic nature, considering accidents due to operating errors, equipment failures, and leaks from sealed sources during transport.⁵⁸ International Commission on Radiological Protection has a guide on "Protection of the Public in Situations of Prolonged Radiation Exposure".

5. TRANSPORT SECURITY AND RISK ASSESSMENT

The EIA appears to be more focused on the safety issues and the physical security of the containers during transportation than with securing the shipment from possible outside threats. There are no evaluations as to how external risks, such as terrorist threats to the vessel carrying the fresh or spent fuel, would be avoided or how the company will coordinate with the “Coast Guard and other relevant public agencies” which have the responsibility for security throughout the Turkish territorial seas. Furthermore, the EIA does not mention security measures beyond the territorial sea.

5.1. Security Measures and Roles for Response

The intergovernmental agreement between the Russian Federation and Turkey states in Article 12/4 that the responsibility for waste management and decommissioning is placed on the project company. However, it is unclear how Akkuyu AŞ will manage the transshipment of fuel and waste to and from Akkuyu NPP.⁵⁹ The EIA report dated 2014 simply mentions that the fuel will be delivered by maritime carriage to the dock at the Akkuyu area and then be transferred directly by road to the NPP.⁶⁰

As the route will include the Straits, and thus Istanbul, which is a densely populated area where the width of the Straits can drop to less than a kilometer, security measures both on board and around the vessel will be required, as well as coordinated measures with land based law enforcement agencies. As for providing security on the vessel, there is precedent for armed guards being used (case of Pacific Pintail and Pacific Teal in 1999). Indeed, Article 35 of the TAEK Regulation on Physical Protection calls for armed personnel. However, who will provide the armed security personnel is not clear. As the Coast Guard jurisdiction and responsibility under its law does not include providing such protection for private parties, this will likely fall on Akkuyu AŞ. A private security company will probably need to be set up as the task requires specialized and specifically trained personnel. Unless specific provisions are agreed upon by a possible agreement on transfer, as envisaged by Article 12/2 of the IGA, an Act concerning Private Security Services⁶¹ would be applicable for such shipment originating from and traversing Turkish territory. The Act asserts that the establishment of private armed security units or utilizing the services of a private armed security companies is subject to the permission of the Provincial Governor, without prejudice to international obligations concerning security in ports and airports (Article 3). The establishment of private security companies itself is subject to the permission of the Ministry of the Interior, and the provision of such services by aliens is subject to the condition of reciprocity (Article 5).

At present time, the Ministry of Transportation, Maritime Affairs and Communication does not permit the use of private armed security personnel on board Turkish flagged vessels even for passage through the Gulf of Aden, where pirate attacks are frequent.⁶² However, the same ministry is currently working on legislation to allow and regulate private armed security personnel on board Turkish flagged vessels.⁶³ Even in the case of a foreign flagged vessel being used to transport the fuel or waste, ports being the territory where the coastal State has complete jurisdiction, the matter of private armed security personnel will need to be specifically addressed either in the form of a permission to be granted to Akkuyu AŞ under the Act concerning Private Security Services or specific provisions in an agreement under IGA Article 12/2.

On board security needs to be complemented by other security forces on sea. This task obviously falls within Coast Guard capabilities. According to Article 35 of the TAEK "Regulation on the Physical Protection of Nuclear Facilities and Nuclear Materials," transports of nuclear materials by sea shall be under the guard and escort of the Turkish Coast Guard Command during the shipment within territorial waters of Turkey as well as the loading and unloading at Turkish ports.⁶⁴ Interestingly, the regulation calls for Coast Guard escort only until the vessel clears Turkish territorial waters. However, Coast Guard law also empowers it in the Turkish Exclusive Economic Zone beyond territorial sea to discharge the duties it is assigned under national law.⁶⁵ The type of the guard is undefined for transport by road, rail, or air.

Shore based precautions are also needed: As the breadth of the Straits are narrow, it essentially takes only a few minutes by a fast boat to reach the vessel from any number of mooring areas or even the boathouses of *yalis* on the Bosphorus. As such, the geological conditions of the potential route for Akkuyu's fuel and waste necessitate Turkish policy makers and security elite to contemplate a comprehensive plan, which should encompass an exhaustive threat analysis, for ensuring the physical security of the radioactive cargo.

5.2. Risks

The main security risks associated with the transport of nuclear material are protests, terrorist attacks, theft, diversion, and sabotage. Turkey's proximity to the active conflicts in the Middle East and instability that stems from domestic terrorism add to these risks.

International protests so far have targeted transshipments through third State waters. In 1992 shipment from Japan had to stay clear out of South African and Portuguese EEZs as they demanded. In 1995 *Pacific Pintail* carrying spent fuel was banned from the EEZs of Argentina, Chile, Brazil, South Africa, Nauru and Kiribati and the territorial seas of Antigua, Colombia, Dominican Republic and Porto Rico. Chile went as far as threatening to send its warships if the vessel did not leave the calmer waters of its EEZ, where the vessel had turned to escape the perilous conditions off Cape Horn.⁶⁶ On numerous occasions, CARICOM and the Pacific Islands Forum have issued objections to the transit of nuclear shipments through their waters.⁶⁷

The decommissioning of the nuclear reactor from San Onofre NPP in Southern

California may be a precautionary account. Burial in California or transporting it across the US to South Carolina where it was to be buried were “rejected because of US laws governing the disposal of nuclear wastes and because of liability concerns”.⁶⁸ Instead, the US planned to ship it by a sea journey around South America, the southern tip being one of the most dangerous maritime passages. This plan too had to be abandoned following a warning by Argentinian officials to the effect that the vessel would be intercepted and escorted out if it attempted to pass through its EEZ. This came after an Argentinian court order prohibiting this passage, citing the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal.⁶⁹ Nuclear cargo is at its most vulnerable point during shipment.⁷⁰ By boarding a vessel carrying MOX fuel during its passage through the Panama Canal in 1998, Greenpeace has demonstrated that the cargo is even more at risk from threats in narrow waterways.⁷¹

Luckily for Turkey and Russia, Akkuyu fuel and waste will not need to cross any other areas than Turkish and Russian territorial sea and EEZ. However, if another NPP is indeed built in Sinop, it is likely that the transshipment will have to traverse the Mediterranean to be processed elsewhere. As such, Turkish authorities will have to consider the implications of nuclear fuel and waste transshipment from both a security and safety perspective and from the perspective of bilateral relations in the Sinop project.

Curiously, the EIA refers to getting prior “authorization” from the “transited countries” when planning the route that the shipment of spent fuel shipment will take.⁷² It is unclear whether this statement envisages that the shipment of spent fuel, which will have to be the subject of a separate treaty, will be made through the land route while the original fuel will declaredly reach Mersin by the sea route.

A brief look at the history of protests from States, to the effect that they will not allow passage of nuclear cargo through their territorial sea or EEZ, reveals that Turkey (or the carrier) may have to face serious challenges. If spent fuel is to be processed in a facility other than in Russia then the likely route out of the Mediterranean will take this ultra-hazardous cargo through waters between Libya and Malta, where mass irregular migration has already put strains on policing maritime areas. The fight against migrant smugglers has led to the securitization of border controls. Even the United Nations Security Council has felt compelled to endorse Chapter VII measures on the matter.⁷³ In addition, the volatile situation in Libya with rivalling authorities, one being the UN-backed government and the other in Tripoli backed by powerful militias, should be taken into account when planning for the voyage. Malta, which is just around 200 nautical miles (nm) across from Libya and requires prior notification of hazardous cargo through its territorial sea⁷⁴, is not likely to lean towards a route closer to its shores.

The maritime shipment of fuel from (and the likely shipment of the waste back to) Russia by way of the Aegean may also engender political and legal complications. In the current state of 6 nm territorial sea, plotting a route through the high seas without entering the Greek territorial waters is possible. However, the Aegean Sea is already the subject of multiple jurisdictional disputes between the parties. In 1995, the Turkish parliament declared in a plenary session that in the event of extension by Greece of its territorial sea in the Aegean to 12 nm (which would close off a route between the Mediterranean and the Black Sea through the high

seas), the parliament would “grant the Government all authority including military, to protect and defend the country’s vital interests” in a joint statement by all “political parties represented in the legislature”.⁷⁵ The dispute concerning the delimitation of the continental shelf is currently in a standstill following the Bern agreement of 1976 to refrain from unilateral acts. While the continental shelf grants coastal States rights over the seabed and subsoil without prejudice to the status of the waters above as high seas, it may still be a relevant consideration as it serves as a template for EEZ⁷⁶ declarations. It also demonstrates how tensions tend to lead to confrontations in this area.⁷⁷ Given that the international practice mentioned above favors coastal State restrictions over passage of ultra-hazardous cargo and that the regional environmental treaties mentioned below contain obligations, which emphasize the protection of the environment, the possibility of protests from Greece should not be overlooked.

While the safety and security of the facility is the primary responsibility of the operator, in this case the Russian Federation, it is the Turkish government’s responsibility to minimize terrorist threats against nuclear facilities on Turkish soil and in Turkish waters. Turkey is responsible for responding to calls for security support, preventing unauthorized groups getting close to sensitive sites, and protecting against plane, truck, missile, and long-range bomb attacks.⁷⁸

In the NTI 2016 index, among 152 countries without weapons-usable nuclear materials, Turkey ranks 27th in the “most favorable nuclear materials security conditions” against theft category, with an overall score of 77 out of 100.⁷⁹ Turkey also scored 93/100 and ranked 12th in global norms, 93/100 and ranked 22nd in domestic commitments and capacity. Considering that the country remains a nuclear newcomer and its capabilities will improve in order to overcome the challenges posed by Akkuyu and its other nuclear undertakings, these rankings suggest that Turkey is at a relatively good place to start. Yet the country’s risk environment score and ranking have been considerably lower, with a score of 39/100 and ranking 103rd.⁸⁰ In consideration of its geographical proximity to regions with active conflict, Turkey will need to take a proactive stance on transport security of nuclear materials.

Concerns of an ISIS radiological dispersal device (RDD), known as dirty bomb, and catastrophic nuclear terrorism are worrisome. In November 2015, 10 grams of Ir-192 capsules, a radioactive isotope of iridium and a Category 2 radioactive source according to the IAEA, were stolen from a storage facility near Basra belonging to the US oilfield service company Weatherford. The gamma rays in this isotope is used to test materials in oil and gas pipelines, owned by the Istanbul-based SGS Turkey company. While the material was eventually found dumped next to a gas station in Zubair, 9 miles south of Basra, neither SGS nor Weatherford claimed responsibility for the facility’s security. Only months after, a suspect linked to the Paris bombers, Mohammed Bakkali was found with surveillance footage of high-ranking Belgian nuclear official at the Mol nuclear research facility on radioactive waste, raising fears that ISIS is intending to obtain radioactive material. Judging from these incidents, it is clear that Turkey has to adopt a robust mechanism to enhance its nuclear security measures, particularly against theft during transport.

6. CONTINGENCIES AND LIABILITY

A critical issue in ensuring the safety and security of the cargo, environment and human life is the existence of sound contingency planning and a satisfactory liability regime. The aforementioned troubled planning for the shipment of the decommissioned nuclear reactor from San Onofre by the US, may be a cautionary example in this regard as well. The Department of Transportation had initially objected to the maritime transport around South America as it found out that Southern Californian company, Edison, needed to draw up more realistic plans for salvage in case of sinking. The State Department also demanded that the company show detailed salvage contingency plans and an adequate liability insurance.⁸¹

The 2014 EIA states that Russian companies are among the foremost establishments handling such shipment, appear to rely mainly on the specialized training of the personnel they employ and require that all vessels engaged in carriage of radioactive or nuclear material, have an emergency action plan for accidents.⁸² Nonetheless, the Turkish side cannot solely rely on entrusting the Russian companies, but should rather be engaged actively in the contingency planning process.

6.1. Contingency Response Planning and Salvage

Under Law No.5902, the Disaster and Emergency Management Authority attached to the Prime Minister's Office (AFAD) is in charge of coordinating the response to radiological events. The report prepared by the Working Group on Technological Disaster Risk Reduction identified the "integration of maritime emergency management into the national emergency management for effective assistance and cooperation" as one of the actions that need to be undertaken. To this end, Action 2.6 includes "planning, measures and intervention for nuclear and radioactive pollution at sea" and foresees legislative and planning preparations.⁸³ AFAD and TAEK are among the authorities responsible for the action, and Coast Guard Command is the relevant authority.

The Turkish Armed Forces have radiological and nuclear response capabilities in the form of CBRN Defense Battalion and CBRN Special Response Force.⁸⁴ However, as their primary objective is responding to the use of CBRN in armed conflicts and to ensure continuity of military activities, their relevance for contingency planning in a maritime transportation would probably be limited. It should also be noted that while the Coast Guard is within the organizational structure of the Turkish Armed Forces, it serves under the orders of the Ministry of Interior during peacetime.⁸⁵

The 2014 dated EIA does not properly address the prevention of, emergency planning for or dealing with accidents or attacks during transportation of fuel or waste. Coupled with the apparent lack of general regulation and coordination

for radiological or nuclear incidents at sea, the need for an in depth EIA for the transportation of fuel and waste should be emphasized even more.

6.2. Liability Regime

Turkey is party to the Paris Convention on Third Party Liability in the Field of Nuclear Energy and the 2006 Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, but not the 2004 Protocol to Amend the Paris Convention. Turkey, Russia and Japan are not parties to the 1971 Convention relating To Civil Liability in The Field of Maritime Carriage of Nuclear Material, which exonerates the carrier for liability in a nuclear accident if the operator of the facility from which the nuclear cargo was transported is already liable under the Paris Convention.

The provisions of the Paris Convention and the Vienna Convention are not explicitly incorporated into the Turkish national law. Article 5(5) of Law No.5710 on Construction and Operation of Nuclear Power Plants and Energy Sale simply states that the Paris Convention as well as other international and national regulations are applicable in case of “accidents during carriage of nuclear fuel or radioactive waste.” Other relevant national legislations include Article 71 of the Law on Obligations holding the operator of facilities that involve “significant danger” responsible for damages; and Article 3(g) and Article 28 of the Law on Environment, which incorporates the ‘polluter pays’ principle. The Paris Convention puts a maximum of 15 million SDR on the operator’s liability. However, it has been reported that Turkey’s Draft Nuclear Energy Liability Law calls for the establishment of a nuclear damage determination commission exceeding the limits of the operator liability, and requires the operator and nuclear fuel carrier to guarantee and insure the plant for possible damages.⁸⁶ The draft law enforces a strict liability for both the operator of the nuclear facility and the carrier of nuclear materials up to a maximum limit, with also an obligation to take liability insurance up to that limit. The carriers are given the option of posting a guarantee instead of insurance. The State is responsible for damages exceeding this upper limit.⁸⁷ Although there are general principles applicable to the issue of liability of the carrier under the Turkish private law and the reference in Article 5 of Law No. 5710, which incorporates the provisions of the relevant treaties⁸⁸, the enactment of a specific legislation envisaged in this draft law would allow for more accuracy.

7. REGIONAL CHALLENGES

Even though the route of the shipment of the fuel and radioactive waste could be arranged to transit only through Turkish and Russian maritime areas, protection of the marine areas is a common interest to all riparians of shared seas and as such is subject to international obligations and even third party compliance mechanisms.

7.1. International Law Rights and Obligations concerning Transshipment of Nuclear Materials

Past objections and protests against the shipment of nuclear cargo have claimed that environmental rights allowed a coastal State to restrict the rights of innocent passage through their territorial seas, even restrict the freedom of navigation in the EEZ. While possible maritime carriage of nuclear fuel to and waste from Akkuyu NPP will not traverse maritime areas of third party States and so will not have to deal with any “ban” on transit, it will still have to comply with international rules on the protection of marine environment. These rules represent the application of the precautionary principle and the duty of cooperation. Moreover, these rules are applicable not only by virtue of general international law, but also are enshrined in specific regional treaties. Turkey is a party to these treaties, namely, the Bucharest Convention on the Protection of the Black Sea Against Pollution of 1992 and the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution of 1976 as amended in 1995. The precautionary principle requires “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason to postpone cost-effective measures to prevent environmental degradation.”⁸⁹ Of specific relevance to the subject at hand, this principle is enshrined in the Barcelona Convention Article 4 using the same wording. The concrete ways and means by which this principle would be put into effect are the preparation of the EIA of the activity and the duty of consultation.

Recently, the International Court of Justice (ICJ) has held that the preparation of an EIA is, “a practice, which in recent years has gained so much acceptance among States that it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context.”⁹⁰

The 2014 EIA on Akkuyu is very sparse on the impact assessment of the carriage of the fuel and waste by sea. There may be two reasons for this: Firstly, neither the current Environmental Impact Assessment Regulation of 2014 in its Annex I nor do any of the previous regulations that may have been applicable to the Akkuyu project after the project begun with the IGA in 2010 list “carriage” of nuclear or radioactive material among projects subject to EIA.⁹¹ The other more pragmatic reason appears to be complacency of the fact that radioactive materials have already transited to Russia through the Turkish Straits⁹² without any incidents. However, now the case is quite different from when Turkey was simply the transit

State between two third parties instead of the actual origin country. Moreover, the domestic legislation leaving the carriage radioactive materials outside of the scope of EIA requirements do not absolve a State of its international obligations. It is worth reminding that one of the significant cases where the inadequacy of the EIA was among the concerns was the Sellafield MOX Plant Case between the UK and Ireland concerning the carriage of spent radioactive fuel in the Irish Sea between the two States.⁹³

Another international obligation regarding hazardous transboundary activities is the duty of cooperation. The duty of cooperation for “States bordering an enclosed or semi-enclosed sea ... in the exercise of their rights and in the performance of their duties ... to coordinate the implementation of their rights and duties with respect to the protection and preservation of the marine environment”⁹⁴ is not only a general principle of international law,⁹⁵ but also is frequently relied upon by Turkey in the context of Aegean Sea disputes with Greece.

The Bucharest Convention Article 14 also calls on States to “cooperate in preventing pollution of the marine environment of the Black Sea due to hazardous wastes in transboundary movement.” The Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal of 1996 annexed to the Barcelona Convention goes even further in its Article 6(4) through asserting that “the transboundary movement of hazardous wastes through the territorial sea of a State of transit only takes place with the prior notification by the State of export to the State of transit.” Turkey has become party to this protocol in 2004 and it has entered into force in 2008. It is of course possible to plot a course for navigation without entering the territorial waters of Greece in the Aegean. Indeed, if the EIA is taken as a quasi-official then “prior authorization” (going one step further from the notification requirement of the Protocol to the Barcelona Convention) from the transit country (i.e. Greece) would need to be negotiated. To avoid this, the route would need to keep to the high seas portions of the Aegean or within the narrow band of Turkish territorial waters, very close to the shore. However, in the latter scenario nearly the whole voyage would have almost the same characteristics as travelling through the Straits. Moreover, no matter the route, the unavoidable proximity to Greek territorial waters would probably leave Greece keen to remind Turkey of its obligations, including an EIA for the transportation itself.

7.2. Compliance

The region in consideration already suffers from tensions concerning hydrocarbon exploration, as Turkish challenges to delimitation agreements remain in place. Turkey may have to explain its position concerning the carriage of nuclear materials at the Compliance Committee of the Barcelona Convention under such a political backdrop. The Compliance Committee is a non-adversarial mechanism set up to help Member States to better implement the convention. Turkey may apply to the committee within its own initiative or another Member State may refer an issue to the attention of the committee. Yet the committee produces neither judgments nor binding decisions, but mere recommendations to assist the Member State in bringing their operations into conformity with the Barcelona Convention.

8. RECOMMENDATIONS AND CONCLUSION

While Turkish authorities have found refuge in referring to the intergovernmental agreement with Russia and to Turkey's membership to the global nuclear-related regimes, a closer look at the domestic legislative and regulatory frameworks for transport reveals that Turkey is hoping for the best scenario in avoiding risks.

According to a Turkish media report dated February 20, 2014, the IAEA Integrated Nuclear Infrastructure Review (INIR) on the Akkuyu nuclear power plant, which the Turkish Energy Ministry refused to share with a local court, stated that Turkey should define a national policy for the "front and back-end" of the nuclear fuel cycle (i.e. identify national responsibilities for the disposal of spent fuel and radioactive waste).⁹⁶ While this issue remains unresolved, there are a number of transport related issues that Turkish decision makers need to address in their consultations with the Russian authorities.

- A more detailed Environmental Impact Assessment is needed to assess the risks associated with the transport of nuclear material, especially in reference to the roles of relevant Turkish authorities and their action plans.
- All staff with access to nuclear facilities and transport should be carefully vetted, selected, and trained.
- Turkey should clearly define the penalties for illegal possession and trafficking of nuclear materials, including during transport, as well as the protocols for local and national law enforcement.
- Since Turkey will be outsourcing nuclear fuel and shipping spent fuel to Russia, the national plans and procedures for secure interim storage and transportation of spent fuel and radioactive waste should be agreed upon by all stakeholders.
- The physical protection system and safety response systems should be customized to Turkey and close coordination amongst these systems should be established.
- Turkish stakeholders should be ready to evaluate, prepare, and agree upon detailed and long-term plans and procedures to minimize risks related to radioactive waste. As such, cost estimates and contingency planning should be revised more thoroughly. These plans and procedures should also clearly identify the decommissioning stages, size and location of long-term radioactive and hazardous material storage and dump sites in order to reassure all stakeholders.⁹⁷
- All stakeholders should prepare and agree on precise plans and procedures for contingency planning, which involve all stages of transport.
- The precise manner of transportation of fuel and waste need to be determined with Russia. If the deployment of private armed security on board is foreseen, legislation needs to be enacted. In any case, modality and procedures for information sharing and cooperation between land-based law enforcement agencies and the Coast Guard need to be established.

1. The code is updated every two years.
2. International Maritime Dangerous Goods Code, 2006 edition, International Maritime Organization, London, 2006, at: <https://law.resource.org/pub/us/cfr/ibr/004/imo.imdg.1.2006.pdf>
3. <http://www.oecd.org/chemicalsafety/risk-assessment/48772773.pdf> p/ pp. 129-158. United Nations Committee Of Experts on the Transport of Dangerous Goods, Recommendations on the Transport of Dangerous Goods: Model Regulations, Rep. ST/SG/AC.10/1/Rev.14, United Nations, New York (2001).
4. Ibid, p. 89.
5. Ibid, p. 110.
6. "Ulastirma, Denizcilik ve Haberlesme Bakanligi Tehlikeli Mal ve Kombine Tasimacilik Duzenleme Genel Mudurlugu," at: http://www.kugm.gov.tr/BLSM_WIYS/TMKDG/tr/Mevzuat/Talimatlar/20131001_102445_64574_1_64896.pdf
7. Ibid.
8. "Nuclear Transport Facts," World Nuclear Transport Institute, at: <http://www.wnti.co.uk/nuclear-transport-facts/regulations/sea.aspx>
9. Nilsu Goren and Aviv Melamud, "'A Regional Arrangement on Securing Radiological Agents as a CSBM,'" in Harald Muller, Daniel Mueller, eds. WMD Arms Control in the Middle East: Prospects, Obstacles, and Options, February 2015, Ashgate.
10. Gareth Evans and Yoriko Kawaguchi (co-chairs), "Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers," *Report of the International Commission on Nuclear Nonproliferation and Disarmament*, 2009, p. 120.
11. "Joint Radiation Emergency Management Plan of the International Organizations," International Atomic Energy Agency, 2013, at: http://www-pub.iaea.org/MTCD/publications/PDF/EPRJplan2013_web.pdf Appendix A, p. 5.
12. "Security in the Transport of Radioactive Material," IAEA Nuclear Security Series, No.9, at: http://www-pub.iaea.org/MTCD/publications/pdf/pub1348_web.pdf p. 10.
13. Ibid, p. 11.
14. "Nuclear Security Summit 2014, National Progress Report, Turkey," 2014.
15. "EU Statement- United Nations Preparatory Committee on the Treaty on Nonproliferation of Nuclear Weapons: Cluster III," May 5, 2014, at: http://www.eu-un.europa.eu/articles/en/article_14987_en.htm
16. "Technical Instructions for the Safe Transport of Dangerous Goods by Air," International Civil Aviation Organization, Document 9284, at: <http://www.icao.int/safety/dangerousgoods/pages/technical-instructions.aspx>
17. "Joint Radiation Emergency Management Plan of the International Organizations," International Atomic Energy Agency, 2013, at: http://www-pub.iaea.org/MTCD/publications/PDF/EPRJplan2013_web.pdf p. 17.
18. "International Civil Aviation Organization Technical Instructions," World Nuclear Transport Institute, at: <http://www.wnti.co.uk/nuclear-transport-facts/regulations/air-postal.aspx>
19. "European Agreement concerning the International Carriage of Dangerous

- Goods by Road,” World Nuclear Transport Institute, at: <http://www.wnti.co.uk/nuclear-transport-facts/regulations/land.aspx>
20. “Class 7: Radioactive Materials,” United Nations Economic Commission for Europe, at: <https://www.unece.org/fileadmin/DAM/trans/danger/publi/adr/adr2005/English/Part2c.pdf>
 21. “Transport: Introduction,” United Nations Economic Commission for Europe, at: <http://www.unece.org/trans/danger/what.html>
 22. “Convention on the Physical Protection of Nuclear Materials,” International Atomic Energy Agency, at: <https://www.iaea.org/Publications/Documents/Conventions/cppnm.html>
 23. “Nuclear Security- Measures to Protect Against Nuclear Terrorism: Amendment to the Convention on the Physical Protection of Nuclear Material,” IAEA GOV/INF/2005/10-GC (49)/INF/6, at: <https://www.iaea.org/About/Policy/GC/GC49/Documents/gc49inf-6.pdf> The amendments will take effect once they have been ratified by two-thirds of the States of the Convention, yet only 94 states out of the required 101 have ratified it.
 24. Ibid, p. 5.
 25. Ibid, p. 6.
 26. Serhat Kose, “Recent Status of Nuclear Program in Turkey,” Turkish Atomic Energy Authority, Workshop on Introduction of Nuclear Power Program Management and Evaluation of a National Nuclear Infrastructure, February 8-11, 2011, Vienna, at: http://www.iaea.org/NuclearPower/Downloadable/Meetings/2011/2011-02-TM-WS-Vienna/Day-1/Kose_Turkey.pdf
 27. “Radyoaktif Maddenin Guvenli Tasinmasi Yonetmeligi,” The Official Gazette, <http://www.resmigazete.gov.tr/eskiler/2005/07/20050708-16.htm>
 28. Official Gazette, 6/11/1998, no. 23515, Mukerrer.
 29. The Turkish Straits User’s Guide further provides that “The Turkish Straits Vessel Traffic Services and, if necessary the [the Undersecretariat for Maritime Affairs], based upon the data provided by such vessels, shall inform the relevant vessel’s owner, operator or master, of the requirements and recommendations, if any, necessary to ensure a safe passage of the vessel through the Turkish Straits, taking into consideration all specifications of the vessels including the dimensions and maneuvering capabilities, the morphological and physical structure of the Turkish Straits, the condition of the season the navigation, safety of life, property and environment as well as the maritime traffic.”
 30. Official Gazette 11/1/1994, no. 21815.
 31. IMO Doc. Res. A. 19/827 “ Routing Measures Other than Traffic Separation Schemes Rules and Recommendations on Navigation through the Strait of Istanbul, the Strait of Çanakkale and the Sea of Marmara”.
 32. “Turk Bogazlari Deniz Trafik Duzeni Tuzugu Uygulama Talimati,” December 24, 2012, at: http://www.canakkaleliman.gov.tr/main.php?module=deytaweb site&page=pgnewsdetail&news_id=961
 33. “Radyoaktif Atik Yonetimi Yonetmeligi,” The Official Gazette, March 9, 2013, at: <http://www.resmigazete.gov.tr/eskiler/2013/03/20130309-4.htm>

34. "Tehlikeli Maddelerin Deniz Yoluyla Tasinmasi Hakkinda Yonetmelik," March 3, 2015, at: <http://www.resmigazete.gov.tr/eskiler/2015/03/20150303-6.htm>
35. EIA, X, p. 14.
36. EIA, XI, pp. 36-37.
37. "Akkuyu Nükleer Santralinin Lisanslanmasinda Esas Alinacak Mevzuat, Kilavuz ve Standartlar listesi," at: <http://www.enerji.gov.tr/File/?path=ROOT%2F1%2FDocuments%2FSayfalar%2FAkkuyu+Nükleer+Santralinin+Lisanslanmasında+Esas+Alınacak+Mevzuat%2C+Kılavuz+ve+Standartlar>Listesi.pdf>
38. EIA, V.2.1-2.5, p. 111.
39. Pekar, p. 5.
40. Pekar, p. 9.
41. "Akkuyu Nükleer Santrali'nin CED raporu onaylandı," *CNN Turk*, December 1, 2014, at: <http://www.cnnturk.com/haber/turkiye/akkuyu-nukleer-santralinin-ced-raporu-onaylandi>
42. EIA, IV.3.1-3.10, p. 51.
43. EIA, V.1.1.-1.28, p. 71.
44. EIA, V.1.4, p. 21.
45. EIA, V.1.5, p. 22.
46. EIA, V.2.11-2.14, p. 159.
47. "Nükleer Tesislerin ve Nükleer Maddelerin Fiziksel Korunmasi Yonetmeliği," *The Official Gazette*, May 22, 2012, at: <http://www.taek.gov.tr/belgeler-formlar/mevzuat/yonetmelikler/nukleer-guvenlik/Nükleer-Tesislerin-ve-Nükleer-Maddelerin-Fiziksel-Korunması-Yönetmeliği/>
48. Ibid.
49. "Akkuyu EIA report turned down by Environment Ministry," *Sunday's Zaman*, July 28, 2012, at: <http://www.todayszaman.com/news-322112-akkuyu-eia-report-turned-down-by-environment-ministry.html>
50. "Akkuyu NPP JSC has filed to authorities of the Turkish Ministry of Environment and Urbanization the EIA Report of the Akkuyu NPP," Akkuyu NPP JSC, Nuclear Industry News, April 8, 2014, at: <http://www.akkunpp.com/akkuyu-npp-jsc-has-filed-to-authorities-of-the-turkish-ministry-of-environment-and-urbanization-the-eia-report-of-the-akkuyu-npp-project/update>
51. "Environment report for Turkey's first nuke plant re-submitted," *Hurriyet Daily News*, April 6, 2014, at: <http://www.hurriyetdailynews.com/environment-report-for-turkeys-first-nuke-plant-re-submitted.aspx?pageID=238&nID=64613&NewsCatID=348>
52. <http://www.cnnturk.com/haber/turkiye/akkuyu-nukleer-santralinin-ced-raporu-onaylandi> and <http://www.radikal.com.tr/turkiye/akkuyu-nukleer-santrali-ced-raporunda-sahte-imza-skandali-1270315/>
53. EIA, V.2.2, p. 100.
54. EIA, V.2.2, p. 100.
55. EIA, V.2.11, p. 157.
56. Coskun and Pamuk, "Turkey's first nuclear plant faces further delays," 2014.
57. <http://www.taek.gov.tr/en/latest-news/337-news-flash/1304->

58. "Security in the Transport of Radioactive Material," IAEA Nuclear Security Series, No.9, at: http://www-pub.iaea.org/MTCD/publications/pdf/pub1348_web.pdf p. 15.
59. On the other hand, Article 6 of the Essential Elements on the Host Government Agreement Annex to the Agreement between Turkey and Japan on Cooperation for the Development of Nuclear Power Plants and the Nuclear Power Industry leaves this to the responsibility of Turkey with the Project Company contributing to the cost. Practical considerations on the manner of transport considered in this part of the present report still apply though. (RG 23.05.2015 - 29364)
60. EIA Report, 2014, p.100 of Chapter V.2.2.2.
61. RG 26/6/2004 Sayı :25504
62. T.C. Ulaştırma, Denizcilik ve Haberleşme Bakanlığı, Deniz ve İçsular Düzenleme Genel Müdürlüğünün 26.03.2012 tarih ve B.02.1.DNM-4229 sayılı yazısı
63. "Turk gemilerine silahlı özel güvenlik," *En Son Haber*, April 20, 2013, at: <http://www.ensonhaber.com/turk-gemilerine-silahlı-ozel-guvenlik-2013-04-20.html>
64. "Nükleer Tesislerin ve Nükleer Maddelerin Fiziksel Korunması Yönetmeliği," The Official Gazette, May 22, 2012, at: <http://www.taek.gov.tr/belgeler-formlar/mevzuat/yonetmelikler/nukleer-guvenlik/Nukleer-Tesislerin-ve-Nukleer-Maddelerin-Fiziksel-Korunması-Yonetmeliği/>
65. Coast Guard Command Law, art.4(A).
66. VanDyke, ODIL 1996, 386-7.
67. For detailed account, VanDyke, "Ocean Transport of Radioactive Fuel and Waste" in *The Oceans in the Nuclear Age*, Caron and Scheiber (ed.s), 2010, pp.152-156.
68. VanDyke, 2010, p.156
69. *ibid.* p.158. In fact art.1 of Basel Convention excludes radioactive waste which "are subject to other international control systems" from its scope.
70. INFOCIRC 225/Rev.4 (corr), art.8.1.1
71. Han, Çelikpala, Ergün, Nuclear Security: A Turkish Perspective, edam, p.60.
72. EIA Report, 2014, p.109 of Chapter V.2.2.2
73. UNSC res.2240(2015) authorizing States operating in the region to take forcible measure against smuggler vessels on the high seas.
74. VanDyke, ODIL, 2002, p.86.
75. TBMM Tutanak Dergisi, Dönem 19, Yasama yılı 4, Cilt 88, 121. Birleşim, 8.6.1995, Perşembe, p.136-7.
76. The EEZ includes sovereign rights over natural resources of the seabed, subsoil and the water column thus is concurrent with the continental shelf when declared. However while the continental shelf rights are *ipso facto*, EEZ only exists if and when declared.
77. Tensions arose twice before between Turkey and Greece concerning continental shelf rights, once in 1974 which led to Greece referring the matter to the UN Security Council and the ICJ simultaneously and once again in 1987 when after declarations of intent to "take action" by both sides, the situation was quelled through diplomatic means. (Fuat Aksu, *Türk Dış Politikasında Zorlayıcı Diplomasi*,

- Bağlam Yayıncılık, Ankara, 2008, p.167, 169.)
78. Or, Saygin, Ulgen, 2011, p. 39.
 79. "The 2016 NTI Nuclear Security Index: Theft and Sabotage, Building a Framework for Assurance, Accountability, and Action," Nuclear Threat Initiative, Third Edition, January 2016, pp. 22-23, 27.
 80. Ibid.
 81. Van Dyke, Ocean Transport, p.157.
 82. EIA Report, 2014, p.109 and p.121 of Chapter V.2.2.2
 83. 2014-2023 Technological Disasters Roadmap Document, 2014, AFAD, p.30 and 31.
 84. For detailed explanations on these see, *Nuclear Security: A Turkish Perspective*, EDAM, 2015, p.62-64.
 85. Coast Guard Command Law, art. 2.
 86. Necip Kağan Kocaoğlu, "Nükleer Tesis İşletenin Hukuki Sorumluluğu: Karşılaştırmalı ve Uluslararası Özel Hukuk Analizi", Ankara Barosu Dergisi, cilt.68, sayı 2010/2, s.58.
 87. Başak Başoğlu, "Nükleer Santral İşletenlerin Hukuki Sorumluluğu", presentation in Conference on Legal, Political and Ecological Aspects of Nuclear Energy, Istanbul Bilgi University, 25 June 2014, Istanbul.
 88. These would have been applicable even without this incorporation by virtue of article 90 of the Turkish Constitution which provides that the treaties which Turkey is party to have the same hierarchical status as laws in the Turkish legal system.
 89. Principle 15, Rio Declaration on Environment and Development.
 90. Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, 2010, para.204. Neither of the parties before the Court in this Case were signatories of the 1991 Espoo Convention on Transboundary EIA thus making an EIA prior to undertaking an activity which may cause significant harm is now considered a customary international rule.
 91. For the current Environmental Impact Assessment Regulation see, Official Gazette, 25 November 2014 no. 29186. For the 2013 Regulation repealed by the 2014 Regulation, Annex I list see, Official Gazette 3/10/2013, no. 28784; for the 2008 Regulation, Annex I list repealed by the 2013 Regulation see, Official Gazette 11 July 2008, no. 26939.
 92. EIA 2014, Section X, p.14.
 93. The MOX Plant Case (Ireland v. United Kingdom), (Provisional Measures, Order of 3 December 2001) ITLOS No. 10, and MOX Plant Arbitration (Jurisdiction) (2003) PCA (www.pca-cpa.org)
 94. UNCLOS art.123.
 95. The MOX Plant Case (Ireland v. United Kingdom), ITLOS, Order of 3 December 2010, para.82.
 96. Tolga Tanis, "IAEA 'secret' report reveals Turkey's nuclear duties," *Hurriyet Daily News*, June 1, 2015.
 97. Or, Saygin, Ulgen, 2011, p. 33.