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Integrated Emergency Management and Risks for Mass Casualty Emergencies

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Abstract:

Today it is observed the intense growth of various global wide scale threats to civilization, such as natural and manmade catastrophes, ecological imbalance, global climate change, numerous hazards pollutions of large territories and directed terrorist attacks, resulted to huge damages and mass casualty emergencies. The humankind has faced the majority of treats at the first time. Therefore, there are no analogues and means to be used for their solving. It stimulates modernization of traditional methods and development of new ones for its researching, prediction and prevention with maximum possible decreasing of their negative consequences. The global issue of safety provision for the humankind is the most actual and requires an immediate decision. Catastrophe risks have increased so much, that it becomes evident, that none of the states is able to manage them independently. Join efforts of all world community are necessary for the substantial development of our civilization. Main obstacles for this realization are under discussion. The authors of this article have their own experience and methods in this direction. Wide scale global catastrophes have not any boundaries. Any political and economic frictions between some states are not the reasons for the implementation of the struggle against them. The total emergency recommendations and actions have to be improved to eliminate and software of negative disaster's responses on population and environment. Some our examples of realization with using of own Integrated Emergency Management and using of special methods and techniques in the most critical situations, which have taken place in different countries in 21 century.

Keywords:

Risks, Emergency Management, Natural and Manmade Catastrophes, Terrorism

1. Introduction

Sense and purpose of any management of any object include the providing of its normal stable exploitation. But the constant variation of environment and manmade factors greatly complicate object's management especially in extreme situations such as under negative responses of manmade and natural catastrophes and accidents, including different terrorist attacks.

Now there is not the universal method and methodology for risk and damages assessments for many similar objects. It is necessary to develop individual approaches and methods for every concrete situation with taken into account main possible natural and manmade accidents in researched region. Only some total principles, presented in the end of these article authors of this article may recommend. That is why the demonstration of risks and damage assessments and its connection with corresponded Emergency Management for Mass Casualty Emergencies is presented here for different real accidents. Then the comparison of some approaches and methods will be given in details with our own experience in this thematic. That is why our many references and own publications, connected with this article theme, include the vast information for its using in different cases [1-28].

2. Main Results

The first international thematic experience closely connected with risk problem and its management, A.N. Valyaev has obtained during his participation in the Joint Venture between Pegasus Gold Company, USA; Kilborn Engineering Pacific LTD, Canada; KazGold, Australia and Government of Kazakhstan Republic in 1994 year during the work in North America. Our global task was the building of the special plant in the East – Kazakhstan region (see Figure 1) on extraction of silver, gold, platinum and others metals from the huge tailing storage of non- ferrous metals, named as Chashinskoe, This building was located near the Kazakhstan Rider city and another populated localities with agricultural industry and some rivers, high Altai mountains and forests. The modern extraction technology, included the wide application of poison cyanides reagents, were used. That is why it was necessary to provide the serious ecological safety for population and environment with the exact fulfilling of the determined demands for normal exploitation of many risk objects. It was happy case for application of the rich existence thematic experience on the building and exploitation of similar objects in North America. Our international work group had to take into account the main natural treats and manmade dangers. At that period authors of this article had not any special regional risks maps that may help us. Only 10 years later, the authors of this article had such maps for Armenia, Georgia, Azerbaijan, Kazakhstan and some Russian regional maps and applied them in our future investigations. Such maps, part of them have been obtained with the using of space technology, are presented in our thematic articles [1-19]. This article presents some results, obtained in our International Projects. Valyaev A.N. is the leader of our International Program on Risks Program, which based on the separate projects developed by 6 scientific groups from the countries in the former Soviet Union - Russia, Armenia, Georgia, Azerbaijan, Kazakhstan and Kyrgyzstan.

The Test Nuclear Semipalatinsk Poligon, where about 500 underground and surface nuclear explosions have been made for the long time1949 - 1989 years, is located here. It was necessary to provide many serious demands for the existence risk water objects. The largest Kazakhstan Irtysh River flows in this region with numerous confluent rivers. Ulba River (see Figure 1) flows in 10 km from this plant building. This region belongs to Altai Mountains with Belukha highest tip (4506m) over sea level. East Kazakhstan is the area of major ecological risk, where 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 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 The largest Bukhtarma HES with the 100 m height of dam has the sizeable reservoir, the basin length of which is above 300 km and the depth - up to 100 m. The other UK HES with the 42 m height of dam and a sole hatch is located in 15 km from the city –see Figure 1.

Figure.1*.The scheme of Irtysh river flow on the territory of Kazakhstan Republic. 1 - Shulba HES, 2 - Ust-Kamenogorsk HES, 3 - Bukhtarma HES.*

The next Shulba HES is located in 180 km from UK. Errors in the design of these HESs have caused a number of different accidents. Unfortunately, the data on observations of the HESs accident's statistic are practically absent today. The UK with 330 thousand inhabitants is one of the most contaminated towns in the world and located in Irtysh mountain valley. It represents the unique urban system, oversaturated by different enterprises. The largest in FSU 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 > 5m. 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 R/h are registered at UMP territory. Many other operating city 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 arsenic in the form of highly toxic substances calcium arsenate and Arsenite, where 7-10% As is contained. In Irtysh river basin, where > 40% of HES energy in Kazakhstan is worked out, large active non-ferrous pits, precious and rare-earths metals pits with their dumpnations are also located. Ulba River, flowing into Irtysh near UK city, toxins concentration is: Cu (4.86-5.50) maximum permitted concentration (MPC), Zn 4.71-5.37MPC, oil products 2.03-2.07 MPC, nitrite nitrogen 1.40-1.95 MPC.

Risks of ecologic catastrophes are increased, because the noticed two HES are placed at Irtysh upriver of UK city (Figure 1). The huge water masses in the man-made seas press strongly on the bottom of mountain surfaces disturb and deform their initial natural states. Authors of this article consider 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). Such earthquakes may cause the damages of HES dams, where in addition part of them are in non-satisfactory states, especially Ust-Kamenogorsk HES dam, operated >50 years. Also any HES with its huge water reservoir are very attractive for the possible controlled terrorist acts, including with using of explosive. According to some primary estimates, 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: Ust-Kamenogorsk, Semipalatinsk, Pavlodar, Omsk, Tobolsk and in many inhabited localities. Irtysh-Karaganda man-made channel supplies water to Kazakhstan central regions, such as Karaganda, Kazakhstan capital Astana cities and their oblasts. Irtysh pollution presents the serious danger as a potential source of World Ocean contamination through Arctic Ocean.

Now authors of this article present some elements of the risk management, which have been used for this region. This management is included the main following moments:

- Prediction of main different risk events;

- The calculation of the total possible limited damages;

- The development of measures, directed to preventing and softening of risk damages.

The problems of prediction will be presented later. Our method of calculation is the following. Authors of this article consider the common case of any object exploration 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 losses. Assume that j is the kind of loss with aj. value. Then j = 1,2, …n, where n is the total number of possible kinds of losses; (4) realization of i accident creates the loss of j kind with Pij probability, thus the matrix of loss probabilities is determined. Then the total vector of limited losses $\vec{a}_{\lim}$ may be determined on next formula:

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

Where P(1) is the probability of loss formation under normal exploitation; $\vec{a}_{1n}$ is the vector of limited loss under regular exploitation. $P_{ij}a_j$ coordinate vector value in sum is equal the loss value of j kind under realization of i kind accident.

Under absent of accidents the second term in the right part of (1) is equal zero and then $\vec{a}_{\lim}$ total vector of limited loss is determined the first part of (1):

$$\vec{a}_{\lim} n = P(1)\vec{a}_{1n} \quad (2)$$

The main problem in this calculation is in the determination of loss probability matrix. As one of the possible methods authors of this article propose to use the method of expertise estimates. More detail information authors of this article obtained with the using of our special risk models.

The plan of calculations of the total losses for this region includes the following. At first for every object authors of this article have to point out and develop the classification of main possible accidents. For example, in the case of HES disaster authors of this article have to take into account the next possible kinds of accidents:

- Total damage or break of one or some HES dams;

- Partial damage of HES dam;

- Destruction of water lock;

- Stopping of HES turbines.

Let us consider the most dangerous first accident, investigate the extreme cases of developing the worst catastrophes and analyze the possible scenario of their realization connected with damage of three HES, located upriver of Irtysh near Ust-Kamenogorsk city:

(a) Bukhtarma hydroelectric stations (HES);

(b) Ust-Kamenogorsk HES;

(c) Both HES simultaneously;

Here authors of this article have to take into account that the total damage of Bukhtarma HES dam with the height ~ 100m will probably stimulate the total damage of UK HES (height ~ 40m). Then it is necessary to evaluate the parameters of catastrophic submergence on every scenario:

(a) Maximum possible height and speed of break-through wave;

(b) Estimated time of wave crest coming and front of wave crest onto town territory;

(c) Boundaries of possible submergence zone in the vicinity;

(d) Maximum depth of submergence for every definite locality ant time of its submergence.

(e) To point out all main objects that will be over dammed.

For these estimates and calculations authors of this article shall use the computer modeling with taking into account the real profiles of local earth's crust and mountains valley (including its rock and soil materials), HES with its and another water reservoirs, such as lakes and rivers, others natural objects.

In the case of the possible HES disaster near U- tailing storages our analysis will include the following:

(1) To analyze the possible scenes of realization of situations on pollutant migration from tailing storage:

(a) Constant pollutant migration without damage of tailing storage dams;

(b) Similar migration with the partial damage of tailing storage dams, for example, under landslide or earth flow;

(c) Pollutant migration under complete damages of dams, for example in result of earthquake;

(d) Pollutant migration in result of:

(1) Partial flowage;

(2) Total one;

Under realization of last two scenes it is possible two following cases of development of catastrophic situation:

(1) All tailings are washed off with river during few days;

(2) All tailings are washed off with river instantly.

The last situation is the most extreme and dangerous, because it will cause the maximum pollution with maximum losses both for environment and population.

For all cases it is necessary to take into account the following kinds of possible losses:

(1) Caused by people victims and harmed to population health;

(2) Caused by pollution of wide scale territories with subsequent losses in forest, agricultural and fish industries;

(3) From the strong pollution of buildings and constructions;

(4) Resulted from the pollutant migration in basins of the largest rivers.

Under risk evaluations it is necessary to take into account the possible chemical nuclear reactions and transformations of pollutants in soil, water and air. For example, transport calculation will be done for decay chain 238U>234U>230Th>226Ra.

In total case risk management includes the following:

(1) Selection for each country a site for which the risk of occurrence of one or several catastrophes is maximum and where the damage is the greatest;

(2) Development of scenarios for implementing possible catastrophes for the site selected;

(3) Estimation of risks and possible ecological and economic damages at varied scenarios of catastrophe development;

(4) Suggestion of some recommendations on risk reduction and actions to eliminate the effects of accidents/catastrophes.

Authors of this article may notice the next important moment for risk management. In many cases it is easy to assess the probability of natural catastrophes than manmade ones on the following reasons. If it is existence the good monitoring of observed territory during many years with registration of main characteristics then it allows to predict appearance of different events/ For example in seismic dangerous territories it will be earthquakes,

In [16,17,18,19] authors of this article have analyzed in detail Processes under outbursts of mountain lakes and proposed the physical and mathematic models for risk assessment. It allows taking into account the main elements for management of

mountain water objects. The analysis of our complex formula for probability of outburst of concrete mountain lake allowed organizing some possible preventing measures to avoid natural catastrophes and accidents. These results were the scientific base for develop of our ISTC Project: "Assessing and decreasing risks of damages, caused by Tien–Shan mountain lakes outbursts (URL= http://www.istc.ru/istc/db/projects.nsf/All/DFBF107592E1AA85C32574C900285DB5? OpenDocument). Its realization will promote to stable development of Euro-Asia Continent.

Another our thematic investigations on risk management were connected with another following serious problem in many countries of the world for the water supply in cities and settlements implemented large borehole water intakes, and as a result in these regions occur significant reductions in groundwater levels. In karst regions these activate land subsidence and other dangerous environmental effects have been taken into account.

Karst as a dangerous engineering-geological process is especially disastrous for civil, industrial and hydrotechnical constructions. The article is discussing the results of engineering-geological, hydrogeological and geophysical complex investigations that were carried out in the northern part of Syria: in the territory of Ras Al Ayn City. Karst processes have been activated last few years in this territory mainly because of human activities. A numbers of target maps are drawn for case study area including zoning map of the karst risk: according to that map the city territory is divided into 3 parcels. Necessary engineering measures are proposed for ecological remediation of the studied area.

The activation of technogenic karsts inside of the city and surrounding territories resulted on to a decrease in stability of operating structures. As a result, from a number of houses were deported population and town planners have to refuse some building projects as well. Especially important should be considered practical test of the design method developed by us for forecasting of possible activation of karst phenomena. The proposed method of prognosis is recommended to use in other countries with similar physical-geological conditions.

Here authors of this article present the application of our special risk model for electric energy, production at nuclear power plants (NPP) [21,22]. NPP production results to generation of radionuclide's gas-aerosol atmospheric discharges (RGAD) and liquid radioactive discharges (LRD) into NPP surface heat sinks with the additional pollution of. It is necessary to provide the exclusive safety measures, in particularly provide the levels of irradiation doses for population (PID) will be not exceeded the 10 Micro Sievert. 17 new atomic power units will be put in exploration at 7 homelands now operated NPP. Authors of this article have collected and analyzed RGAD and LRD for all10 Russian NPP during 1995 -2007. The observed stable annual tendency of RGAD and LRD decreasing has created the well ground scientific base for prediction of their levels of each NPP according to our own special developed methodology. These levels have been used for PID calculations on the special certified model "Kassandra" and "Nostradamus' information-simulation systems, developed in our Institute, for assessment of irradiation dose of human organism through all possible ways and chains: water, breath, food (meat, milk, fish, vegetables, fruits) and others under the response of the following varied natural climate temporal space random factors: wind, its velocity and directions, snow, rains, temperature and humanity, really registered at each NPP region. For most critical

population group "fishers" authors of this article used such assumptions and predictions that PID obtained assessments were the maximum (conservative) ones. "Kassandra" model was used for radionuclide's transport and assessment of their concentrations in water, bottom sediments and flood plains of rivers and heat sinks, connected with real NPP. Simulation of radionuclide's migration was used with taking into account of mass their exchange between main stream and underflow for river contamination model under the persistent radioactive discharges during long time. "Nostradamus' system was developed for the effective forecasts of radioactive situation with atmospheric radionuclide's emission. Results of PID assessment are presented in Table 1.

Table1. *Predicted of irradiation doses for population in zone of Russian reconstructed NPP observation.*

Nuclear power plant (NPP)	Effective dose of irradiation for water consumption, Micro Sievert	Effective dose of irradiation for air way, Micro Sievert	Effective dose for all possible ways of irradiation, Micro Sievert
Kursk NPP	6,69	0.19	6.88
Kola NPP	7,8	0.014	7.814
Kalinin NPP	3,4	0.012	3.412
Volgodonsk NPP	3,99	0.0026	3.9926
Leningrad NPP	0,62	0.24	0.86
Novovoronezh NPP	0,828	0.023	0.851
Smolensk NPP	5,14	0.1	5.24

These PID values provide the permitted risk level less than 10-6 in year and are less in 2-3 orders of the local natural radioactive back ground. Our proposed method and methodology have the universal character and may be used for decision of some thematic problem of atomic energy.

Any large concentration of population is the possible and potential places, where manmade catastrophes an accident may be happened. It is very difficult to realize the need monitoring here. For example, every day huge amount of population in large cities uses metro as speed underground subway. Metro construction and its exploration are very risk objects, where is possible mass casualty emergencies, including terrorism attracts with using of explosives. The most accidents in Moscow metro are the following. In 1982 the escalator with passengers was has been broken with fall down acceleration at "Aviamotornaya" station. 8 victims and 30 men have been resulted. In 1990 bridge copestone collapsed with appearance of 8 heavy ~ 100 kg fragments. It was happy case that victims were absent. In 1991the metro car broke into flames in the tunnel between Semenovskaya and Partizanskaya stations. Passengers were locked in dark tunnel and then have been saved. In 1994 two metro trains came into collision in tunnel near Nagornaya station. More tha 2,5 thousands of people have been locked in the dark tunnel/ 18 persons have been sent into hospital. 3 losers were after another collision of two trains at Petrovsko- Razumovskaya station in 1994. In 2003 wheel pair took off from train car in dark tunnel near. Passengers went by feet to the Novokuznetskaya station. In 2006 the part of tunnel has been crushed near Sokol station in result of the large tunnel roof perforation by workers, who drive piles on the building surface. In result two piles fell down on the train. In 2008 in tunnel near Vladykino station 4 last train cars left the rails and 8 persons have been suffered. About 100 passengers have been evacuated from the tunnel near Orekhovo station in result of the fire in service technical room in 2011.In 2013 the manmade short circuit of high –voltage cable caused the fire without electro energy

feeding of few trains. About 4500 passengers were evacuated and 27 of them were hospitalized.

July 15, 2014 the largest Moscow metro accident took place about 200 passengers were injured and 23 people were killed after train derailed between Park Pobedy and Slavyansky Boulevard" The main reason was the following. The works have not been conducted in a proper manner.""A set of points was fixed in place with a piece of regular 3-millimeter wire which snapped." This fact in additional above ones confirmed that the technical manmade mistakes and not observing special safety rules and instructions were the main reason of the large accidents. It is important to notice that any large accidents in electric energy power supplies resulted to very serious negative consequences of many connected systems.

On 25 May 2005, Moscow's power supplies were the centre of a major incident, which resulted in the supply being outed for several hours in many of City of Moscow districts, as well as Moscow, Tula, Kaluga and Ryazan provinces http://en.wikipedia.org/wiki/2005_Moscow_power_blackouts Some tens of thousands of people were trapped in stranded underground trains in the Moscow Metro and in elevators, railway signaling was put out of action and many commercial and governmental organizations were paralyzed. Here, the high voltage (500kV) current, going into the capital along the main power lines, is lowered via transformers for city usage to 220kV and 110kV. Theories of the possible reasons of this accident were the following. The immediate cause of the incident, some state, was a mixture of several factors, among which feature: equipment wear-and-tear, absence of back-up powers, the fact that Moscow had endured temperatures above 30 ℃ for a number of days. Moreover, Moscow is a very complex region and has the most complex electrical schemata, or "copper board", as it is known by those in the business. It is the only region in which there has been no automatic shut-off system installed since the fall of the Soviet Union. This increased vulnerability of Moscow's electrical network played an important role in what happened. But after all President Putin pointed out the main reason - the sudden failure of main electric transformer with its price only about 15,000 USD.

The essential negative contribution in metro accidents is caused by the following facts: 1. using of false parts and appliances for constructions and fix of metro equipments; 2. metro train drivers and another technical personal have not the sufficient professional qualifications

Another metro global accident was connected with terrorist attacks, that have happened in Madrid (2004) and London (2005). In 2010 Moscow Metro bombings were suicide bombings carried out by two women during the morning rush hour of March 29, 2010, at two stations of the Moscow Metro (Lubyanka and Park Kultury), with roughly 40 minutes interval between. At least 40 people were killed, and over 100 injured, in 2004. The similar Avtozavodskaya and Rizhskaya bombings took place. Chechen separatists were responsible for these terrorist acts. It is impossible to predict similar accidents. But sometimes the special homeland security services may to predict possible terrorist attacks with using of explosives. Today the modern high technologies are successfully used for detections of explosives in different parts of different complex constructions as potential dangerous places for using of explosives in terrorist controlled acts [28].

The most open to objection for directed nuclear and radiological terrorist attacks are the countries with the development atomic energy and therefore, where the operated

nuclear power plants (NPP) with different storages of nuclear wastes. are located. The next following factors greatly increase the risks of possible above mentioned attacks: 1. the high possibility of realization of great natural disasters, such as earthquakes and others; 2. the absence of high level control for radioactive materials; 3. the existence of operated or so called frozen and operated conflicts zones. It may be different wars at its territories or action of radical Islamism groups or the whole Islamism states. The authors of this publication from Russia, Armenia and Australia should be notice that the best safety situation presents in Australia, where atomic energy production is absent. At its territory only the usual natural and manmade disasters, such as large forest fires, flooding, leakages of different hazards, such as oils, toxins and another chemicals in its Indian and South Pacific Oceans. Today there are many developed usual different high technologies and methods for the successful struggle against them and softening of its negative consequences.

All 10 Russian operated NPPs are located in non-seismic dangerous regions and have the sufficient high technological safety level. The Armenian NPP (ANPP) is located at the high density populated region in 30 km from its Yerevan capital at the high dangerous seismic mountains zone. It has been put into exploitation in 1980 with equipment of two Russian NPP blocks «VVER 440 S», that belonged to the first reactor's technical generation. ANPP produces about 40 -50 % of total Armenian energy. The low-enriched uranium fuel is used for energy production. After the great destroy 1988 Armenian Spitak city after the great earthquake with M = 7.0 Richter-scale magnitude, that has killed 26,000 people ANPP, located in about 40km from Spitak, has been stopped in 1989. It resulted to the huge energetic crisis, global economic problems with additional energetic blockade from Turkey and the Armenian –Azerbaijan Nagorno-Karabakh conflict. Then with the Russian help ANPP has been put into exploitation in 1995. And today here there is the great seismic ANPP risk. For example, in March 2013 the large earthquake (M =2, 5) has taken place here http://dloadme.net/?p=2652 (URL= http://www.kavkaz-uzel.ru/articles/194544/). The Operational Safety Review Team (OSART IAEA) after the detail ANPP analysis concluded, that it may be function till 2016. Recently the huge 2011 Fukushima NPP disaster has been modeling at ANPP http://www.yerkramas.org/2011/05/11/avariyu-na-fukusime-1-smodelirovali-na-armyanskoj-aes/. Now Armenia plans to build the second NPP with (4, 5 billion USD cost) with Russian support (URL = http://atomas.ru/isp/avar/glav-2-2.htm).

Until today terrorists didn't use nuclear weapon. But with every year this threat becomes more and more reality. It is noticed more and more expansion of state's geography, where corresponding acts and attempts, closely connected with nuclear and radiological terrorism, have taken place –USA, Spain, France, Japan and Germany. Some cases were referred to using of radioactive materials by suicides, dingbats and usual bulldozers. According to IAEA estimates during 1993-2004 more than 650 cases have been registered in the world that was connected with contraband traffic, keeping and sales of nuclear materials. In 18 cases malicious persons had the high enrichment uranium and plutonium with potential possibility of its using for creation of nuclear weapon. The military ambition of Pakistan, Iran and some others states make it easy of nuclear terrorism realization. Another negative reason is non-stable development of many countries and absent of needed control for dangerous elements. The existent of high level of its corruption with the great difference between population's incomes also worse this situation.

The aerosol dispersion of radioactive materials on huge territories or where there is density accumulation of people (for example in subway) has in addition the awful negative psychological effect. In this case may be used baby air ball.

It is important to notice the exclusive danger of floating NPP (FNPP) as a first-class object for directed terrorist attack. Especially if FNPP will be located in regions with maritime piracy and there is localization of any world terrorist center. Similar places are dislocated in Southeast Asia, where special alarm systems are absent. But there are many terrorist organizations, having technical ships with modern equipment and submariners –rangers. For its realization of directed terrorism attack the next following most probability methods may be used: 1. Destroy of FNPP reactor with discharge of radioactive materials; 2. Attack on FNPP for rapture of uranium fuel for the next preparation of nuclear weapon; 3. Rapture of low active material for preparation of dirty bomb. Also for these purpose may be used explosives for underwater bursts [29].

Early authors of this article have investigated many Uranium tailing storages, located in high Tien–Shan Mountains at Kyrgyzstan state territory. These storages are the objects of the great radiological and chemical risks, because its localization in seismic dangerous regions with constant intense earthquakes and another connected natural disasters, creates the great threat for population and environment. Also here it is possible the terrorist attacks with using of explosives on dams of huge artifice reservoirs at six hydroelectric stations at Naryn largest Kyrgyzstan Country River. Down Mountain River valleys Russian and NATO military air bases are located. They are also very attractive objects for terrorist attacks by any possible negative means, including impact of different hazards. Any natural or manmade dams destroy results to huge destroyed shock water wave at first. Then in second next over damming wave will impact on Uranium tailing storages with transfer of radioactive and toxin hazards on vast territories. Also at these high mountains territories are localized the silver and gold mines with the large its own negative tailing storages, contained different toxins. Authors of this article have assessed the corresponding possible risks and its damages for some accidents with using our own developed physical - mathematic model for estimation of probability of the concrete dam's destroy for artifice manmade water reservoirs of hydro constructions and natural high mountain lakes with taking in to account its current state and its environmental situation in details [17]. It is necessary for successful management of all water objects. Our results were the scientific base for development of our own ISTC Project # KR-1678. "Assessing and decreasing risks of damages, caused by Tian–Shan mountain lakes outbursts (URL= http://www.istc.ru/istc/db/projects.nsf/All/DFBF107592E1AA85C32574C900285DB5?OpenDocument). Its realization will promote the stable development not only for Kyrgyzstan and neighboring states, but also for all Central Asia.

Authors of this article may notice that it is not sufficient to use only new different high technologies for the successful struggle against terrorism because terrorist organizations have its own good pay up scientists. And always to destroy is easier than to build anything. The good example is the USSR crush. The best variant here is to vanish potential terrorists at their living place without waiting its penetration to the planning place of terrorist attack. But there are another serious obstacles, such as the following ones: 1. usually terrorists are living at the places, where during many years traditional national states are living and each other knows in detail. Any new person will be detected just now; 2. Future young positional terrorists are often sent for their

education to another terrorist organization in the inconsiderable in number of countries such as Pakistan, Saudi Arabia, Qatar and some others. And sometimes later they will be sent to future places of terrorist attacks; (3) new terrorist` preoperational centers are constantly appearing and they are hidden in different unsuspected organizations, such as international studying centers, religion centers and others. Many new countries have been created after USSR destroys in 1991. And if the country is poorer, than it has more wish to open similar different centers. For example, in Central Asia it may be Kyrgyzstan and Tajikistan. Children from these countries have got serious traditional religion training on whole their life. But it is not very difficult for high qualified tutors to transform of young person ideology with non-stable physiology from his usual Islamic religion into Radical Islamism or, as it is observed today, to make of young person into citizen of Islam State. This transformation is combine with a large premium and future handsome salary that is why it is often successful for poor persons under youth unemployment. This situation is reflected by the next example. Moscow and its very high density population region are very suitable and attractive place for realization of terrorist attacks of many possible types, including of radiological one. Beside here there are a lot of different ineligible foreigners and refugees from all republics of old USSR. Balashikha city is the largest one in Moscow region. Near there are the special plant of TVEL Fuel Company on production of NPP fuel (URL= http://www.tvel.ru/wps/wcm/connect/tvel/tvelsite.eng/). Two authors of this presented article Alexander Valyaev and Gurgen Aleksanyan were the participants of NATO Advanced Research Workshop: "Prevention, Detection and Response to Nuclear and Radiological Threat" that will be held in Yerevan in May 3-6, 2007. One of the presented communications from Austria was devoted to world actual problems of radioactive material's robberies and its traffic over the vast territories of many countries. One fragment described the facts of few similar robberies from TVEL Fuel Company. In some cases the attempts of radioactive material's sale have been stopped by special skillful actions of the Federal Security Service of the Russian Federation. Then its agents have imitated the roles of buyers of these materials.

Alexander Valyaev is living in Balashikha city and has his own great interest to these very actual thematic events. For example, in November 27, 2013 Russian TV-channel Center (TVC) has shown the foreign recruiters, who agitated the regional young women to be terrorists for very large salary. It was only such short information. But it is not difficult to predict their future actions. All potential terrorists will be put for living in one of many regional masjids, where local secret center of terrorist education is located. Then foreign high qualified radical Islam tutors will to teach them the methods of terrorist attack's realization. It will not demand a lot of time – may be one or two months. For example, it may be the rules and methods for using of different small explosive bombs in density populated places, such as in Moscow metro, meetings, concert and sport halls or another places of a lot of people's accumulations. During this training all terrorists, together with their eat and drink, will have the special light heroines, and will listen special lectures about their religion duty to kill all infidels. And, if everyone kills more people, that he will be happy in paradise in the future. This method of terrorist preparation has the following advantages over traditional ones: it is not necessary to search candidates in abroad; to educate them in foreign special centers; to have not any serious problems with terrorist transportation to the potential terrorist attacks.

In next article the authors of this article should like to pay attention to use of the new latest high technologies for prevention of nuclear and radiological treats and to decreasing its possible risks and damages. Some technologies have been under the detail consideration at some thematic NATO ARW, where Alexander Valyaev was its participants with his own communications: 1."Vapor and Trace Detection of Explosives for Anti-Terrorism Purposes", March 19-20, 2003, Moscow, Russia. 2. "Bulk Detection of Explosives: Advance Techniques Against Terrorism" June 16-21, 2003, St. Petersburg, Russia [29]. 3. Radiological Risks in Central Asia", June20-22, 2006, Almaty, Kazakhstan. 4. Prevention, Detection and Response to Nuclear and Radiological Threat", May 2-7, 2007, Yerevan, Armenia. 5. "Natural Disasters and Water Security: Risk Assessment, Emergency Response and Environmental Management." October 18-22, 2007, Yerevan, Armenia. 6. "Stimulus for human and social dynamics in the prevention of catastrophes" October 5-8, 2010, Yerevan, Armenia.8. "Correlation between Human Factors and the Prevention of Catastrophes" in Dnipropetrovsk, Ukraine, 12th – 15th September 2011. 9. NATO ATC (NATO ADVANCED TRAINING COURSE): "Integrated Emergency Management for Mass Casualty Emergencies" Florence, Italy, October 26-29, 2011 .

Early during past thematic NATO ARW "Prevention, Detection and Response to Nuclear and Radiological Threat", May 2-7, 2007, Yerevan, Armenia A. Valyaev, using his own sufficient experience, has proposed the next following proposals for improving of the current situation, connected with studying of catastrophes, risks, damages, possible directed terrorism acts for its purposes and stimulations of disasters, including its prediction and prevention. Below authors of this article try to do the first steps on analyze the situation, reflected in the thematic NATO and ISTC Workshops, where A.N. Valyaev has participated.

It is the tradition, that at all above mentioned Workshops the thematic problems on ecology and natural and manmade disasters, connected with every country (where the Workshop has taken place) have been especially under consideration more wide than others and in details. But these problems are most important at transboundary territories, that need the join efforts for its successful decision. But for thematic 1-4 Workshops, the great lack is the absent among all participants of scientists from corresponding transboundary countries. For example in 1 Workshop Iran, Turkey, Azerbaijan scientists were not participants. Although Turkey is the NATO member and of course, knew about this NATO ARW. Authors of this article consider that may be in future it will be necessary to send the special invitation to Minister of Foreign Affairs and ask him to take care about the present of its scientists from the suitable scientific organizations at very actual NATO ARW.

In addition, some courtiers, such as Armenia, Turkey and Azerbaijan have the international transboundary frictions, which reflect in its scientific relations. As the result at the International Conference "Nuclear and Radiation Physics" with the Ecological Section in 2005 in Almaty, Kazakhstan, the Azerbaijan scientist –ecologist demanded from the Conference Organize Committee to refuse the Armenian scientists in participation in the Conference, because its country creates the great pollution (heavy metals, toxins, radionuclides from its Nuclear Power Plant and others) of the main Araks river at Armenian territory. Then this river flows into Kura River that flows at Georgian and Azerbaijan territories, and at last flowed into the Caspian Sea. Thus the international frictions negatively result to scientific relations and there the serious obstacles for prevention of many manmade catastrophes, nuclear and radiological terrorists attack.

As for Iran anybody may notices, that this country is greatly closed in plan of international communications, including scientific ones. But authors of this article met Iran scientists in Moscow at International Conferences on Space technologies"Earth from Space- the Most effective Solutions". The Iran participation in these scientific thematic events will promote to the successful decision of the important Problems of Nuclear Military Materials and Technologies non transferring may be partially resolved by these ways. It will be "the heavy drop" from NATO on decreasing of political frictions with Iran and strengthening of peace.

Humanity has faced with such constantly intensive growing threats (especially connected with terrorism) at first time. There are not special and effective methods for struggle against them. In 21 century number of disasters and its damages will be constantly increase. The weakly guarded borders of Chechnya, Afghanistan and other zones of not only "frozen" conflicts, but also operated ones, can further stimulate insurgencies;

Possible terrorist attacks, including with using of explosives, at European and Asian continents can result to global pollution (and may be infections) of river's basins in the Caspian, Black, Kara Seas, Arctic Ocean and consequently, the World Ocean.

These problems are under consideration at another special organization, where high qualified scientists are constantly working. That is why it will be useful to invite some its representatives in the theatrical NATO ARW participation. For example, in above mentioned NATO ARW the organizers and participants were IAEA, ISTC, the USA Homeland Security Department and DOE, the Commission on Nuclear Regulation, the Center of Non Profile Investigations, the Center of Nuclear Safety, Ministers of Custom and Boundary Protection, European Scientific Academy.

The international terrorism organizations have its own scientists, which work in security and mystery at problems of effective realization of different terrorism attacks with huge disasters and victims. To destroy is more easily than to construct anything. This fact worse greatly the successful decision of problems on struggle against disasters and terrorisms

As for problem of thematic education and increasing of safety culture, our proposal is the following. In some Moscow Universities there are the Departments on preparation of specialists on studying of disasters and catastrophes. The mission of NATO Scientific Committee is not only organization of NATO ARW and NATO ATC, but today also it is necessary to organize the thematic two weeks NATO ASI, where scientists, having their own scientific results, will realize their lectures and practice lessons for effective modern education of young scientists from the world. I was the participants of NATO ASI in 2001, 2002 and 2004 years. But ones were connected with the fundamental problems of nuclear and radiation physics. Today is the time for such education through NATO ASI. Authors of this article may propose its possible theme*: "Some Threats for World Civilization and its prediction/prevention/elimination"for provision of stable development"* and not only for NATO ASI, but also for NATO ARW. Another title may be the following: *"Modern methods and technologies in prediction/prevention natural and manmade disasters and in struggle against terrorism".*

The important social aspect is the following. In the countries of Former USSR the population considers NATO only as the aggressive military Block of non friendship west states. NATO scientific events, its grants and support of the main actual

investigations help to create right opinion and are able to vary such negative relations. In addition today there are some common programs NATO with Former USSR countries, for example in struggle against international terrorism.

Russia is not NATO member and not its panther. In addition Russia is often considered as "sensitive country" as the zone of political and terrorist conflicts. But I consider it is not the reason for refuse from Russian scientists in participation in the actual thematic scientific events. Our Nuclear Safety Institute of Russian Academy of Sciences (IBRAE RAS) has own experience in these scientific directions (http://www.ibrae.ac.ru). Some of them are the following: (1) Comparable analysis on the ecological risks, related to the impact of the radioactive and chemically hazardous substances on the environment and population; (2) Emergency response in radiation accidents. Scientific and technical support in decision making on protection of population and territories; (3) Analysis of risks, related to the management, transportation and processing of the spent nuclear fuel and radioactive waste. Analysis of risks and counter-measures against radiological terrorism.

The thematic workshops on the mentioned problems with the participation of the 8-th Big Main Countries are sometimes held in our Institute.

3. Conclusions

It is clear that all experimental data and existence statistic for any risk object exclude at all the possibility of creation temporal trend for prediction of accidents and catastrophes. Only for some natural water objects such as high mountain lakes results of many years' observations and constant current detail monitoring on variation of its water contaminations, including radionuclides reactions, allow to predict its outbursts with the certain probability. Some advanced space technologies may be used for constant current monitoring of local regions, where it is possible dangerous natural earthquakes and manmade accidents on risk objects, such as water artificial constructions –HES, its dams and huge storage reservoirs. In separate cases the using of such similar measures is able to predict future earthquakes, such as its time of appearance and intensity. Early Valyaev A.N. studied and worked in Polytechnic University in Russian Tomsk city in Siberia, where his colleges developed their own method of earthquake's prediction, based on the detail observations of natural electromagnetic field in the local seismic regions of the Earth with determination of some its main parameters. This method was based on their own patent technologies that were successfully tested on seismic dangerous mountain regions such as Issyk - Kul Lake in Kyrgyzstan and Sayn mountain regions in East Siberia. That is why authors of this article may recommend this method in many cases.

The next following obstacles create the substation difficulties in risk management: (1) Every country has its own political, economic and demography particularities, that greatly reflect on behavior of emergency actions in critical situations; (2) Serious international frictions between different courtiers often take place especially at its transboundary territories; (3) Many vast territories are localized in zones of so called "frozen" or operated international and region conflicts, that in addition promote realization of different directed terrorist acts; (4) Contradictions of interests between of all community (including state governments) and the local private and international industrial companies, that realize its activity in separate country; (5) Insufficient level of population's safety culture; (6) Using of traditional and classical methods for disaster's investigations is often non effective and has failures. The brittle

equilibrium between nature and human civilization has been broken now. Our Earth replies and revenges us. Sometimes it is impossible to predict natural and manmade disasters, catastrophes and terrorist acts with using of explosives. It demands very high organizational functions of all special emergency services – informational, fire, evacuation, searching of casualties with immediate realization of medical help.

The authors of this article believe that in order to successfully prevent all sorts of terrorist attacks, the best solution would be the total control of each person and all of his possible contacts in the territory of his native country. It demands very expansive finance and now has some sufficient realization only at USA territory. It is connected with the intense growth of number no controlled thematic centers for preparation of terrorists all over the world not only in the noticeable countries of Asian – African continents, but in poor Republics of old USSR, such as Kyrgyzstan, Tajikistan and others.

Our Nuclear Safety Institute Russian Academy of Sciences, Moscow, Russia has own experience in the prediction, prevention, counteraction and decreasing of possible risks and damages, connected with acts of radiation and nuclear terrorisms. Some thematic intentional meetings and conference, including of countries of Main Large Eight Countries, are held in our Institute. Its scientific questions and results, including the final recommendations completely prove the conclusions of this article.

In next our article authors of this article shall pay additional attention to another today urgent problem, connected with mass casualty humanitarian tragedies that have taken place illegal migrations, for example from Africa to Italy by Mediterranean Sea.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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