# HCC

Chernobyl Disaster

# TALMUN’24

**Agenda Item:** Chernobyl Disaster

# TABLE OF CONTENTS

## 1. Letter From Head of Crisis

Esteemed Delegates,

As the Head of Crisis, I am excited to welcome you to our first precious TALMUN'24 conference. As you embark on this journey of diplomacy, negotiation, and problem-solving, I would like to provide you with some guidance to help you navigate the crisis aspect of our simulations. We chose one of the most interesting and challenging crisis agenda item for you.

I hope you will accomplish this committee with enjoyment and victory.

I encourage you to embrace the challenges and opportunities that crisis simulations present and to approach them with enthusiasm, creativity, and a commitment to collaborative problem-solving. Together, we can work towards finding viable solutions to the most pressing global issues facing our world today.

Warm regards,

ECE UMAR
Head of Crisis

## 2. Letter From Under Secretary General

Honorable delegates of TALMUN24,

I welcome you again to our prestigious conference, TALMUN’24UN’24. It is my pleasure to present this study guide to you, which will inform you thoroughly about the topic that will concern you during our conference.

We, as the academic members and the crisis team members have worked tirelessly and invested countless hours preparing this study guide, ensuring it meets the highest academic standards. I would like to invite all of you to have fun and take pleasure during our committee and the crisis which will be sent by our unyielding crisis team. I would like to thank all of the people who have worked on our committee. I am more than confident that you will be amazed by what we have accomplished here.

Our primary objective is that you will be intrigued and entertained during our conference. Thank you for your participation, and I look forward to a successful and enriching TALMUN’24.

Sincerely,

Akay Engin
Under Secretary General

## 3. Introduction

Nuclear energy has always been a matter of curiosity for humanity. People figured out that they can use it as an unlimited energy source for the whole of humanity. Nuclear energy studies began in the early 20th century along with the activities of atomic physics. However, the use of nuclear energy on an industrial scale began to occur in the 20th century. “Chernobyl Nuclear Power Plant “ was one of the projects that was producing energy to humans of the USSR (United Soviet Socialist Republic).

The Chernobyl disaster was a catastrophic nuclear disaster that occurred in the early hours of 26 April 1986, at the Chernobyl Nuclear Power Plant in Soviet Ukraine. The accident occurred when Reactor Number 4 exploded and destroyed most of the reactor building, spreading debris and radioactive material across the surrounding area, and over the following days and weeks, most of mainland Europe was contaminated with radionuclides that emitted dangerous amounts of ionizing radiation.

## *4. Key Terms*

*μSv·h−1*: This term refers to the measurement unit for radiation dose rate, specifically microsieverts per hour. It indicates the amount of ionizing radiation absorbed per unit of time, commonly used in assessing radiation levels in environments or from sources such as nuclear reactors or medical procedures.

*Coronary thrombosis:* Coronary thrombosis is a medical condition characterized by the formation of a blood clot within the arteries that supply blood to the heart muscle. This blockage can lead to serious complications such as heart attacks or myocardial infarctions, often requiring immediate medical intervention to prevent further damage.

*Isotope:* An isotope is a variant of a chemical element that has the same number of protons but a different number of neutrons in its nucleus. This results in variations in atomic mass but the same chemical properties. Isotopes are commonly used in various fields including medicine, industry, and scientific research.

*Liberal reform:* Liberal reform refers to political or social changes aimed at promoting individual freedoms, civil rights, and democratic principles within a society. These reforms often involve measures to enhance equality, expand personal liberties, and reduce government intervention in private affairs, typically through legislative or policy initiatives.

*Megawatt:* A megawatt is a unit of power equal to one million watts, commonly used to measure the capacity or output of electrical generating stations or large-scale energy systems. It signifies a significant amount of energy, often associated with industrial or utility-scale operations such as power plants or renewable energy installations.

*Neutron:* A neutron is a subatomic particle found within the nucleus of an atom, alongside protons. Neutrons lack an electric charge but contribute to the mass of the atom. They play a crucial role in nuclear reactions, including nuclear fission and fusion processes.

*Nuclear energy:* Nuclear energy is the energy released during nuclear reactions, particularly nuclear fission or fusion processes. It is utilized to generate electricity in nuclear power plants, where the heat produced by controlled nuclear reactions is used to generate steam and drive turbines. Despite its potential as a low-carbon energy source, nuclear energy raises concerns regarding safety, waste management, and proliferation risks.

*Nucleon:* A nucleon is a collective term referring to either a proton or a neutron, which are the subatomic particles found within the nucleus of an atom. These particles are bound together by the strong nuclear force, contributing to the stability of atomic nuclei and determining their properties.

*RBMK reactors:* RBMK reactors are a type of graphite-moderated, water-cooled nuclear reactors originally developed in the Soviet Union. They gained international attention following the Chernobyl disaster in 1986, where a catastrophic reactor meltdown occurred due to a combination of design flaws and operator errors. Despite improvements and modifications, RBMK reactors remain controversial due to safety concerns.

*Thyroid cancers:* Thyroid cancers are malignant tumors that develop in the thyroid gland, a butterfly-shaped organ located in the neck responsible for producing hormones that regulate metabolism. These cancers can manifest as various types, including papillary, follicular, medullary, and anaplastic carcinomas, each with distinct characteristics and treatment approaches. Risk factors for thyroid cancer include exposure to radiation, genetic predisposition, and certain environmental factors.

## 5. General Knowledge about Chernobyl Nuclear Power Plant

The Chernobyl accident in 1986 was the result of a flawed reactor design that was operated with inadequately trained personnel. The resulting steam explosion and fires released at least 5% of the radioactive reactor core into the environment, with the deposition of radioactive materials in many parts of Europe.

The accident destroyed the Chernobyl 4 reactor, killing 30 operators and firemen within three months and several further deaths later. One person was killed immediately and a second died in hospital soon after as a result of injuries received. Another person is reported to have died at the time from a coronary thrombosis. Acute radiation syndrome (ARS) was originally diagnosed in 237 people onsite and involved with the clean-up and it was later confirmed in 134 cases. Of these, 28 people died as a result of ARS within a few weeks of the accident. Nineteen more workers subsequently died between 1987 and 2004, but their deaths cannot necessarily be attributed to radiation exposure. Nobody offsite suffered from acute radiation effects although a significant, but uncertain, fraction of the thyroid cancers diagnosed since the accident in patients who were children at the time are likely to be due to intake of radioactive iodine fallout. Furthermore, large areas of Belarus, Ukraine, Russia, and beyond were contaminated to varying degrees.

The Chernobyl disaster was a unique event and the only accident in the history of commercial nuclear power where radiation-related fatalities occurred. The design of the reactor is unique and in that respect the accident is thus of little relevance to the rest of the nuclear industry outside the then Eastern Bloc. However, it led to major changes in safety culture and in industry cooperation, particularly between East and West before the end of the Soviet Union. Former President Gorbachev said that the Chernobyl accident was a more important factor in the fall of the Soviet Union than Perestroika – his program of liberal reform.

### 5.1. History of Chernobyl

During the operation of a nuclear reactor, the majority of heat generation stems from the process of nuclear fission occurring within the fuel rods. However, it's important to note that a significant portion, exceeding 6%, arises from the radioactive decay of the accumulated fission by products, known as decay heat. Even after the cessation of the fission chain reaction, such as during a reactor shutdown, whether planned or in an emergency situation, this decay heat persists, posing a risk of core overheating or even meltdown if not adequately managed. Hence, ensuring continuous circulation of coolant is imperative to dissipate this residual heat.

In the specific case of RBMK reactors, as exemplified by those at the Chernobyl nuclear power plant, water serves as the primary coolant, circulated throughout the reactor by electrically driven pumps. The sheer scale of this coolant circulation is notable – for instance, Reactor No. 4 at Chernobyl boasted 1661 individual fuel channels, each demanding a substantial coolant flow rate even at full reactor power, resulting in a total coolant requirement of over 45 million liters per hour for the entire reactor.

In the unfortunate event of a complete power loss at the station, each reactor at Chernobyl was equipped with three backup diesel generators. However, these generators required a significant startup time, typically 60 to 75 seconds, to reach full load and produce the necessary 5.5-megawatt output required to power the main coolant pumps. To bridge this critical gap during the startup phase of the generators, special counterweights were employed on each pump, enabling them to provide coolant via inertia until the generators were fully operational.

Nevertheless, potential safety hazards loomed, particularly in scenarios where a station blackout coincided with the rupture of a coolant pipe, termed the Design Basis Accident. In such circumstances, the emergency core cooling system (ECCS) was indispensable, tasked with pumping additional water into the core to compensate for coolant losses due to evaporation.

Addressing these challenges, there were theoretical propositions aimed at leveraging the rotational momentum of the reactor's steam turbine to generate the requisite electrical power needed to operate the ECCS through the feedwater pumps. While this approach held promise, it also posed complexities, as the turbine's speed would gradually decline as energy was extracted. Nonetheless, analyses suggested that there might be adequate residual energy available to sustain electrical power for the coolant pumps for approximately 45 seconds. Although this solution wouldn't entirely bridge the gap between an external power failure and the full availability of the emergency generators, it would offer valuable time to alleviate the situation and initiate appropriate responses.

### 5.2. Chernobyl Region

Following the Chernobyl disaster in 1986, the Exclusion Zone was established on May 2nd, following a decision by a Soviet government commission led by Nikolai Ryzhkov. The zone encompassed a 30-kilometer (19-mile) radius from Reactor 4, albeit its selection was somewhat arbitrary. Initially, this zone was divided into three subzones, each with varying degrees of contamination and corresponding protective measures.

In 1986, updated contamination maps led to a restructuring of the Exclusion Zone into three areas based on revised radiation dose limits. These included the "Black Zone" (radiation levels exceeding 200 $\mu Sv \cdot h^{-1}$), where permanent evacuation was mandated; the "Red Zone" (50–200 $\mu Sv \cdot h^{-1}$), where return was possible once radiation normalized; and the "Blue Zone" (30–50 $\mu Sv \cdot h^{-1}$), where evacuation, especially of children and pregnant women, commenced in the summer of 1986. Subsequently, access to these areas required special permission and was under strict military control by late 1986. While evacuations weren't immediate, eventually, 91,200 people were relocated from these zones.

In November 1986, operational control of the zone was transferred to the newly established production association, Kombinat, headquartered in the evacuated city of Chernobyl. Kombinat's tasks included power plant operation, decontamination of the 30 km zone, provision of supplies to the area, and construction of housing in the newly established town of Slavutych for plant personnel and their families.

By March 1989, a "Safe Living Concept" was developed for inhabitants residing in contaminated areas beyond the Exclusion Zone, spanning Belarus, Ukraine, and Russia. Subsequently, in October 1989, the Soviet government sought assistance from the International Atomic Energy Agency (IAEA) to evaluate the "Soviet Safe Living Concept." Throughout the Soviet era, containment efforts were partially achieved through selective resettlements and delineation of contaminated territories.

### 5.3. The Energy That Chernobyl Produce

Construction of the Chernobyl Nuclear Power Plant (NPP) commenced in 1972 with ambitious plans for 12 units across six phases, aiming to become the largest nuclear facility globally upon completion. The plant ultimately comprised four RBMK-1000 reactors, each capable of generating 1,000 megawatts (MW) of electric power (equivalent to 3,200 MW of thermal power), contributing approximately 10% of Ukraine's electricity supply. Similar to other sites housing multiple RBMK reactors like Kursk, the construction of the Chernobyl plant was accompanied by the development of a nearby city, Pripyat, to accommodate workers and their families.

The construction concluded in the late 1970s, with reactor No. 1 commissioned in 1977, marking the plant's operational debut as the third Soviet RBMK nuclear power plant and the first on Ukrainian soil. Successive reactors followed: No. 2 in 1978, No. 3 in 1981, and No. 4 in 1983. Plans for additional units, five and six, were underway, mirroring the layout of Kursk's units 5 and 6. Reactor No. 5, approximately 70% complete by the time of Reactor 4's explosion, was set for commissioning around seven months later, on November 7, 1986. However, in the aftermath of the disaster, construction on units 5 and 6 was halted, eventually being officially canceled in April 1989, just before the third anniversary of the explosion.

Initially, there were intentions to expand further, with six additional reactors planned across the river, potentially making Chernobyl the most potent nuclear plant globally upon completion. Reactors No. 3 and 4 represented second-generation units, boasting enhanced containment structures, unlike the first-generation units No. 1 and 2, akin to those at the Kursk power plant. These advancements in design aimed to improve safety, with notable upgrades visible in photographs of the facility.

## 6. Stuffs That Used in Chernobyl

Nuclear Fuel;

● The fuel used in nuclear power plants such as Chernobly is uranium-235, a natural isotope of uranium.

● Uranium goes through a complicated process in order to used as a fuel;it is rigorously processed into small ceramic pellets.These pellets are then stacked into a sealed metal tube known as fuel rod.Multiple fuel rods are bundled together to form a fuel assembly.Within the reactor core, several hundred of these assemblies work in concert.Inside the reactor core, U-235 undergoes nuclear fission. When a neutron collides with a U-235 nucleus, it splits into smaller fragments, releasing energy in the form of heat.

● Heat Generation: The heat produced during fission serves a crucial purpose: it raises the temperature of a coolant (typically water) circulating through the reactor core

Neutron Moderators;

● Neutron moderators are materials intentionally placed in a nuclear reactor core to slow down fast neutrons without getting absorbed non-efficient by the fuel. Primary purpose of these is to convert fast neutrons into thermal neutrons with minimal kinetic energy.

● Graphite Moderators

○ Graphite has been historically used as a moderator in certain reactor designs, including RMBK reactors such as the Chernobyl Nuclear Plant.

○ In RBMK reactors, the nuclear fuel rods are encased in chambers with graphite walls. Fast-moving neutrons emitted during fission collide with the graphite moderator, slowing down before reaching other rods.

○ Graphite allows the chain reaction to spread throughout all the fuel rods ○ .Water (Light Water):

○ Usage: Normal(light) water is used as a basic coolant and a neutron moderator in almost every nucleear power plant.

○ Coolant Role: Water removes heat from the fission reactions within the reactor core.

Types:

1. Pressurized Water Reactors (PWRs): In PWRs, high-pressure liquid water serves as both coolant and moderator. The water is heated in the reactor core and then flows through the system to generate stam for electricity production.

2. Boiling Water Reactors (BWRs): In BWRs, the primary coolant undergoes phase transition to steam inside the reactor.

Advantages: Water is abundant, cost-effective, and efficient at transferring heat.

Structural Materials;

● Reactor Vessel and Core:

○ The reactor vessel houses the nuclear fuel and serves as the primary containment.

○ It is constructed from high-quality low-alloy carbon steel.

○ Surfaces in contact with the reactor coolantss are clad with stainless steel (e.g.-304L) to minimize corrosion.

○ Mild steel is commonly used due to its acceptable material conditions and affordability.

● Chernobyl New Safe Confinement (NSC):

○ To shield the damaged nuclear reactor (Reactor 4), the NSC was constructed.

○ It is the world's largest metal structure that can be moved to increase security measyures.

○ The inner and outer walls of the NSC are made of stainless steel to prevent corrosion.

● Corium:

○ After the Chernobyl disaster, a mixture called corium formed.

○ Corium consists of various phases, including uranium oxides, zirconium compounds, and uranium-containing glass.

○ It solidified within the reactor core and posed significant challenges during cleanup and containment.

● Emergency Measures:

○ During the accident, boron, dolomite, sand, clay, and lead were dropped onto the burning core by helicopter to extinguish the fire and limit the release of radioactive particles

## 7. How Energy Produced in Chernobyl

Enriched uranium is needed to build a nuclear power plant. As a result of uranium splitting by fission reaction, a very high amount of energy is released. For this fission, neutrons hit the nucleus of the uranium element at a high speed. This collision causes the nucleus to become unstable and subsequently causes a fission reaction that releases great energy. As a result of the first triggering fission reaction, neutrons are emitted into the environment. These neutrons continue to hit other uranium nuclei until fission occurs in every atomic nucleus of the element. The resulting energy is lethal if left uncontrolled. To control, there are units in reactors that hold excess neutrons and prevent them from reacting. In this way, a controlled fission reaction chain is provided.

When we look at the internal structure of a nuclear power plant, the energy generated by the fission reaction of uranium allows water vapor to be heated to very high temperatures. This high temperature steam is fed to turbines connected to the electric generator. The high-energy steam hitting the turbine blades turns the turbine shaft in the known way and the generator is enabled to produce electrical energy. The electricity generated in the generator is sent to the place where it will be used via conductive wires called transmission lines. The steam coming out of the turbine, whose pressure and temperature have decreased, goes to the condenser to be used again, and after it turns into water, it is heated again with the energy released by fission and turned into steam, and the cycle continues.

## 8. Possible Dangers in Chernobyl Zone

The Chernobyl exclusion zone is among the most radioactively contaminated regions on the planet. Thousands of acres surrounding the reactor site have ambient radiation dose rates exceeding typical background levels by thousands of times. In parts of the so-called Red Forest near the power plant it's possible to receive a dangerous radiation dose in just a few days of exposure.

Perhaps the greater environmental threat to the region stems from the potential release to the atmosphere of radionuclides stored in soil and plants should a forest fire ignite.

Such fires have recently increased in frequency, size and intensity, likely because of climate change, and these fires have released radioactive materials back into the air and dispersed them far and wide. Radioactive fallout from forest fires may well represent the greatest threat from the Chernobyl site to human populations downwind of the region as well as the wildlife within the exclusion zone.

### 8.1. Examples of These Danger's in the Past

The Chernobyl Forum report says that people in the area have suffered a paralyzing fatalism due to myths and misperceptions about the threat of radiation, which has contributed to a culture of chronic dependency. Some "took on the role of invalids." Mental health coupled with smoking and alcohol abuse is a very much greater problem than radiation, but worst of all at the time was the underlying level of health and nutrition. Apart from the initial 116,000, relocations of people were very traumatic and did little to reduce radiation exposure, which was low anyway. Psycho-social effects among those affected by the accident are similar to those arising from other major disasters such as earthquakes, floods, and fires.

A particularly sad effect of the misconceptions surrounding the accident was that some physicians in Europe advised pregnant women to undergo abortions on account of radiation exposure, even though the levels concerned were vastly below those likely to have teratogenic effects. Robert Gale, a hematologist who treated radiation victims after the accident, estimated that more than 1 million abortions were undertaken in the Soviet Union and Europe as a result of incorrect advice from their doctors about radiation exposure and birth defects following the accident.

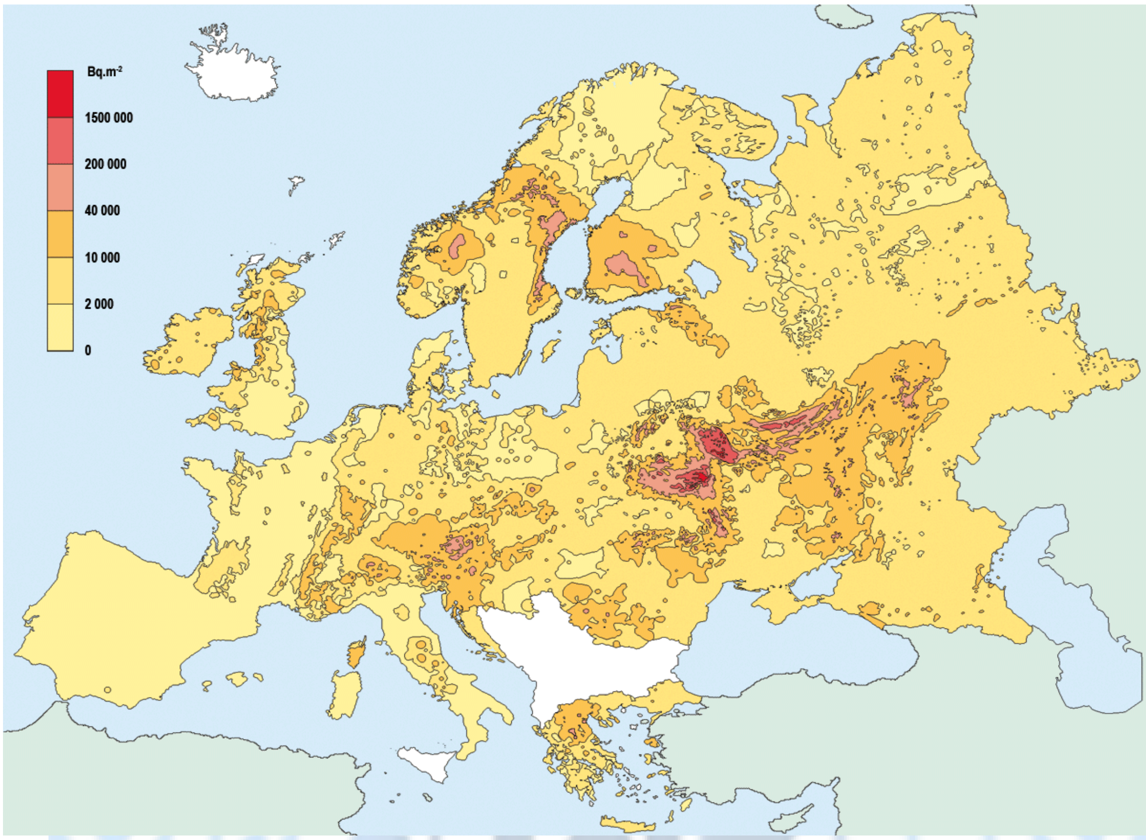
### 8.2. Possible Precautions Which Are Taken to These Dangers

Even if we exclude historical factors, disaster is inevitable as a result of these dangers and it is unacceptable not to take precautions. In this case, lack of precaution means a lack of respect not only for the lives of one's own citizens, but for the lives of all the people of the world. If there is insufficient diversification in finding these possible measures, these are some partıcular solutions you need to follow; (The precautionary proposals that will follow are the strategies implemented by the Soviet crisis coordinators of the period);

- Taking the Initial emergency measures after the explosion, including identification and treatment of the injured ones at the power plant,
- Carrying the casualties at the nearby settlements out of the danger zone,
- Post-explosion fires were brought under control, and measures were taken to contain the spread of radiation,
- Declaring a "semi-military"  zone outside the Chernobyl nuclear power plant that civilians will be banned from entering,

### 8.3. Possible Regions Which May These Dangers Can Affect

Some 150,000 square kilometers in Belarus, Russia and Ukraine are contaminated and stretch northward of the plant site as far as 500 kilometers. An area spanning 30 kilometers around the plant is considered the “exclusion zone” and is essentially uninhabited. Radioactive fallout scattered over much of the northern hemisphere via wind and storm patterns, but the amounts dispersed were in many instances insignificant.
Scandinavian countries and other parts of the world were affected by the radioactive releases from Chernobyl. Caesium and other radioactive isotopes were blown by wind northward into Sweden and Finland and over other parts of the northern hemisphere to some extent. During the first three weeks after the accident, the level of radiation in the atmosphere in several places around the globe was above normal; but these levels quickly receded. No studies have been able to point to a direct link
between Chernobyl and increased cancer risks or other health problems outside the immediately affected republics of Ukraine, Belarus and the Russian Federation.




## 9. Starting Date

The official starting date to our committee is 12 April, 1986. Which is two weeks before the Chernobyl Disaster. The feature of this date is that it is 2 weeks before the explosion, so it is suitable for managers and engineers to take the necessary precautions against the impending explosion or any other threat.

## *10. Matrix*

*Viktor Bryukhanov:*

Viktor Petrovich Bryuhanov is the former construction manager of the Chernobyl Nuclear Power Plant and was the chief manager of the nuclear power plant from 1970 to 1986 (corresponding to 16 years). He was one of the chief managers of the operation at the time of the explosion of the 4th reactor, although he did not want to admit it. He assumed management responsibility and communicated with higher units to provide the necessary support to the power plant.

*Anatoli Mayorets:*

Anatoly Mayorets was the Minister of Energy Engineering of the Soviet Union at the time. He was a very successful manager, having personally worked on all energy engineering projects of the USSR. Mayorets played a major role in the design, installation and activation of the Chernobyl Nuclear Power Plant.

*Anatoly Stepanovich Dyatlov:*

Anatoliy Stepanovych Dyatlov was the former deputy chief engineer in the operation of the Chernobyl Nuclear Power Plant. According to official versions, he was found guilty in the Chernobyl Disaster. To list the reasons for this: He became one of the top 3 managers in the management of the power plant with his 14 years of superior experience and experience. Dyatlov was responsible for the operation of reactors 3 and 4. Dyatlov supervised the test of the 4th nuclear power plant, which ended in a nuclear disaster on April 26, 1986. In this test, which they carried out with Nikolai Fomin, another manager of the power plant, the Chernobyl nuclear disaster occurred as a result of their failure to comply with safety rules and gross negligence. As a consequence of this situation, he was judged and sentenced to 10 years in prison.

*Aleksandr Akimov:*

Aleksandr Fyodorovich Akimov was a Soviet engineer who was the shift supervisor of the night shift working at Reactor Unit No. 4 on the night of the Chernobyl disaster. On the night of April 26, 1986, Akimov was on duty as shift supervisor of the power unit of reactor No. 4. The reactor's power level had been reduced and prepared for a planned safety test. Akimov refused to take the test due to his low and unstable condition, but was not accepted by Anatoly Dyatlov. However, the power reduction was very sudden, leaving the reactor in a "toxic" state. It then caused the reactor to shut down. Increasing the power after this point put the reactor in a very dangerous situation, unbeknownst to the operators. As a result of this situation, necessary precautions could not be taken and an explosion occurred. After the explosion, Akimov and his team tried to pump water into the reactor core all night long. He was awarded the 3rd degree Order of Courage.

*Nikolai Gorbachenko:*

Gorbachenko, a radiation monitoring technician, began his shift and checked in unit 3; he skipped the check of unit 4 as it was being shut down, so at the moment of the accident he was located in the duty room.

*Valery Khodemchuk:*

Valery Ilyich Khodemchuk was a circulation pump operator on the night shift at the Chernobyl power plant and a Soviet engineer who was the first victim of the Chernobyl Disaster. He was the first person to die in this disaster, as powerful explosions in reactor 4 destroyed the reactor and surrounding building, including the main circulation pump halls.

*Vitaly I. Borets:*

Borets, block shift leader at the Old Leningrad Nuclear Power Plant; He, who was responsible for the preparation of the test, would supervise the test according to the original schedule and asked his colleagues to cancel the test due to the condition of the reactor. He went home to spend the night and was called to the scene to assist with the post-accident situation. He worked at the scene to prevent the disaster as much as possible.

*Leonid Toptunov:*

Leonid Fedorovych Toptunov was a Soviet engineer who was the senior reactor control engineer at Reactor Unit No. 4 of the Chernobyl Nuclear Power Plant on the night of the Chernobyl Disaster of April 26, 1986. On the night of April 26, 1986, Leonid Toptunov was working in the control room at the reactor control panel together with his colleague Aleksandr Akimov.

*Anatoly Kurguz:*

Kurguz was an operator at the central hall. He was scalded by radioactive steam entering the control room; his colleague Oleg Genrikh escaped the worst and survived.

*Vyacheslav Brazhnik:*

Brazhnik was a senior turbine machinist operator. During the disaster, he ran into the control room to try to report fire in the turbine hall.

*Pyotr Palamarchuk:*

Palamarchuk was in charge of the Chernobyl operating group. He tried to communicate with other management rooms at the time of the disaster, but failed due to the high radiation exposure of the devices. He also took part in rescue operations.

*Razim Davletbayev:*

Davletbayev No. 2 was an engineer who was the deputy head in the turbine department. At the time of the disaster, he participated in search and rescue efforts with Palamarchuk.

*Nikolai Fomin:*

Nikolai Fomin was the chief engineer at the Chernobyl Nuclear Power Plant. As the chief engineer, he was found guilty in the accident that caused the reactor to explode. Fomin learned of the accident late in the day and subsequently helped clean up the incident. Fomin and Bryukhanov were tried together and both were sentenced to 10 years in prison.

*Leonid Telyatkinov:*

Leonid Petrovych Telyatnikov was a Soviet, and later Ukrainian, fire brigade commander notable for his role in directing the early stages of the initial response to the Chernobyl disaster. Telyatnikov served many years as an officer in both Soviet and Ukrainian firefighting organizations, working in a variety of junior and senior leadership positions throughout his career.

*Boris Stolyarchuk:*

Boris Stolyarchuk was a Senior unit 4 control engineer. He was present in the control room during the explosion. He was controlling the feedwater and deaerator mechanisms.

*Yuri Tregub:*

Yuri Tregub was a Unit 4 shift leader. After the explosion he went to survey the plant from the outside first with Yuvchenko and then with Dyatlov. Also ordered by Dyatlov to manually turn on the emergency high-pressure coolant water. Survived.

## 11. Other Countries' Views on Chernobyl Nuclear Power Plant & How Did They Effected From the Accident

No reports were released until the third day after the Chernobyl explosion. Then, Swedish authorities correlated a map of enhanced radiation levels in Europe with wind direction and announced to the world that a nuclear accident had occurred somewhere in the Soviet Union. Before Sweden's announcement, the Soviet authorities were conducting emergency fire-fighting and clean-up operations but had chosen not to report the accident or its scale in full. No established legitimate authority was able to immediately address the situation and provide answers to questions

US covered the Chernobyl accident so that Americans would not be misled in their understanding of and attitudes toward nuclear power in general. It also sought to determine if reporters took advantage of the Chernobyl accident to attack nuclear technology or the nuclear industry in general. Coverage was analysed in five US newspapers and on the evening newscasts of the three major US television networks. Despite heavy coverage of the accident, no more than 25% of the coverage was devoted to information on safety records, history of accidents and current status of nuclear industries. Not enough information was provided to help the public's level of understanding of nuclear power or to put the Chernobyl accident in context. However, articles and newscasts generally balanced use of pro- and anti-nuclear statements, and did not include excessive amounts of fear-inducing and negative information.

Three large scale surveys among the West German population were conducted in November/December 1986, May/June 1987 and May/June 1988 in order to analyse the long-term impacts of the Chernobyl disaster on opinions, attitudes and behaviour of the public. Particular emphasis was given to the perception of the threat caused by the event, the credibility of the information sources and the consequences drawn for dietary behaviour and attitudes towards the future use of nuclear power in West Germany. Results indicate that uncertainty about the health consequences of the reactor accident is a major response of the population to the event. The information given to the public by different sources after the accident was generally evaluated as insufficient. Although the assessment of the danger of the Chernobyl disaster was not reduced between the first and the third survey, the political opposition to the future use of nuclear power decreased to some extent. (This development was partly counterbalanced by the impact on public opinion of a scandal within the West German nuclear industry.) The results of a couple of elections after the Chernobyl disaster indicate that the majority of the population-though critical to nuclear power and concerned about its risks-does not demand clear-cut changes in energy policy.

Turkey is one of the countries that was severely impacted by the CNPP accident. The radiological evaluation for Turkey was conducted by the Turkish Atomic Energy Agency (TAEA, 2007). Unfortunately, the doses estimated by TAEA (2007) for different exposure pathways in some regions of the country were quite controversial, primarily due to data deficiencies. Since there was no air sampling station in the eastern Black Sea region, the air activity concentrations required for dose calculations in this region were considered the same as those measured in Istanbul. Furthermore, 137Cs deposition values used in dose calculations were measured about 5 years after the accident and no comprehensive evaluations were made on how much of these depositions were caused by the CNPP accident or by past nuclear activities such as nuclear weapon tests. Only one previous study were conducted to simulate the atmospheric transport of radionuclides originating from the CNPP accident over the Anatolia region (Simsek et al., 2014). This study applied various atmospheric dispersion modeling (ADM) simulations by considering various scenarios. It used three different source terms and two different dry deposition velocities to simulate the air activity levels and deposition values. Further, Simsek et al. (2014) also estimated total effective dose equivalent (TEDE) with two different methods for each city in Turkey. However, they considered only 137Cs and neglected other radionuclides for TEDE calculations.

Despite the limited number of modeling studies conducted for Turkey and its surroundings on the impacts of Chernobyl accident, large numbers of measurement and sampling studies were made to determine the level of radioactivity in Turkey after the Chernobyl accident Unfortunately, most of these studies have been limited to regional (usually province-based) sampling of multimedia compartments (soil, lichens etc.) and no detailed evaluation was undertaken to detect the extent of contamination and its potential radiological impacts. Furthermore, very few studies were found for countries in the east of the Mediterranean such as Iraq, Syria, Lebanon which did not include comprehensive radiological evaluations.

In Japan,The editorials used for the present study were retrieved from the online archives of the Tokyo editions of three Japanese national newspapers: The Asahi, The Yomiuri, and The Nihon Keizai. The Asahi and The Yomiuri were chosen because they are the two of the largest-circulation national newspapers in Japan. Given that post-Chernobyl antinuclear movements fell into a decline after the early 1990s (Yoshioka, 2011), editorials were selected from a four-year period after the 1986 Chernobyl disaster. Only editorials addressing Japan's nuclear safety were chosen for analysis. Editorials that appeared not to be explicitly related to Japan's nuclear safety were excluded during the coding process. Specifically, they constitute all the editorials that refer to "nuclear power" and "safety" published by the three newspapers from April 26, 1986, to April 26, 1990. The unit of analysis was an editorial. Drawing on the media package model, I conducted content analysis of these editorials by using standard coding and proposing two dominant media packages: "Enhancing nuclear safety" and "Japan's nuclear safety excellence" packages. Within the "enhancing nuclear safety" package, the code provides such categories as "nuclear safety should be enhanced in Japan." The package assumes that nuclear safety can be ensured with further efforts. The other dominant media package can be labeled as "Japan's nuclear safety excellence package." Within this media package, the code provides categories such as "Since Japan is excellent about nuclear safety, we should contribute to international society by using excellent Japanese nuclear safety technology." As indicated in the previous section, Japanese newspaper editorials never seriously reconsidered Japan's dependency on nuclear energy after the Chernobyl accident. By generating two 1976 Yasuhito Abe International Journal of Communication 7(2013) dominant media papckages, Japanese newspaper editorials contributed to framing nuclear power in terms of Japan's commitment to the technological development of nuclear power (the progress package). The following is the ratio of each media package.

The Chernobyl nuclear accident also contaminated a large part of the higher latitudes of the northern hemisphere. Latter problems in upland UK, where ecological problems still remain some 17 years after initial contamination. Following deposition of radiocaesium and radioiodine in May 1986, measurements of radioactivity in grass and soil indicated a rapidly declining problem as the radioiodine decayed and the radiocaesium became immobilised by attachment to clay particles. However, these studies, as well as the advice received by the Ministry of Agriculture, Fisheries and Food, were based on lowland agricultural soils, with high clay and low organic matter contents. The behaviour of radiocaesium in upland UK turned out to be dominated by high and persistent levels of mobility and bioavailability. This resulted in the free passage of radiocaesium through the food chain and into sheep. Consequently the Ministry banned the sale and movement of sheep over large areas of upland Britain, with bans remaining on some farms to the present day. Present day predictions suggest that these bans will continue in some cases for some years to come. The causes of radiocaesium mobility in upland areas have subsequently been the subject of intense investigation centred around vegetation and, in particular, soil characteristics. Soil types were identified which were particularly vulnerable in this respect and, where these coincided with high levels of deposition, sheep bans tended to be imposed. While much of the earlier work suggested that a low clay content was the main reason for continuing mobility, a very high organic matter content is now also believed to play a major role, this being a characteristic of wet and acidic upland UK soils. The overall message from this affair is the importance of a fundamental understanding of biogeochemical pathways in different ecosystems when attempting to predict the impacts of large-scale contamination.

## 12. Bibliography

https://iopscience.iop.org/article/10.1088/0963-6625/1/3/005/meta

https://www.un.org/en/observances/chernobyl-remembrance-day/background

https://www.sciencedirect.com/science/article/abs/pii/S0272494405801239

https://www.sciencedirect.com/science/article/abs/pii/S1309104221003706

https://ijoc.org/index.php/ijoc/article/view/1848/982

https://en.wikipedia.org/wiki/Leonid_Telyatnikov#Chernobyl_disaster

https://en.wikipedia.org/wiki/Nikolai_Fomin

https://www.eea.europa.eu/data-and-maps/figures/deposition-from-chernobyl-in-europe

https://www.edfenergy.com/about/nuclear/what-is-nuclear-energy

https://en.wikipedia.org/wiki/Nuclear_power

https://en.wikipedia.org/wiki/Leonid_Toptunov

https://en.wikipedia.org/wiki/Valery_Khodemchuk

https://en.wikipedia.org/wiki/Individual_involvement_in_the_Chernobyl_disaster

https://en.wikipedia.org/wiki/Aleksandr_Akimov

https://en.wikipedia.org/wiki/Anatoly_Dyatlov

https://en.wikipedia.org/wiki/Chernobyl_Nuclear_Power_Plant#Computer_systems

https://en.wikipedia.org/wiki/Valery_Legasov

https://en.chernobylhistory.com/chernobyl-a-moment-before-the-disaster/