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Legal Frame of Nuclear and Radiological Programs in General and the Egyptian Programs in particular
Part2. Egyptian Nuclear and Radiological Programs

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ABSTRACT

In Part, 1 of the current study, the international legal framework of the nuclear and radiation programs in general were discussed. Here the in this part, the Egyptian nuclear and radiation program will be discussed.

Egypt has two nuclear reactors at the Site of the Nuclear Research Center in Anshas, the first research reactor and the second research reactor. The First Research Nuclear Reactor (ET-RR-1) was introduced in 1961, with the help of the former Soviet Union. It was designed to produce I radoisotopes; and train personnel and technicians. It is a test reactor only, with a strength of (2 MW), and operates with uranium. Egypt's second research reactor began to agree on in 1992, and operated in November 1997. And this is an ideal period for the construction of the reactor. The maximum reactor capacity is 22 MW. The Soviet Union linked the first Egyptian reactor to a series of similar reactors in the socialist countries, and was the only supplier of fuel. Although the fuel of this reactor contains an average, enrichment rate of 10% and higher than the ratios used in nuclear plants, which are usually 4 to 5%, the enrichment plants of this fuel made the Soviet Union concentrated within its territory. As for the first reactor, and the second reactor, Egypt made sure to get a fuel production plant that begins by converting 20% enriched uranium UF-6 into the fuel basket used inside the core of the reactor.

The Egyptian radiological activities include particle accelerators; and gamma irradiation units. In Egypt there is one cyclotron accelerator located in the Nuclear Research Center of the Atomic Energy Authority. The National Center for Radiation Research and Technology of the Atomic Energy Authority is located in Nasr City. Also two gamma radiation units are used for sterilization of medical equipment; and sterilization of some food products; as well as in radiation technology research.

The shipment of radioactive materials circulating within Egypt is classified into three basic groups as follows: Group A contains fissile material containing uranium-233-235, plutonium-239, and plutonium-241, as well as UF-6; hexafluoride uranium, whatever the enrichment rate in uranium; and D2-O; heavy water. Group B deals with all radioactive sources of high radioactivity. Group C is concerned with low-activity non-fissile material and naturally enriched fissile material. Radioactive materials crossed through the shipping corridor and the Suez Canal in accordance with the considerations contained in Law No. 7 of 2010 on the regulation of nuclear and radiological activities, in addition, the executive regulation issued by the Decision of the Prime Minister No. 1326 of 2011, moreover, the IAEA regulations on the safe transport of radioactive materials.

1-INTRODUCTION

Nuclear and radiological programs generally consist of exclusively six activities. These activities can be divided into three groups, the first set of activities represents the nuclear part of the programs, namely reactors of both types and their respective nuclear fuel circuits. The second set of activities includes all radiological activities such as radiological facilities and radioactive waste management facilities, while the third group includes the safe transport of radioactive materials whether nuclear or non-nuclear. We also mentioned in the first part, that any radiological nuclear program

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consists of only six elements, while the Egyptian program is only five elements, and the only difference from the global radiation programs is the delay in the implementation of nuclear plants and their fuel department, due to political, strategic and international technical constraints.

Egypt, once called the United Arab Republic, which included Egypt and Syria, one of the limited third world countries that allowed from the outset to participate in the process of making agreements on nuclear disarmament (1). This is through its membership of the 18-nation Committee on Nuclear Disarmament established in 1961. Now it called the Geneva-based Conference on Disarmament. In addition to Egypt paid special attention to disarmament issues as part of his comprehensive vision of re-establishing Egypt's economic construction. In addition, the need to defuse the arms race in the Middle East and support security and stability there. Egypt has crystallized its final position towards the region at several points, signing the Nuclear Non-Proliferation Treaty.

Egypt's commitment to a nuclear-weapon-free zone in the Middle East is beyond doubt and Egypt for years played a leading role in promoting the goal of ridding the region of the threats of such weapons. On the other hand, it understood that the term "nuclear policy" no longer linked to any efforts to acquire a nuclear weapon. Egypt made a strategic decision several decades ago to stop thinking about the military nuclear option and establish a specific vision. Egypt is one of the most prominent members of a small club of states whose parties have voluntarily adopted a policy of military nuclear non-nuclear, despite having tangible capabilities in this field such as Brazil, Argentina, South Korea and Taiwan, as well as the two major forces in the civil nuclear club, Japan and Germany.

The desire for nuclear energy has been one of the reasons why Egypt ratifies the NPT. As since 1974, 1980, countries with nuclear technologies have been tightening their emphasis on the full export of these technologies to non-NPT member states. The refusal of the United States, West Germany, Canada and France to engage in serious negotiations with them for nuclear cooperation without joining the Treaty or subject to its terms, despite Egypt's reportedly benefiting by signing the treaty. In strengthening the credibility of its nuclear disarmament orientations in the region specifically with Israel, not supporting any attempt to expand the proliferation of such weapons in the region to other States, and being able to develop its peaceful nuclear research capabilities. Its contacts after the signing of the NPT for purpose of building some nuclear reactors did not produce a tangible practical or material result until the program frozen in 1986. Nevertheless, advanced countries in the military industries sought to legalize technical and technical restrictions with a range of actions, from the Australia Chemical and Biological Control Group in 1985; to the MTCR missile technology control system, to the Paris and London Declarations in 1991 on the transfer of weapons, Conventional and prevention of weapons of mass destruction.

Egypt's radiation nuclear program consists of five activities exclusively: research reactors and its complementary fuel department; radiological facilities, namely accelerators, gamma irradiation units; facilities using radioactive isotopes and sealed radioactive sources such as hospitals and laboratories, laboratories at universities and research centers, industrial use of radioactive materials; radioactive waste management facilities; and safe transport of radioactive materials.

2- First Branch: Egyptian Nuclear Activities

Egypt has two nuclear reactors at the Site of the Nuclear Research Center in Anshas, the first research reactor and the second research reactor.

First Research Nuclear Reactor (ET-RR-1):

The First Research Nuclear Reactor (ET-RR-1) (2) introduced in 1961, with the help of the former Soviet Union. It designed to produce radioactive isotopes; and train personnel and technicians. It is a test reactor only, with a strength of (2 MW), and operates with uranium. It singer, with (9) channels, each channel allows the output of neutrons to a certain degree and a certain direction for the conduct of irradiation experiments and the production of radioactive isotopes. The workers separates in each channel by a huge wall of lead prevents the effect of radiation for each channel on the experiments of the adjacent channel. The reactor does not fit nuclear fuel from the operation of the reactor for military purposes.

The second research nuclear reactor (ET-RR-2):

Egypt's second research reactor (3) began to agree on in 1992, and operated in November 1997. And this is an ideal period for the construction of the reactor is the real

school after which the state begins to build reactors Nuclear energy production". The maximum reactor capacity is 22 MW. The reactor has various applications in all aspects of peaceful life. It including the production of radioactive isotopes used in hospitals to diagnose and treat diseases, explaining that isotopes once produced transported within a few hours for use in all hospitals of the Republic. In 2013, the reactor modified to be able to produce the most important material. This saves a lot on the state of hard currency, so the exact name of the reactor, is the Egypt complex research reactor. The reactor is dedicated to research, which is multi-purpose, and most of the purposes are practical research and production of radioactive isotopes for medical and scientific purposes. In 2009, the shape of the reactor changed, so that it could produce medical isotopes, which did not exist previously. When the Medical radioactive isotope plant established radioactive samples sent in an airtight container for the plant, and procedures carried out to extract the Calcium to treat patients for cancer, or Iodine injected by the patient for thyroid treatment.

Egyptian Nuclear Fuel Department (4)

The Soviet Union linked the first Egyptian reactor to a series of similar reactors in the socialist countries, and was the only supplier of fuel. Although the fuel of this reactor contains an average, enrichment rate of 10% and higher than the ratios used in nuclear plants, which are usually 4 to 5%, the enrichment plants of this fuel made it the Soviet Union concentrated within its territory. Therefore, it can control the production of isotopes in these reactors, as well as research carried out in these reactors through missions for reactor operators to obtain degrees and to be the first envoys to be the vanguard of the missionaries of communist thought. Nevertheless, with the collapse of the Soviet Union these envoys became the vanguard of the pioneers of the Egyptian nuclear program, especially their contribution to the establishment of the Egyptian regulatory body in its first steps to establish the National Center for Nuclear Safety and Radiation Control. Although the center was under the supervision of the Atomic Energy Authority, it was only financial supervision and not supervisory supervision, as it was responsible for inspection, licensing and binding of nuclear reactors that follow atomic energy, as well as extracting the licenses of the operators of these reactors.

As for the first reactor, as for the second reactor, Egypt made sure to get a fuel production plant that begins by converting 20% enriched uranium UF-6 into the fuel basket used inside the core of the reactor.

3- Second branch: Egyptian Radiological Activities

The Egyptian radiological activities include particle accelerators; and gamma irradiation units. In Egypt there is one cyclotron accelerator located in a densities and follows a nuclear research center of the Atomic Energy Authority. The Radiation Technology Center of the Atomic Energy Authority is located in Nasr City. Also their two-gamma radiation units used for sterilization of medical equipment; and sterilization of some food; as well as in radiation technology research.

Particle Accelerator

Particle accelerators is a device that uses electrical fields to accelerate electrical charge particles to high speeds, and identify them in guided rays. Based on the cathode ray tube use a simple speed accelerator, and there are two types of speed accelerators, linear accelerators or Straights and circular accelerators, referred to as particle collisions with atom crushers, take advantage of high-energy particle packs in both basic and applied science research, and scientists conduct particle interactions at the highest possible energy levels. For detecting new primary particles, interactions conducted by colliding with known particles such as electrons or protons at very large particle kinetic energy in order to overcome the dissonance that occurs between two positively charged protons. In Egypt, one accelerator of the type Cyclotron is located in Nuclear Research Center of the Atomic Energy Authority. It licensed by the Nuclear Regulatory Authority, which invented the American physicist Ernest Lawrence cyclotron in 1930, and won the 1939 Nobel Prize for Physics (5).

The cyclotron owned by the Nuclear Research Center is a Russian-made integrated multi-purpose energy variable accelerator, accelerating light charged particles such as protons, protons and alpha particles, and particles move within the cyclotron in a vicious chamber between two powerful electromagnetic poles. Two, the electric magnet generates an electrical field that forces the particles to move in a circular path. A vacuum room also contains two electrodes similar to the letter "D", between them a watch, and applies a reluctant electrical field within this watch, affecting the electrical charge of the particles. It gives it a boost as it passes through the watch. As a result, the particles gradually increase in speed and follow a circular path that is proportional to their speed. Thus, the particles take a spiral orbit, diverging outward. When particles approach the edge of

the magnetic field, they are at their maximum speed, then directed towards a target, or floated from the device in the form of a particle pack.

Gamma Irradiation Unit

The gamma Irradiation Unit is the only one in the Arab Republic of Egypt that sterilizes and treats medical products and food commodities with radiation. It consists of radioactive cobalt 60 source with a capacity of half a million Curie, and is in the course of raising the capacity of the source to 700,000 Curie. This unit considered one of the economic units within the Atomic Energy Authority, because it aims to perform the service at low prices and a small profit margin. It contributes to reducing the burden on the general budget of the state. Due to the increase, and continued demand for the service of sterilizes irradiation from Alexandria and neighboring areas to increase export and achieve the objectives of the state in increasing the economic return of hard currency. The Authority is end to establish another unit in Alexandria. That unit serves for export purposes, and takes the necessary action towards final receipt and obtaining operating licenses (6).

The Radiation Technology Center of the Atomic Energy Authority, located in Nasr City, has the two gamma radiation units that add 2 billion pounds. And added value to the Egyptian economy directly. The cost of exposing a kilo of oranges to radiation to save it from damage for a longer period is approximately 25 pts to make it get a pass certificate without an agricultural ban in ports. While thousands of tons are currently, executed when exported, stressing the need to expand the establishment of new x-ray units to prevent the use of toxic gas in Egypt. For the medical sterilization process, its use currently cancelled globally. And many crops that are refused export to foreign markets for exposure to pests or injuries in the process of transportation, although the product's obtaining a certificate of radiation makes it pass through quarantine without any problems or waiting and without agricultural prohibition. Moreover, crops such as manga are exposed to the seed; there is no means but radiation to kill them and insect in wheat.

The orange crop is also subject to execution in ports due to exposure to the scourge of fruit fly or worm injury. Moreover, can be stopped wasted by exposure to radiation at a cost of only 25 pts per kilo, which gives it strong benefit, we want at least 10 units immediately to work in the Egyptian market to reduce losses in various products that are damaged (7). The first unit opened in 1979, in Nasr City. In addition, the second opened in 2014, in Alexandria. It provides the service for the treatment of food with radiation, and sterilization of medical materials. This done by placing the product in concrete wells with a radioactive source, and the product revolves around it to be exposed to radiation scientifically, and since we are an official service provider without seeking profit, there is often a loss but this is aimed at not having a monopoly for such uses.

The center deals with more than 200 companies in the medical and food fields. It representing about 400 products worth 18 million pounds representing only about 1% of the value of the product up to 2 billion pounds direct value added by the center in the Egyptian economy. In the health field used to eliminate microbes completely without affecting the nature of the components of the product that sterilized. Whether it is the gloves used in the operating room, industrial joints, blood bags or devices Kidney washing and toothbrush, and everything that enters the human body. The Ministry of Health depends on it completely in the service of the Egyptian citizen in this matter. Moreover, there are not all the necessary possibilities to cover all hospitals, and in the field of furniture, there is the so-called "encryption", as well as the elimination of wood mite, dealing with gemstones, television industry, led bulbs, electronics, Arab industry and various industries (8).

Radiation Facilities using Radioactive Isotopes and Sealed Sources

These are hospitals; universities laboratories; and research centers that use radioactive materials as well as the industrial use of radioactive materials such as ceramic factories. The Nuclear and Radiological Control Authority issues spatial licensing and supervises laboratories and users of open radioactive sources (9):

1- Laboratories of the Atomic Energy Authority and the Nuclear and Radiological Control Authority;

2 - Medical field in diagnosis, treatment and medical analysis;

3- The field of scientific research in many research centers and universities;

4- For industrial applications in the manufacture of some products such as crystal, ceramic and sanitary ware.

Several spatial licenses issued by the Nuclear and Radiology Regulatory Authority until 2020, Laboratories of the Atomic Energy Authority; laboratories of the Nuclear and Radiological Control Authority universities; faculties of medicine, science, agriculture. Educational hospitals under the Ministry of Health; Hospitals and private medical centers, it is divided into category A coefficients and Class B coefficients. For class A laboratories, and class B laboratories a 62 licensed laboratories issued. While 41 licensed for Class C laboratories issued in the same time. There are 24 spatial licenses for non-exempt industrial entities such as ceramic factories and sanitary ware and crystal factories.

Radioactive Waste Management Facilities (10)

The Atomic Energy Authority is the only body responsible for the management of radioactive waste in Egypt. This includes transportation, storage, treatment and safe burial, in accordance with law 7 of 2010. The Center for Hot Plants is responsible for the safe disposal of all nuclear waste in accordance with Egyptian law. That nuclear waste comes to the center from all places with sucking, and is summarized either incinerator burning of the center or through pressure so that the volume of radioactive materials for a third reduced. Then It is stored in a 100% safe manner. The Hot Plants burned from one to 2 tons per year of waste, where 90% of that waste is disposed of, and the ash of about 100 kilos remains at most safely preserved. It then they buried in special burial grounds that are never opened. As high-radiation waste is preserved in concrete "barrels or cubes" and buried in permanent burials at certain depths, and in stable geological formations, carefully selected, pointing out. The life expectancy of the waste ranges from several months to thousands of years, and the plants processes all kinds of radioactive waste that reaches the center according to the Egyptian law.

The plants processes the natural radioactive waste; and to keep pace with the technological and industrial development in the fields of oil and gas production; and the resulting accumulation of natural radioactive materials. This natural radioactive waste is one of the most important risks resulting from the the oil and gas industry at all stages. In addition, safe handlings of these radioactive materials ensure the safety of workers and the environment surrounding these areas. The reuse of such equipment after the removal of radiation pollution maximizes the benefit of the state's economic resources and leads to the economic growth of the state in order to achieve the principle of development sustainable. Moreover, support the elimination of risks for natural radioactive waste in Egypt. That image of natural radioactive waste due to the contamination of pipes; and equipment used in drilling the detection of oil; natural gas and ground water, which usually contaminated with natural radioactive materials such as uranium, thorium, and especially radium. According to the regulations of the Nuclear and Radiological Control Authority, requires the cessation of the use of these pipes and equipment after a period of work. It is stored in special places, and disposes them, to protect workers and the environment from the harmful effects of ionizing radiation. In addition, the pollution unit of the atomic energy hot plant did this function. The function approved and licensed by the Nuclear and Radiological Control Authority. In addition, one of the main work of the plants is to solve the radioactive problems facing oil companies by cleaning their pipes; reusing that equipment after the removal of radiation pollution from it. Moreover, reusing «scrap iron» because Egypt imports a lot from abroad, and we have many oil companies, which helps maximize the country's economic resources and lead to economic growth and significant gains by reselling or reusing them after this safe measure.

The plant processes Low-level radioactive waste from hospitals, which causes a great deal of trouble for the decontamination. This waste obtained at very low costs, which often makes the Authority obliged to bear additional costs at its own expense as part of its keenness not to dump it on the street. Due to the seriousness, it may cause because of this, especially with regard to some very dangerous waste, most notably "contaminated cotton" with radioactive materials that may be found. It poses a risk to the workers in the field of children's toys, which sold at cheap prices, so the unit is very keen to get this waste and try to bury it safely even if it comes to incurring part of the costs. The plants amounts to about 20 kilograms to 30 kilograms of medical waste per year, and this large amount of radioactive waste carefully treated so as not to harm the environment.

The plant dose not processes high and medium-level waste. Egypt does not have a landfill for high-level waste and medium-level waste because it needs special technology. The plants currently study, since their burial need old mines whether in western or eastern Sahara. So that we can treat it as a safe landfill for this type, but burying high-level waste underground i.e., buried under a depth of 150 to 200 meters, and this also needs to be Very strong studies, especially since their depth reaches

beyond groundwater, i.e. more deeply to be underground water .

The number of closed radioactive sources not used in the Authority's warehouses amounts to 1,600 high-radiation sources. Radiation pollution of imported scrap iron lies with the hot plant responsible for inspecting, treating and removing radiation pollution of scrap iron imported from abroad. Especially since there are very large quantities of ships reaching Egyptian ports. Especially the port of Alexandria loaded with imported scrap iron. This iron checked to find out the sources of its pollution and the level of radiation. It cleaned to reach the limits of radioactive pollution allowed to be fit for use and reach the highest degree of safety, making companies Able to sell it again or recycle it, thus achieving a new recovery for the Egyptian economy in implementation of the principle of sustainable development.

4- Third Branch Safe Transport of Radioactive Materials

The shipment of radioactive materials circulating within Egypt classified into three basic groups as follows: Group A, which contains fissile material containing uranium-233-235, plutonium-239, and plutonium-241. As well as UF-6; hexafluoride uranium, whatever the enrichment rate in uranium; and D2-O; heavy water. Group B deals with all radioactive sources of high radioactivity. Group C is concerned with low-activity non-fissile material and naturally enriched fissile material.

Radioactive materials crossed through the shipping corridor and the Suez Canal in accordance with the considerations contained in Law No. 7 of 2010 on the regulation of nuclear and radiological activities, in addition, the executive regulation issued by the Decision of the Prime Minister No. 1326 of 2011, moreover, the IAEA regulation of the safe transport of radioactive materials.

Transported radioactive material through the Suez Canal

The traffic requirements during the Suez Canal is that the carrier submits a request for a pass permit explaining all data on the shipment at least two weeks before the passage through the canal for radioactive sources and not less than a month for all types of nuclear fuel. The carrier informs the regulatory authority of the date of the ship at least 48 hours before it reaches the shipping course of the Suez Canal, and all shipments of radioactive materials and sources are subject to inspection by experts of the Nuclear and Radiological Control Authority. The carrier pays the costs of the safety assessment in the name of the Research Support Fund, issued by a decision of the President of the Republic. The carrier also pays the transportation and residence expenses to the experts of the regulatory authority in a hotel of at least four stars in accordance with the Regulations of the Suez Canal. The carrier authorized to pass only after payment of the specified safety costs, in case of different data provided from reality paid a fine of 50 thousand U.S. dollars.

Inspection procedures done after ensuring the arrival of documents for radioactive materials at least (48 hours) before the arrival of the ship, which is accordance with the regulations of the Suez Canal and the requirements of the Agency. Therefore, the inspectors can arrange their arrival to the port in due time. The inspectors can see the documents, and determine the quality of the material or radioactive source and its radioactive activity and its quantity and classification and determine the type of insurance required (11). Determine the date of arrival of the ship by contacting, the competent authority can ensure the preparation of passport permits and entry the customs area of the inspectors' masters, and the reservation of way for their transfer to the arrival port submersible. Also making sure that the radiometers required to carry out the task are prepared, and that they are working well and making sure that there is a permit book and claims book and that are enough pages to perform the task.

The inspectors arrived to the port - Port Said or Suez - at least four hours before the scheduled arrival of the ship, to ensure that the power of attorney extracts the necessary permits to enter, climb, and prepare the way for the transfer of the regulator experts to the board ship. The inspector’s review the data and documents with the ship officials, to make sure that the ship conform to a type and quantity of radioactive materials; existence of the required insurance according to the regulations. Also, determine the location of storage of radioactive materials on the ship; and calculate each of criticality safety indexes for fissile materials and transport safety index for non-fissile material. In the case of a payload of fissile material, it ascertained that there are no hydrogen materials or liquids at a distance of less than 10 meters of fissile material in accordance with IAEA and Egyptian nuclear control authority requirements.

Radiation level measurements made on parcel surfaces and matched with documents. In the event of a radiation level higher than the requirements of the IAEA and the Authority, the necessary warning signs placed and presence in these places prohibited without justification. In the event of apparent expulsion damage, it ascertained that there is no external radiological contamination.

After the inspection completed, the ship is departed, the necessary permits extracted for transit in the event of meeting the transport requirements, and the permit determined to classify the group according to the classification in the regulations and conditions of passage. It delivery of the asset to the representative of the ship's power of attorney, and sign it to receive the picture and seal it with the seal of power of attorney. A claim for the costs of evaluating safety also prepared according to the amount of radioactive materials, and classification. Moreover, the delivery of the original and the signature of the power of attorney on the image and stamp it with the seal of power of attorney. If the passage refused for failure to meet the safety requirements, the IAEA informed to take the necessary measures in this regard, in which case the ship impounded in international waters, and the shipment reviewed in accordance with international requirements.

Safe Trading of Radioactive Materials in Egyptian Ports

Person does not authorize any ship inside the port carrying materials of radioactivity unless the following conditions met:

-Provide proof that the shipment of radioactively active materials transported classified in accordance with international rules issued by the AMCO; the International Atomic Energy Agency; and the Nuclear and Radiological Control Authority.

-Provide a packaging certificate;

-Provide a map of the styling showing the whereabouts of radioactive materials (class-7) signed by the captain and stamped with the ship's seal.

-Provide a valid insurance certificate to cover the direct and indirect effects that can result from shipments of radioactively active materials transported during their presence on the ship or during unloading.

-Permit for the import/export and transfer of radioactive material from the Nuclear and Radiation Control Authority.

Ship captains, owners, shipping agencies or approved shipping companies carrying radioactively active materials to the Nuclear and Radiation Control Authority at least 72 hours before the ship arrives at the port, provide all the data referred to and other data on the shipment, source, importer and shipping policy.

The shipping power of attorney or the competent shipping company informs the Nuclear and Radiation Control Authority of the arrival date of the ship at least 48 hours before arrival. The ship is responsible for the delay resulting from not reporting the correct arrival date. The circulation, transportation or storage of materials of radioactivity is only in the presence of the representative of the Nuclear and Radiation Control Authority. He tests the shipment and ensures its safety, and the work of the necessary local radiation survey and verification of data for the shipment and its conformity with the data provided by the power of attorney or the competent shipping company. The shipment of materials of radioactivity is unloaded from the ship immediately and without delay and delivered to the stakeholder under the supervision of the representative of the Nuclear and Radiation Control Authority, which determines the method and method of transport security up to the place of use and the owner must provide all the facilities required for implementation.

Ships arriving at the port or maritime port without prior notification or following all or part of the previous instructions considered dangerous to navigation. The port security and will assume all responsibilities if they are not authorized to unload the shipment of radioactive materials, to provide incorrect data or to be present at the port carrying shipments of radioactivity without a permit, with the nuclear and radiological control authority informed of appropriate insurance and legal procedures. Materials with radioactivity loaded on ships are subject to radiological inspection procedures, and are obliged to implement the preventive instructions issued to them by the Nuclear and Radiation Control Authority during the period of docking at the port, and sailing through Egyptian territorial waters. The Egyptian authorities in accordance with the instructions of the Nuclear and Radiological Control Authority has the absolute right to act against the requirements described highly, including confiscation of letters, and taking legal action before the ship violating the port authorities. The maritime port has the right to refuse to trade, store or re-establish shipping any messages of radioactive material within the port if it considered that any of these operations pose a risk to the property or personnel working at the port. That is in terms of the status of the

message and the way it is packaged or for port conditions at any given time in question.

In all the orders, the ship not authorized to leave the port until the exit permit has obtained from the Nuclear and Radiation Control Authority after the inspection of the ship by the inspectors of the Authority.

INSURANCE

-An insurance policy or bank guarantee issued to Group A;

- An insurance certificate issued from an approved entity for groups (B, C);
- The insurance policy or the insurance certificate or bank guarantee must be valid throughout the ship's stay in the Suez Canal navigational course;
- The insurance policy or insurance certificate or bank guarantee must include a provision giving the injured the right to receive appropriate compensation in the event of damages;
- Compensation must cover all direct and indirect damage caused by the shipment of radioactive materials or sources while passing through the Suez Canal;
- The **Egyptian courts** are competent to assess appropriate compensation for damages that occur during transport in the shipping course of the Suez Canal, in accordance with the rules of international law and Egyptian laws relating to this matter.

4- CONCLUSIONS

This study is demonstrate the legal frame of the regulation of nuclear and radiological programs in generals and the Egyptians programs in Special, part2. Egyptian nuclear and radiological programs. It concluded that:

1 - Egypt's radiation nuclear program consists of five activities exclusively: research reactors and its complementary fuel department; radiological facilities, namely accelerators, gamma irradiation units; facilities using radioactive isotopes and sealed radioactive sources such as hospitals and laboratories, laboratories at universities and research centers, industrial use of radioactive materials; radioactive waste management facilities; and safe transport of radioactive materials. Moreover, the only difference from the global radiation programs is the delay in the implementation of nuclear plants and their fuel department, due to political, strategic and international technical constraints.

2- Egypt has two nuclear reactors at the Site of the Nuclear Research Center in Anshas, the first research reactor and the second research reactor. The First Research Nuclear Reactor (ET-RR-1) introduced in 1961, with the help of the former Soviet Union. It designed to produce radioactive isotopes; and train personnel and technicians. It is a test reactor only, with a strength of (2 MW), and operates with uranium. As for the first reactor, as for the second reactor, Egypt made sure to get a fuel production plant that begins by converting 20% enriched uranium UF-6 into the fuel basket used inside the core of the reactor.

3- The Egyptian radiological activities include particle accelerators; and gamma irradiation units. In Egypt there is one cyclotron accelerator located in a densities and follows a nuclear research center of the Atomic Energy Authority. The Radiation Technology Center of the Atomic Energy Authority is located in Nasr City. Also their two-gamma radiation units used for sterilization of medical equipment; and sterilization of some food; as well as in radiation technology research. The Atomic Energy Authority is the only body responsible for the management of radioactive waste in Egypt. This includes transportation, storage, treatment and safe burial, in accordance with law 7 of 2010. The Center for Hot Plants is responsible for the safe disposal of all nuclear waste in accordance with Egyptian law. That nuclear waste comes to the center from all places with sucking, and is summarized either incinerator burning of the center or through pressure so that the volume of radioactive materials for a third reduced. Then It is stored in a 100% safe manner. The Hot Plants burned from one to 2 tons per year of waste, where 90% of that waste is disposed of, and the ash of about 100 kilos remains at most safely preserved.

4- The shipment of radioactive materials circulating within Egypt or passing Suez Canal or Egyptian port, classified into three basic groups as follows: Group A, which contains fissile material containing uranium-233-235, plutonium-239, and plutonium-241. As well as UF-6; hexafluoride uranium, whatever the enrichment rate in uranium; and D2-O; heavy water, Group B, deals with all radioactive sources of high radioactivity. Group C is concerned with low-activity non-fissile material and naturally enriched fissile material. Radioactive materials crossed through the shipping corridor and the Suez

Canal in accordance with the considerations contained in Law No. 7 of 2010 on the regulation of nuclear and radiological activities, in addition, the executive regulation issued by the Decision of the Prime Minister No. 1326 of 2011, moreover, the IAEA regulation of the safe transport of radioactive materials.

5- Insurance policy or insurance certificate or bank guarantee must issue for all kind of radioactive materials passing Suez Canal or Egyptian ports. It must include a provision giving the injured the right to receive appropriate compensation in the event of damages. Compensation must cover all direct and indirect damage caused by the shipment The **Egyptian courts** are competent to assess appropriate compensation for damages that occur during transport in the shipping course of the Suez Canal, in accordance with the rules of international law and Egyptian laws relating to this matter. Egypt's second research reactor began to agree on in 1992, and operated in November 1997. And this is an ideal period for the construction of the reactor is the real school after which the state begins to build reactors Nuclear energy production". The maximum reactor capacity is 22 MW. The reactor has various applications in all aspects of peaceful life. It including the production of radioactive isotopes used in hospitals to diagnose and treat diseases, explaining that isotopes once produced transported within a few hours for use in all hospitals of the Republic. In 2013, the reactor modified to be able to produce the most important material. Radioactive materials crossed through the shipping corridor and the Suez Canal in accordance with the considerations contained in Law No. 7 of 2010 on the regulation of nuclear and radiological activities, in addition, the executive regulation issued by the Decision of the Prime Minister No. 1326 of 2011, moreover, the IAEA regulation of the safe transport of radioactive materials

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[1] The Nuclear Non-Proliferation Treaty, commonly known as the Non-Proliferation Treaty or the Non-Proliferation Treaty, It is an international treaty aimed at preventing the proliferation of nuclear weapons and weapons technology, strengthening cooperation in peaceful uses of nuclear energy, and promoting the goal of achieving nuclear disarmament and general and complete disarmament, and between 1965 and 1968, the treaty was negotiated by the Eighteenth Committee on Disarmament, including the United Arab Republic, which at the time included Egypt and Syria. A United Nations-sponsored organization based at its headquarters in The United Arab Republic. Geneva, Switzerland, the treaty, which was opened for signature in 1968, came into force in 1970, as required in the text. Twenty-five years later, the parties to the NPT met in May 1995 and agreed to extend the treaty indefinitely. The number of states that are parties to the NPT is more than any other convention on arms control and disarmament, a sign of the importance of the Treaty, as of August 2016, 191 states have become parties to the Treaty. Although North Korea, which joined in 1985, but never complied, announced its withdrawal from the NPT in 2003, after detonating nuclear devices in violation of basic obligations, four UN Member States never accepted the NPT, three of which possessed or believed to possess nuclear weapons, India, Israel and Pakistan, in addition, did not join South Sudan, founded in 2011, and for more details see:

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[5] Ernest Orlando Lawrence, an American physicist who built the first cyclotron, proton accelerator and subatomic particles, in collaboration with Milton Stanley Livingston in 1931, worked on the separation of uranium isotopes in what is known as the Manhattan Project, which contributed to U.S. efforts to produce nuclear weapons in World War II. Iin 1939 he was awarded the Nobel Prize in Physics for his invention of skelotron and subsequent applications, as the chemical component was named. Number 103 Lawrencium (lawrencium) in his honor, for more details due to:

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[10] Yasser Tawfiq Mohammed, Article on The Republic's Radioactive Waste Officer, Atomic Energy Authority, Cairo, December 2019

[11] An approved insurance or bank guarantee policy is issued to Group A, and an insurance certificate is issued by an approved entity for groups B,C, and the insurance policy, insurance certificate or bank guarantee must be valid throughout the ship's stay in the Suez Canal area. The insurance policy (insurance policy or letter of guarantee) must provide for the right of the injured to receive appropriate compensation, and the compensation must cover all direct and indirect damages resulting from the shipment of radioactive materials or sources. While passing, for more details see transport regulations.