Makalenin Dergiye Ulaşma Tarihi:21.03.2016
Yayın Kabul Tarihi: 24.05.2016

AVRASYA Uluslararası Araştırmalar Dergisi Cilt:4 •Sayı:9•Temmuz 2016•Türkiye

POTENTIAL THREATS FROM TRANSBOUNDARY NUCLEAR POLLUTION BETWEEN BULGARIA AND TURKEY

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ABSTRACT

Energy production, use, and distribution cause some of the most pressing environmental problems. The accident in April 1986 at the Chernobyl nuclear power station in Ukraine, in which large amounts of radioactive materials were released into the environment, was the most serious to have occurred in connection with the use of nuclear energy to generate electricity. This accident clearly showed the transboundary nuclear pollution impact that a nuclear accident can have. It had negative consequences on the health, the environment, and the economy of a large geographical area. In this study, the potential threat from the Turkish nuclear power plant that is going to be built close to the Bulgarian border is discussed. The study concludes that Bulgaria will bear a significant negative consequence from an accident that may occur at the nuclear reactor in Igneada/Turkey, which is planned to be build 10 kilometers to the Bulgarian border.

Keywords: Transboundary Nuclear Pollution, Chernobyl Accident, Nuclear Energy, Terrorism Threat

BULGARİSTAN VE TÜRKİYE ARASINDA SINIR ÖTESİ POTANSİYEL NÜKLEER KİRLİLİK TEHDİTİ

ÖZ

Enerji üretimi, kullanımı ve dağıtımı en acil çevre sorunlarından bazılarına neden olmaktadır. Nisan 1986'da, Ukrayna'da Çernobil nükleer güç istasyonu kazası sonucunda, radyoaktif maddelerin büyük miktarlarda çevreye yayılması, elektrik üretmek için nükleer enerjinin kullanımı ile bağlantılı olarak meydana gelmiş en ciddi kazadır. Bu kaza nükleer kazaların nasıl sınıraşan nükleer kirlilik etkisi gösterdiginin en acık belirtisidir. Çernobil kazası geniş bir coğrafyada sağlık, cevre ve ekonomik sorunlara neden olmuştur. Bu çalışmada, Bulgaristan sınırına 10 kilometre uzaklığa inşa edilmesi planlanan Türk nükleer santralinin nasıl Bulgaristana potansiyel bir tehdit olacağı tartışılmıştır. Çalışmanın sonucu olarak, inşa edilmesi planlanmakta olan İğneada/Türkiye nükleer reaktördeki oluşabilecek bir kaza durumunda Bulgarıstan önemli bir olumsuz sonuc taşıyacaktır ve bu nukleer santral Bulglarıstan için büyük bir tehdidtir.

Anahtar Kelimeler: Sınıraşan Nükleer Kirlilik, Çernobil Kazası, Nükleer Enerji, Terörizm Tehditi

INTRODUCTION

The world's population is growing and increasing numbers of people aspire to higher standards of living - we need more and more energy. Energy is essential for all we do as individuals and as societies. However, energy production, use, and distribution also cause some of the most pressing environmental problems. For example, an accident at a nuclear power plant can release highly radioactive materials into the environment. Since radioactive pollution can travel through the air, infiltrate waterways, or disperse into the sea, opportunities abound for persons of one state to suffer radiation damage caused by activities of persons of another state (Heiss, 2011). The accident in April 1986 at the Chernobyl nuclear power station in the Union of

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Soviet Socialist Republics, in which large amounts of radioactive materials were released into the environment, was the most serious to have occurred in connection with the use of nuclear energy to generate electricity.

The Chernobyl nuclear accident was one of the biggest environmental disasters of the 20th century which affected not only the region of Ukraine but also other countries. Transboundary pollution, defined as "pollution whose physical origin is situated wholly or in part within the area under the jurisdiction of one state and which has adverse effects, other than effects of a global nature, in the area under the jurisdiction of another state," is one of the oldest and most persistent problems in environmental law. While transboundary pollution problems can be found along political borders at any level of government, international transboundary pollution has proved particularly difficult to address (Handl, 1988). Till date, there are limited international agreements catering to transboundary radiation pollution. Perhaps, larger and more general issues such as transboundary air and water pollution take precedence. It is also indeed true that tragic disasters such as those of Chernobyl and Fukushima are simply unfortunate and relatively rare in occurrence, which may explain the lack of emphasis and pressure on the part of governments to put in place provisions (Yablokov, 2009) .

The Turkey's recent decision to build 3 nuclear power plants for meeting the increasing energy demand was fiercely debated and protested by the public. Especially the one who is planned to be built in Igneada took more attention mostly because of the environmental protection of the region (Greenpeace, 2015). In this article the potential transboundary impact this nuclear power plant may have to Bulgaria is emphasized.

The main aim of this study is to analyze and discuss the potential threat of nuclear pollution that Bulgaria may face from the Turkish nuclear power plant which is going to be built 10 kilometers to the Bulgarian border. For this purpose, the Chernobyl Nuclear Accident and its transboundary impact is looked as an example case. Furthermore, the Turkey's nuclear energy policy is reviewed, and the potential risk of terrorist attacks to nuclear power plants in Turkey and the burden that Bulgaria might bear is discussed.

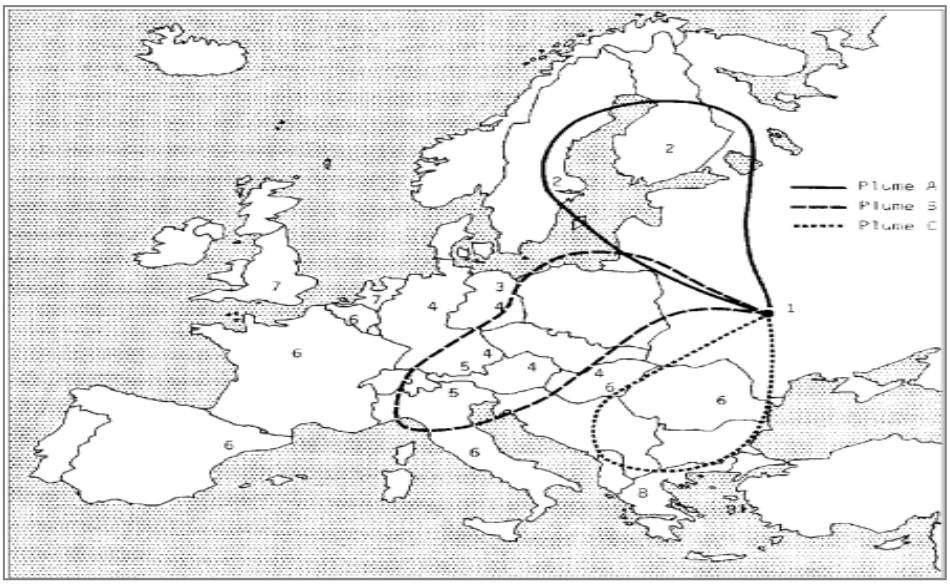
Example Case of Chernobyl Accident and its Transboundary Impact

The nuclear accident that occurred on 26th of April 1986 at Chernobyl, a town in Ukraine situated approximately 100 kilometers north of Kiev, is an event that seems to become increasingly important with time (Krieger, 2004). It is generally known as the largest and most serious accident ever occurred in the nuclear power industry (Berger, 2010). The hazardous effects of a nuclear power plant accident were unimaginable until the Chernobyl accident occurred. The reactor was destroyed in the accident and considerable amounts of radioactive material were released and eventually contaminated a wide geographical area (Tschiersch and Georgi 1987). The total mass of radioactive particulate material released during 26 April – 5 May 1986 was about 8,000 kg (Sandalls et al., 1993). Most of the released radioactive materials were in particulate form (Khitrov et al. 1994), whereas noble gases and most of the iodine were in gaseous form (Pöllanen et al., 1999). Pöllanen et al. (1997) showed that after the Chernobyl accident, several European countries were affected by large and highly

radioactive particles. In the Chernobyl accident, most of the particulate materials were deposited within 20 km of the plant, but about one-third was transported even thousands of kilometers (Powers et al., 1987; Charles et al., 1997).

The radiation from Chernobyl that initially swept over the nearby region on April 28th was brought to the heart of Europe by shifting winds on May 5th. The Chernobyl accident that happened in Ukraine had consequence wide spread to other countries' territories. Radioactive particulate materials released during 26 April – 5 May 1986 were found in many European countries after the accident. A study which was conducted by United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in 1988 showed the spread of radioactive plumes over Europe after the Chernobyl nuclear accident as indicated in Figure 1.

Figure1: Spreading of radioactive plumes over Europe after the Chernobyl nuclear accident.



Source: UNSCEAR report, 1988

Even today, scientists in many countries remain interested in the consequences of the accident in contaminated areas, primarily related to the health risks to the present and future generations (e.g. Varinlioglu and Kose 2005).

The caused nuclear pollution from the Chernobyl accident generally had a negative impact on the health, environment and economy of the contaminated areas.

1.1 Health impact

The Chernobyl nuclear plant accident was responsible for causing deaths both directly and indirectly. The exact numbers of health costs of the accident are fiercely debated. However, according to the World Health Organization (2005) approximately 1000 on-site reactor staff and emergency workers were heavily exposed to high-level radiation on the first day of the accident; among the more than 200 000 emergency and recovery operation workers exposed during the period from 1986-1987, an estimated 2200 radiation-caused deaths can be expected during their lifetime. The total number of deaths already attributable to Chernobyl or expected in the future over the lifetime of emergency workers and local residents in the most contaminated areas is estimated to be about 4000. Except the deaths, residents who ate food contaminated with

radioactive iodine in the days immediately after the accident received relatively high doses to the thyroid gland. Since iodine concentrates in the thyroid gland, this was a major cause of the high incidence of thyroid cancer in children.

1.2 Environmental impact

Environmental impact of the Chernobyl accident was also significant. Ecosystems affected by Chernobyl have been studied and monitored extensively in the past decades (Howard et. al., 1991). Major releases of radionuclides continued for ten days and contaminated more than 200 000 square kilometers of Europe. The extent of deposition varied depending on whether it was raining when contaminated air masses passed (Ginzburg and Reiss, 1991). The accident caused radionuclide contamination of the atmosphere, hydrosphere, biosphere and pedosphere of the entire affected geographical region (Steinhauser et. al., 2014). Environmental damage occurred in many European countries as the cloud of radioactive residue spread all over the northern hemisphere. Thus, Chernobyl has sharpened our awareness of what severe ecological and health impacts an unintentional release of radiation can have on such a vast geographical area. (OECD, 2002; IAEA, 2005).

1.3 Economic impact

Damages from Chernobyl, direct and indirect, are difficult to quantify in monetary terms. The European Economic Community's import ban on Polish food imports cost Poland one million dollars in May of 1986 alone. Austrian farmers in June the same year asked for nearly 5.5 million dollars in compensation from their own government for its failure to exercise enforcement control over vegetable sales. Italian farmers claimed they were losing 3.3 million dollars a day and the West German government estimated that its damage might be in the billions. (Reuters North European Service, 1986). Research conducted by Tveten et. al. (1998) shows that in 1986, in Norway, 2300 mutton was banned, due to the Chernobyl accident, which cost roughly $13 million to the Norwegian economy. Furthermore, Chernobyl had taken an $11 billion toll on Ukraine's economy by the year 1999 (Reuters, 1999). The Soviet Union spent billions on Chernobyl rehabilitation (Geeenpeace, 1996).

It is clear that the Chernobyl accident caused transboundary nuclear pollution damaging the environment, affecting the health and costing to the economy of the contaminated areas.

Turkey's Nuclear Energy Profile and Policy

Nuclear energy is a major source of energy in many countries. Worldwide there are 442 Nuclear Power Plants with the United States having the most Nuclear Energy reactors followed by France, Russia and Japan. According to International Atomic Energy, Nuclear energy constitutes 50.6 % of the world's total energy production.

On the other hand, currently there are no nuclear reactors in Turkey. The main source of energy for the country is natural gas and coal which is mostly imported from other countries.

Table 1. Energy sources in Turkey and their share of the total

Energy sources	Share of the total
Oil	1.5 %
Natural Gas	43.7%

Coal	27.5%
Hydropower	24.2%
Nuclear	0%
Others (renewable and etc.)	3.1%

Source: Republic of Turkey Ministry of Energy and Natural Resources

Every year demand for electricity in Turkey's bustling economy is growing by more than five per cent, yet the country depends on imported resources to meet 73 per cent of its current energy needs. Turkey's new nuclear power programme aims to provide at least 10 per cent of the country's energy by 2023, according to Turkey's Ministry of Energy and (Mutluer, 2015). The country has a project to build a nuclear power plant at Akkuyu with the Russian Federation and is developing another project at Sinop with Japan (Ferrari, 2014). According to recently released information from the Turkish Ministry of Energy and Natural Resources (2015), Turkey is planning to build one more Nuclear Power Plant which is going to be 10 kilometers to the Bulgarian border. The place is famous for its Floodplain Forests National Park which covers an area of 7,800 arches, beautiful landscape and beaches (Greenpeace, 2015). The location of the planned Turkish Nuclear Power Plant is in the city of Igneada close to the Bulgarian border Rezovo Rive as shown in the following map.

Source: Google Maps

The decision for the location of the third nuclear reactor was protested by the public mainly because of the environmental protection of the region. Worldwide, there are floodplain forests only in Amazon, Africa Kongo Basin, and Igneada/Turkey. The region is also a habitat for many protected species (Hurriyet, 2015). A potential accident in the nuclear plant could have a dramatic impact of the ecosystem of the region, but also it can affect a wider geographical area. The Chernobyl accident had a negative effect on the environment, heath and the economy of the contaminated areas outside of the borders of the state. Knowing this fact rises the question how does the

nuclear power plant that is planned to be build 10 kilometers to the Bulgarian border can be a potential threat to Bulgaria?

Potential Threats from Transboundary Nuclear Pollution between Turkey and Bulgaria

The nuclear reactor accident at Chernobyl profoundly highlighted the global scale of states' environmental interdependence. The shift in perception wrought by the accident attests to its powerful impact. Until Chernobyl, the safety aspects of constructing, siting, and operating national nuclear power reactors generally were considered matters of domestic concern, with neighboring countries possessing only a limited legal interest. The accident seriously undermined the viability of this view by demonstrating that the hazards of nuclear power operations are intrinsically international in dimension. People over the world realized that national boundaries are chimerical in an age of nuclear power production (Handl, 1988).

All nuclear activities, and not just those confined to nuclear weapons, are cause for serious concern because of their potential threat and harm. The April 1986 Chernobyl accident, the worst industrial disaster ever, has alerted the international community that nuclear power plants pose a grave danger not only to the region in which they are located but to distant lands, as well. Furthermore, it is a well-known fact that once radioactive particles and gases are released into the atmosphere, long-range atmospheric transport processes can cause widespread distribution of these radioactive matters although they originate from a single point as in the case of the Chernobyl accident (e.g. Mason and Macdonald 1987; Renato et al. 1994). The Chernobyl experience clearly showed that a possible accident in the Turkish Power Plant which is going to be built close to the Bulgarian border would affect Bulgarian territory by large depositions and high concentrations of radioactive pollutants released to the atmosphere. Several studies have been warning about the potential threats of terrorist attacks on nuclear power plants (Akyuz, 2015; Blair and Rewer, 1997).

Turkey is a country with continuous terrorist attacks. The recent terrorist attacks that happened in Ankara in February and March, 2016 with a total of 50 deaths and more than 150 injured makes us think about the safety of the nuclear plants (BBC, 2015). Also the terrorist attack to the natural gas pipeline Baku – Tbilisi – Ceyhan in Northeastern Providence of Turkey in May 2012 and August 2015, shows the awareness of the terrorist about the energy sources (Sabah, 2015). Knowing these facts makes us think is it really safe to build nuclear reactors in Turkey? What about the transboundary effect that a potential nuclear accident or terrorist attack of these reactors can have, especially to Bulgaria? The consequences of such attack can be dreadful. However, as far as transnational pollution is concerned, today's international legal system still has important shortcomings which present major obstacles for legal protection and victim compensation. In the narrower area of transnational radiation pollution, the accident at the nuclear power plant at Chernobyl in 1986 emphasized those shortcomings, as well as the inherent consequences.

Conclusion:

The accident at the Chernobyl nuclear power plant in 1986 was a tragic event for its victims, and those most affected suffered major hardship. As the Chernobyl accident shows, the whole population of foreign states can be affected by a comparable disaster (Heiss, 2011). It is a clear example how a nuclear power plant can be a potential threat for large geographical area. This accident increased the awareness about the transboundary impact that a nuclear accident can have. Knowing this fact, it can be concluded that the Turkey's nuclear power reactor that is going to be build 10 kilometers to the Bulgarian border is a potential threat to Bulgaria. Turkey is a country with continuous terrorist attacks and conflicts, and energy sources are under threat. In case of nuclear accident or terrorism attack to the nuclear power plant in Igneada, Bulgaria will bear significantly negative consequences affecting the health, environment, and the economy of the country. As Chernobyl shows, nuclear accidents and their prevention are a global concern.

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