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Statistic Methods for Assessments of Risks and Damages at Nuclear Power Plants

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Abstract: Many high development countries have not the natural hydrocarbon deposits. That is why NPP energy production is constantly and intensive increases. For example, in France. The corresponding treats under NPP exploitation also are increasing, that caused by different natural and manmade factors, including as attractive objects for possible directed terrorist attacks. Correct assessments of corresponding risks and damages are necessary for any NPP at all periods: its projecting, building and exploitation under its complex integrated emergency management. Here we try to analyze some possible methods of NPP risk assessments. Early we predicted the irradiation doses and corresponded risks for population under implementation of Russian Federal Program:" Development of Russian atomic energy industrial complex on 2007-2020 years at 10 homeland NPP, that operated in normal non disasters regimes during two last decades. But such data are absent for NPP, that have been or will be under non prognostic emergencies. It is connected with the following facts. The part or total of needed information may be obtained only after NPP disasters. Some NPP are located in the dangerous regions and exposed to intense negative natural responses (earthquakes, tsunami, etc.) and manmade ones, when NPP are located in some dangerous conflicts zones with high level of possible terrorism threats. Here the using of classic methods of expertise risk NPP assessments are not correct and often impossible at all. Some needed thematic data may be obtained from primary virtual computer tests of individual NPP with imitation of possible disasters. It allows to plan the actions for NPP operators and special services under serious NPP disasters or may be to prevent them at all. These thematic problems, connected with the following NPP: Fukusima, Seversk in Tomsk region, Armenian, the future NPP in Kazakhstan and nuclear terrorism are also under consideration in this article.

Keyword: NPP, Exploitation, Disaster, Risk, Damage, Irradiation Dose

1. Introduction

Many high development countries have not the natural hydrocarbon deposits. That is why Nuclear Power Plants (NPP) energy production is constantly and intensive increases. For example, in France. The corresponding treats under NPP exploitation also are increasing, that caused by different natural and manmade factors, including as attractive objects for possible directed terrorist attacks. Correct assessments of corresponding risks and damages are necessary for any NPP at all periods: its projecting, building and exploitation under its complex integrated emergency management. Here we try to analyze some possible methods of NPP risk assessments. Early we predicted the irradiation doses and corresponded risks for population under implementation of Russian Federal Program:" Development of Russian atomic energy industrial complex on 2007-2020 years at 10 homeland NPP, that operated in normal non disasters regimes during two last decades. But such data are absent for NPP, that have been or will be under non prognostic emergencies. It is connected with the following facts. The part or total of needed information may be obtained only after NPP disasters. Some NPP are located in the dangerous regions and exposed to intense negative

natural responses (earthquakes, tsunami, etc.) and manmade ones, when NPP are located in some dangerous conflicts zones with high level of possible terrorism threats. Here the using of classic methods of expertise risk NPP assessments are not correct and often impossible at all. Some needed thematic data may be obtained from primary virtual computer tests of individual NPP with imitation of possible disasters. It allows to plan the actions for NPP operators and special services under serious NPP disasters or may be to prevent them at all. These thematic problems, connected with the following NPP: Fukusima, Seversk in Tomsk region, Armenian, the future NPP in Kazakhstan and nuclear terrorism are also under consideration in this article.

Any NPP is the unique very complex object for energy production. Its right normal exploitation is possible under the observation of many thematic known laws and rules with the keeping of the strong serious principles of its safety culture. Really NPP disasters may create the wide spectrum of the great different damages with the exclusive negative and often non reversible consequences for population and environment. Usually NPPs are located in density populated industrial regions, where there is the great need in energy consumption. Besides the NPP specific technological cycle demands a lot of water. That is why all NPP are located near the large water objects (WO), such as rivers, lakes, artificial reservoirs, seas and oceans with its corresponding water systems, located under the earth surface and underground, that extended on sizeable territories. These factors greatly increase possible risks and damages, caused by possible natural and manmade NPP disasters and create the serious additional problems especially connected with great pollution of environment That is why it is very important to realize constant management for the corresponding WO especially in urgent risk situations [1-5]. In addition oceans and seas create the great treats, closely connected with the possible tsunami under earthquakes as it has taken place at Fukushima NPP (FNPP) global catastrophe on March 11, 2011.

Early we used our method for prediction of irradiation doses for population under implementation of Russian Federal Program:" Development of Russian atomic energy industrial complex on 2007-2020 years" [6, 7]. Only the normal non disasters regimes of 10 Russian NPP exploitation have been under the detail consideration. The representative statistic data, obtained for 2 last decades of its exploitation, were sufficient for such consistent prediction.

Here we demonstrate and analyze some possibilities of using of our method for assessments of radiation dose for population under some possible NPP disasters. The following NPP Japan Fukusima, Russian Seversk in Tomsk region, Armenian and the future NPP in Kazakhstan are under consideration.

Our universal formula for assessment of the total vector of limited losses under NPP exploitation has been used for the fixed time interval under the following assumptions: (1) at initial state the object is in normal (non accidents) exploitation; (2) the different kinds of accidents may be occurred as noticed i=2, 3, …, m, where m is the total number of possible accidents (m=1 is corresponded to the normal regime); (3) every accident may create the different kinds of damages: (4) realization of i accident creates the damage of j kind with P_{ij} probability,

$$\vec{a}_{\lim} = P(1)\vec{a}_{1n} + \sum_{i=2}^{m} \hat{P}_{ij}\vec{a}_j \qquad (1)$$

Here j is the kind of damage with $a_{j.}$ value. Then j=1, 2, …n, where n is the total number of possible kinds of damage; where P (1) is the probability of loss formation under normal exploitation; $\vec{a}_{1n}$ is the vector of limited damage under regular exploitation. $P_{ij}a_j$ coordinate vector value in sum is equal the damage value of j kind under realization of i kind accident. Thus the matrix of loss probabilities is determined. Under absent of accidents (normal regime of exploitation) $\vec{a}_{\lim}$ is determined only the first part of (1) formula.

The main problem is P_{ij} values assessment. Usually the representative statistic data for its assessment are present only for long duration of NPP normal exploitation period. Such data are absent for NPP non prognostic emergencies, when some information may be obtained only after disasters.

It is noticed that some NPP are located in regions, exposed to negative natural responses, such as earthquakes, tsunami. This situation takes place for Armenian, Japan, California NPP and the others. The serious negative manmade factors with the global wide scale treats exist for some NPP in the dangerous conflicts zones with high probability of possible terrorist attacks, including using of explosives. Using of classic methods of expertise assessments for NPP disaster are not correct (often impossible) in these cases. Some needed data may be obtained from primary virtual computer tests of concrete NPP with imitation of possible disasters. It allows to assess risk values and also to plan the actions for NPP operators and special emergency services under serious NPP disasters or may be to prevent it at all. Effectively of liquidation of any disaster, including NPP one, is determined by qualification and professional actions of special save emergency services. Especially when the determined disaster is in the stage of its developing. In some cases developing of the happened disaster may be stopped at all. But in any case it will help to minimize and soft of its negative consequences. Also it is often necessary to transform these consequences from its possible irreversible state in reversible ones.

2. Method

Here we use the theoretic methods, based on our previous results for last decade. The complex investigations of risks and possible ecological and economic damages from large-scale natural and manmade catastrophes in ecology-hazard regions of Central Asia and the Caucasus are presented in details in the cycle of our previous works [8-12]. Some problems of nuclear safety for U - tailing storages also have been under consideration there with the application of our methods.

3. Results

Now we pay some attention to FNPP catastrophe. Today FNPP presents by itself the wide scale suitable polygon for complex and detail researching of all possible NPP disasters, because it includes many events, that reflect the close connected natural and manmade reasons from the stage of the catastrophe's appearance and its developing. The FNPP is dislocated at the North Pacific Ocean beach. As we imagine from the detail analysis of the known thematic information, the scheme of tsunami response on the FNPP with its consequences followed after the earthquake on March 11, 2011 is presented in Figure 1. The main reason FNPP catastrophe was the first shock huge water wave (HWW) resulted after the earthquake, located down ocean bottom. HWW front height at the beach was about 10-15 m with its 965 km/h. speed.

The most dramatic scenario has taken place, when NPP external its diesel underground electric generators have been totally over dammed. The outside electric supplement from external sources, such as high voltage electric lines, was destroyed and the inside energy supplement from generators were stopped at all. That is why all emergency systems, such as the hydrogen defense, emergency cooling water injection pumps of NPP blocks, the system of fire-protection, the system of industrial seismic-protection, the signal system about temperature's access in the first reactor's counter have been broken and switched off. It is known that any hydrogen mix with the air is extreme explosive one. Hydrogen generation in the localized places inside of reactor and near it caused the blasts with the fires, that created the additional destroys of all defense constructions and the additional radioactive leakages in atmosphere and in the ground and water objects. It is noticed that the repeat shocks from next earthquakes at the beach with not high intensity as the first one in the Ocean on March 11, 2011, didn't allow to construct additional defense from penetration of all possible pollutions in environment. The direct discharges of radioactive vapor propagated in atmosphere. In result of defense capsule's destroys in the first counter of the reactor the heavy NPP disaster has taken place and melt-down nuclear fuel penetrated into the soil. In this case it was impossible to assess the total level of radioactive pollution and its spreading in the soil. May be some underground water channels are located here and the part of such pollution penetrated in the Pacific Ocean by this way. The noticed very negative dramatic scenario have taken place at 3 from 8 FNPP reactors.

The nearest suitable electric power source, that was sufficient for the normal function of emergency equipments, is located in about 6 km from FNPP. The Japan emergency specialists began to construct electric wires on the utility poles. But we think that the best solution was to put electric cable directly on the soil surface. It allowed to save substantial time.

The detail parameters of these earthquake, tsunami impact and FNPP reactor's parameters graphs on the evolution of pressure, temperature, etc. since the catastrophe are known and presented in some information sources, such as http://www.iitk.ac.in/nicee/wcee/article/WCEE2012_2048.pdf

http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/documentation/cn200_Final-Fukushima-Mission_Report.pdf

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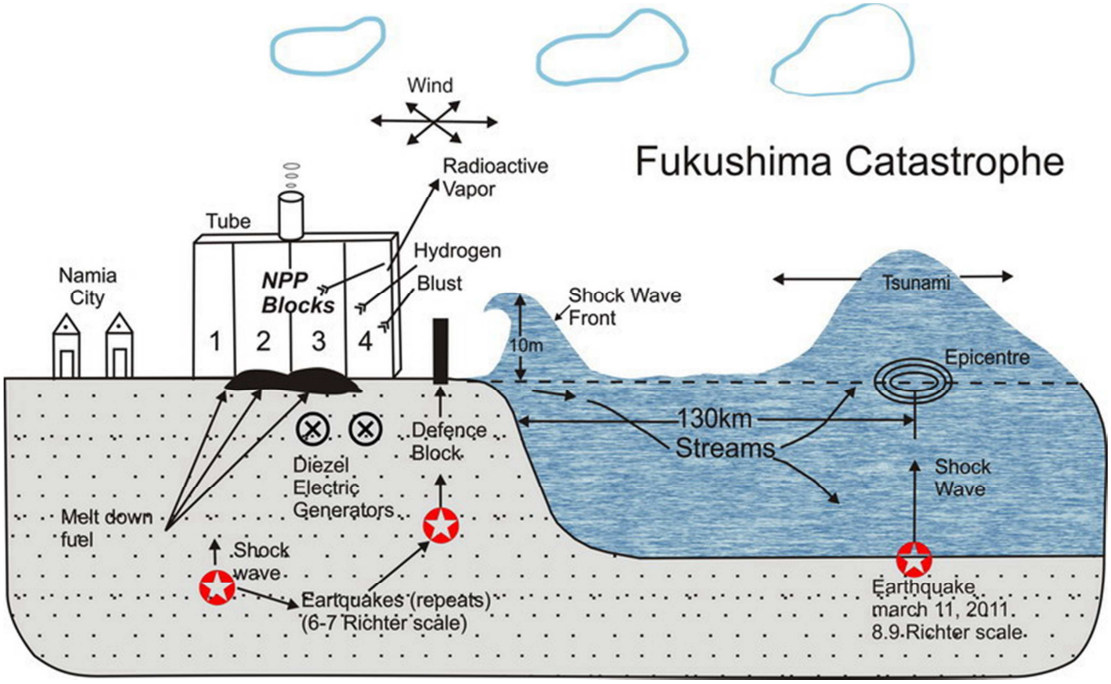


Figure 1. *Scheme of tsunami response on FNPP.*

According to the Russian Medicine Norma the limited irradiation human's organism doses (IHD) levels on every separated radionuclide must not more than 10 MicroSievert in year. At FNPP the irradiation level near it was till 10 000 MicroSievert in hour.

In the case of NPP exploitation both in normal or emergency regimes the irradiation human dose (IHD) is the following function:

$$IHD=F\ (RGAD + LRD) \quad (2)$$

where RCAD is the value of radio nuclide's gas-aerosol discharges in atmosphere; LRD is the value of liquid radioactive discharges into different water objects.

At FNPP catastrophe the environment irradiation level was extreme. The current IHD is determined only by the direct radioactive responses:

$$IHD=F_1\ (\text{Direct Radioactive Atmosphere and Water Responses}) \quad (3)$$

But our method for IHD assessment is available in this case. It is important to notice that the most high risk levels, caused by irradiation, are especially negative and characterized for children and embryos. The radiation creates the negative gene mutation at cells level under speed organism's growth. And today FNPP is constant source of shot and long -lived isotopes, that keep its activity now and will be keep during unknown period. The main problem is the correct assessment RGAD and LRD values and its three–dimension (3D) time variations. The scientists of our Nuclear Safety institute of Russian Academy of Sciences (IBRAE RAS) have paid the great attention to the complex detail researching of FNPP catastrophe. Some results are presented in 10 thematic articles, collected in the book "Proceeding of IBRAE RAS, issue 13: Accident at "Fukushima -1 NPP: Response Experience and Lessons [13]. Also it is very important to make the correct categorization of Aqueous Media and Water Bodies by Contamination Radioactive Levels [14].

The special two step test procedure has been developed in Japan for NPP test on its stability under the intense responses of earthquakes and tsunami. Only after its complete successful passing any NPP may be put into exploitation again.

Today the IAEA International 7 NPP Scale Accident levels is the following:

(1) Insignificant accident; (2) Average accident; (3) Serious accident; (4) Accident within NPP location; (5) Accident with the risk for environment; (6) Heavy accident; (7) Global accident (catastrophe). Only 4-7 levels are really dangerous ones. The U. S. nuclear accident at Three Mile Island Nuclear Generating Station in 1979 had 5 level. Although the reactor's zone has been defected, but the defense construction capsule was not destroyed and kept the radioactive discharge at the low level. Japan Government Nuclear Agency classified the F NPP catastrophe as 7-th maximum Global level. Till it was only one time for Chernobyl NPP catastrophe in 1986.

It is important to notice that apart from the technical mistakes in any NPP projecting and during its exploitation, there were some great political mistakes in different countries, that created negative base in future NPP accidents. After atomic energy creation in USSR, at first time our Government considered that all NPPs are presented by itself the same energy objects as hydro or coal thermal stations for energy production. And it was not necessary to pay the special attention and relation to its exploitation with additional funding and to create new separate thematic Minister Department. Also some mistakes in NPP projecting and building have worsted the situation. The result was the global Chernobyl catastrophe. But under the Chernobyl only the single huge radioactive blast has been happened/ And it was not located near the Ocean. Today at the FNPP catastrophe we have deal with the constant intense source of environmental wide scale radioactive pollution. It is unknown the temporal final of its activity and it is impossible to assess the total risks and the connected damages.

In India when the information about the serious future earthquakes have gotten all NPP reactors have been stopped. Although the similar stopping causes the RGAD and LRD increasing, but it will be not called as any disaster because there is constant monitoring over this technological process and its management.

It is important to notice that the luck of culture in nuclear safety exists at population of most countries. Although Japan population has the high level of culture in respect of different kinds of disasters (for example, to earthquakes), but its population has the great radiophobia for nuclear disasters. This fact has the reason in background of Hiroshima and Nagasaki atomic bombing in 1945.

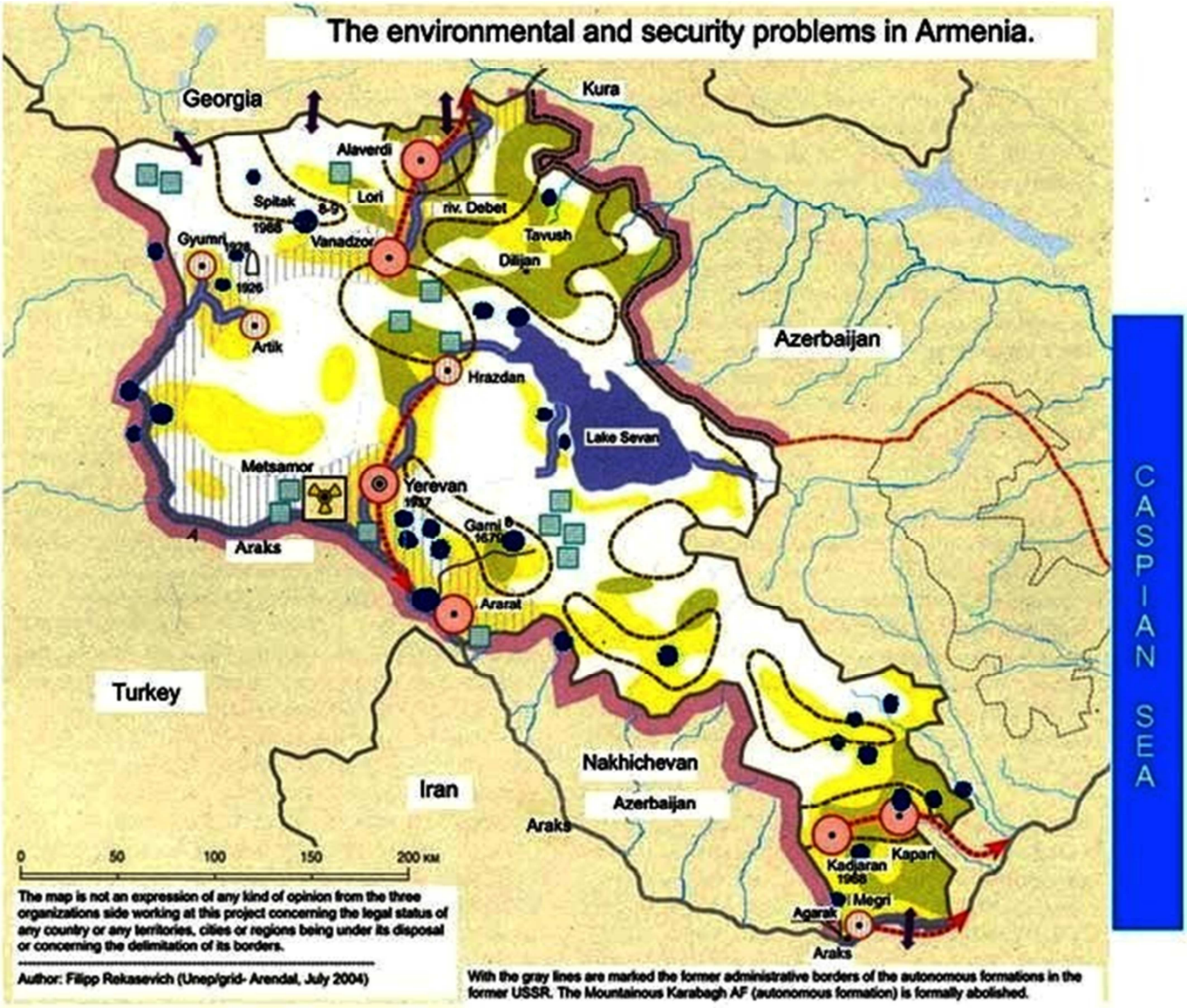
Today in Japan there are 5 000 points for earthquake's predictions, in China - 2700, in Iran–1200. But the information about the future huge earthquake and tsunami in March11, 2011 has been ignored by the official state organizations and the private energy companies, such as Tepko, that was responsible for normal FNPP exploitation Today Japan System for Prediction of Environment Emergency Dose Information (SPEEDI) has been modified to WSPEEDI https://www.rap.ucar.edu/nsap/events/fukushima/documents/Session3_Briefing2-Nagai.pdf.

Some China specialists consider, that the earthquake on March 11, 2011 has been stimulated by the Japan testing of underground atomic bomb's blast at the Pacific Ocean bottom. We have not information about the methods, how it is possible to differ atomic blast from earthquake at Ocean large depth.

China Mass Media informed, that the huge crater has been created at this place and in result the china ship with 100 men at its board went down. Also they consider that under surface FNPP the secrete plant for production of weapon U-235 and plutonium is located. This information has been presented by only China Mass Media. But today it agrees with the following fact that FNPP is kept as the constant intensive irradiation source.

Now we notice some problems, that closely connect with the Armenian (Metsamor) NPP (ANPP). Special maps of territories with noticed localization of risk objects have to be use under projecting and exploitation of any NPP. Figure 2 presents the map of risks in Armenia. We used it for assessments of risks and possible ecological and economic damages from large-scale natural and manmade catastrophes in the Caucasus ecology-hazard regions. ANPP is closely located near the main epicenters of last earthquakes with 7-9 balls on Richter scale. For the long-term period of APP exploitation from 1976, after Spitak earthquake in 1989 (6.8 Richter scale) APP has been conserved. In result the great energy absence in the whole country has been appeared. Then in 1995 ANPP has been into exploitation with the help of Russian specialists. ANPP contains two VVER-400 and V230 (376 MW) nuclear reactors, that produce about 40% of the total country's electricity The huge amounts of highly active, medium-active and low-active wastes has been accumulated and kept in the corresponding storages, located near Araks river, that flows into Kura river and then in Caspian Sea.

After the recent ANPP reconstruction ($7 million cost) its active life has been prolonged on 12 years till 2026 year. But the Armenian ecological situation is constantly worse by the following serious factor, that at its seismic dangerous territory are located the huge storages of the radioactive wastes without the needed good conditions of its keeping. That is why some US specialists call that some Armenian regions are te "black swamp" or "black quicksand." http://www.silkroadreporters.com/2014/11/08/armenias-nuclear-problem/#sthash.AOZNS7wp.dpuf.



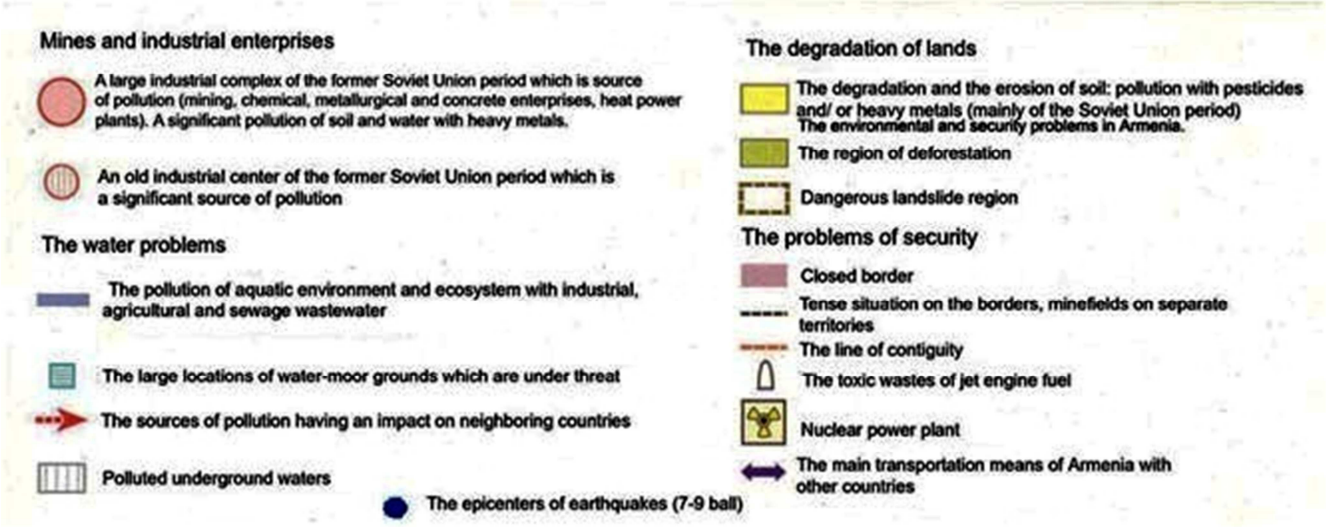


Figure 2. *The map of risks in Armenia.*

Now we do some remarks to the future building of one from the three NPP in Kazakhstan Republic (KR), named as Kurchatov NPP Today KR has many operated uranium fields. Now this country occupies the first place in the world on U–extractions. That is why Kazakhstan plans to construct 3 own first NPP at its territory. The first NPP is planed to construct at Eastern Kazakhstan (EK) region near Kurchatov sity, located at Nuclear Semipalatinsk Test Polygon (STP) territory (Figure 3). The detail thematic EK thematic consideration is presented in our previous works [7-11]. It is the territory of global ecological risk. Early EK region was not seismic dangerous one. But after about 500 nuclear blasts, produced in 1949-1990 years, it became the global risk zone with the appearance of natural earthquakes in addition the negative great manmade radioactive pollution as the result of STP intense exploitation. Now STP has been closed for nuclear weapon tests.

The large hydro electric stations (HES) have been built on EK Irtysh river, the largest river of the country, with its sizeable artificial reservoirs appeared after the HES building (Figure 3). The huge water masses, accumulated in the new sizeable artificial reservoirs began to press on the surface of the ground, where many Altai high mountains massifs are located. This pressure were not desirable for our Earth at all. The Earth expresses its protest to the people for their manmade constructions in the form of stimulated new intense earthquakes. In result early non seismic region has been transformed in seismic dangerous one.

At EK territory the numerous old and new multiple mines for extracting metals and minerals, as well as a number of industrial enterprises and their tailing dumps, including uranium, are located in the cities and their suburbs along the Irtysh river. It originates in China, further flows via the lands of Kazakhstan and Russia, including such large cities as East-Kazakhstan capital Ust-Kamenogorsk (UK), Semipalatinsk, Pavlodar, Omsk, and Tobolsk, and after its confluence with the Ob River it flows into the Arctic Ocean (Figure 3) The largest Bukhtarma HES with the 100 m height of dam has the most sizeable reservoir, the basin length is above 300 km and the depth - up to 100 m. The other UK HES with the 42 m height of dam with its huge reservoir is located in 15 km from the city.

The next Shulba HES (1) is built in 180 km from UK. Errors in the design of these HESs have caused a number of different accidents. UK city with 330 thousand inhabitants is one of the most contaminated towns in the world, located in the narrow Irtysh mountain valley. It represents the unique urban system, oversaturated by different enterprises. Its Ulba Metallurgical Plant (UMP) incorporates three separate works, producing enriched U for nuclear power plants, Be, Ta and their products. Operating UMP wastes storage, located in city center, has accumulated ~100 thousand tons of wastes, contained U, Th and their decay products. Its size is 400* 220 m^2 with the depth of contamination > 5 m. The level of gamma–radiation at its surface reaches 360 μR/h and increases with depth up to 1000 μR/h The radioactive anomaly regions with 1000 up to 6000 μR/h are registered at UMP territory.

Many other operating UK large plants, such as Lead–Zinc, Titan-Magnezium, Ceramic, worked on Be base, plants, power capacitors plant, nonmetalliferous group of enterprises and Silk Cloth enterprise, use in their technologies the different poisonous and toxins, while their wastes are also located in city boundaries. For instance, Lead–Zinc plant stores in open cast dumpnation on 17.5 hectares area > 13 million ton of wastes and ~1 thousand tons of highly toxic arsenic (7-10%) are contained. In Irtysh river basin, where > 40% of HES energy in Kazakhstan is produced, the large active non-ferrous pits, precious and rare-earths metals pits with their dump nations are also located.

Risks of the possible ecologic catastrophes are increased, because the noticed two HES are placed at Irtysh upriver of the city. We consider that the huge water masses in the manmade reservoirs press strongly on the bottom of mountain surfaces, disturb and deform their initial natural states. These factors resulted to the

increasing of the frequency and intensity of the strong earthquakes, included catastrophic ones, that already happened not only near the city (in 1990), but also in Altai mountains in Russia (in 2003, 2005 years). The last earthquake (M=5.0 on Richter Scale) was on March 16, 2016 near STP. Such earthquakes may cause the damages of HES dams, where in addition part of them are in non satisfactory states, especially UK HES dam, operated >50 years. Any HES with its huge water reservoir as the any NPP are very attractive for the possible controlled terrorist acts, including with using of explosive. According to some primary assessments, in result the huge break-through damming wave with its front height ~30 m will destroy the city and its environs. All enterprises, their products and hazard impurities in the storages then will be carried out down Irtysh to many cities and after Irtysh - Ob rivers junction spread over the large territories, including Arctic Ocean through Kara Sea.

Irtysh basin accumulated 120 million m^3 of different wastes, which is 60% of the total pollution of Kazakhstan whole water basin. It results to abrupt worsening of water quality in all cities: UK, Semipalatinsk, Pavlodar, Omsk, Tobolsk and in many inhabited localities. Irtysh-Karaganda manmade channel supplies water to Kazakhstan central regions, such as Karaganda, Kazakhstan capital Astana city and its regions. The following major pollutants were recently detected into soils and water: (1) toxin components due to sulfide non-ferrous ores processing: SO_4, NO_3, NH_4, Cu, Pb, Zn, Cd, Tl, Se, Hg, Sb, As, and also pH indicator; (2) complex components, due to processing of rare metal ores, Be and Li; (3) complex of detrimental substances: SO_4, Cl, NH_4, NO_3, F, Li, Be, Th, U with high general alpha and beta radioactivity and also pH indicator.

The available downstream STP, where are buried more than 18,000 tons of radioactive waste of the total activity of 1.300.000 Ci, significantly aggravates the situation. Radionuclides of the total activity over 10.000.000 Ci were accumulated during nuclear tests in the underground wells, located within the 60 km far from Irtysh. As a result of multiple nuclear explosions (> 500) for the period of 1949-1990 years, U-235 and Eu-152 are registered as available on the territory of above 300 sq. km. The Chagan river with very high radionulides concentration flows out the manmade Atomic Lake (created in result of the underground nuclear explosion) and flows into Irtysh.

Figure 3. *The scheme of Irtysh river flow on the territory of Kazakhstan Republic.*

1–Shulba HES, 2 - Ust-Kamenogorsk HES, 3 - Bukhtarma HES. Future Kurchatov NPP will be located at Semipalatinsk Test Plolygon. ★ - Epicenter of the last earthquake on March 16, 2016 (M=5.0 on Richter Scale)

That is why EK HES are very attractive for realization of directed terrorist acts with using of explosives. It is sufficient to destroy the Bukhtarma HES gate of upper floodgate from 3 ones, that used for passing of ships. And then the huge water mass will realize the global catastrophe with a lot of victims and great pollution of the considered water basin, including the Arctic Ocean and then World Ocean.

The population of our Earth prefer to live in the regions with high risks level, but where there are very comfortable conditions for living. For example US California state region is the very risk one, where the intensive destroyed earthquakes have taken place early and today. Besides about the 10 US NPPs are constantly operated in this extreme dangerous region.

Now we should like shortly describe the thematic situation with the building of new NPP in Siberia near Seversk sity in Tomsk region. Its information has been taken in the open mass media sources. The shot historical facts are the following.

The unique Siberian nuclear power plant (SNPP) in Seversk city (Tomsk-7) may be called as the second NPP in USSR The construction of this plant will provide the Tomsk region with a reliable source of power supply: the annual electricity generation will be 17,300,000,000 kWh. At present the enterprise is diversifying its economic activities, providing foreign companies broad opportunities for collaboration. SNPP in its initial form was established in 1949 as a unified complex with nuclear cycle, whose main task was production of nuclear weapon components from fissile materials–namely, highly enriched uranium and plutonium. First batch of enriched uranium-235 was produced in 1953. Since the 1960's SNPP has been gradually converting to civil production and serving as an example of how such plant can successfully transition from former defense enterprises to exclusively peaceful manufacturing. Nearly all technologies of Russian nuclear industry are applied at SNPP. Such a diversification is one of the reasons that the company was able to successfully overcome periods of economic instability in Russia and develop new products and services for the international market in the early 1990's. The main little local plants, that entered in SNPP, use the unique closed nuclear cycle, from nuclear energy utilization for power generation to reprocessing and storage of nuclear wastes. After the signing of the 1991 US-Russian Agreement on Utilization of Military Uranium, the Combine became actively engaged in realization of the HEU-LEU Program ("Megatons to Megawatts", conversion of highly enriched uranium to lowly enriched form to be then used as fuel in civil nuclear industry). Apart from nuclear industry related activities, SNPP conducts continuous product diversification and introduction of new up-to-date productions. In 2005 SNPP jointly with several other Tomsk organizations established the Scientific and Industrial Center for Research and Utilization of Nuclear Energy. US companies actively take part in investment and technical reconstruction processes conducted on SNPP. Under the intergovernmental agreement between the US and Russia dated 1997, oriented to decommissioning of plutonium producing reactors, the US Department of Energy initiated the wide-scale project of SNPP heating and power station reconstruction as an alternative to heat and power produced by the reactors of SNPP Reactor Plant, which should be decommissioned by 2008. Utilization of mixed oxides of uranium and plutonium (MOX fuel) in specially design reactors is considered one of the promising directions for further development of nuclear industry, let alone the challenge of peaceful utilization of the stock of military plutonium.

Utilization of mixed oxides of uranium and plutonium (MOX fuel) in specially design reactors is considered one of the promising directions for further development of nuclear industry.

The Russian Atomenergoproekt is the general designer of the new moderated SNPP. Today it is under the building on the base of Brest - 300 reactor. Its main design features are the following:

- It is an evolutionary design with high level of reference;
- Consideration of safety requirements, including EUR, IAEA (INSAG inclusive);
- Broad application of passive systems;
- Using of advanced active safety systems;
- Low sensitivity to human errors;
- Complies with modern customer requirements: 60-year service life of the reactor plant equipment;
- Home equipment oriented

We should like to notice with our regret that today there is not the thematic information in open informational sources for the detail analyze of possible risks at Seversk NPP.

4. Discussion

Here we presented the results of our initial investigations. Today we continue our work. And later in according to getting of the future thematic information its detail analyze will been done and send for possible publication in your journal.

5. Conclusion

Today it is clear that risk assessments at any NPP and another objects of atomic energy production are presented the great complex problem, that has a wide spectrum of objective and subjective reasons. Only under exploitations these objects in regular non disaster regimes it is possible to assess some possible risks and damages. This situation is constantly worsened. It is connected with the intensive growth of natural and manmade catastrophes and increasing of its power, damages and consequences. Also international terrorism attacks are thickened and have more hard consequences with mass victims. We have to develop and apply high technologies for the successful struggle against terrorism [15], including the modern space techniques [16-18].

Till today the possible nuclear terrorist acts with great global wide scale non reversible damages don't show itself. But world civilization have to be face with new serious

treats, that to save and keep itself.

One of the authors of this article Alexander Valyaev was the single participant from Russia at the NATO Advance Training Course Integrated Emergency Management for Mass Casualty Emergencies", that has taken place in Florence, Italia at October 25-30, 2011. The participants from Israel and UK told that their countries consider the case, happened in London on 23 November 2006, the poisoning of the UK citizen A. Litvinenko by Russian A. Logovoi with using of Po -210 as the first act of radiological (the branch of nuclear one) terrorism/ But we should like to notice, that this information has not any satisfactory arguments.

The recent clearly expressed fact has confirmed that the Islam State tries to use it its criminal purposes the extreme dangerous nuclear terrorism The security officer at the Belgian NPP has been found murdered with his work pass stolen in the result of recent terror attacks in Brussels. http://www.novinite.com/articles/173732/Security+Guard+at+Belgian+NPP+Found+Killed+with+Work+Pass+Stolen#sthash.Xr6Q0lFF.dpuf

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