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MASTER OF MILITARY STUDIES

**Iran Nuclear Threat
An Environmental Perspective**

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Executive Summary

Title: Iran Nuclear Threat – An Environmental perspective

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BAHRAIN DEFENCE FORCE

Thesis: Iran's inclination towards using the nuclear power is a growing concern for the whole Middle East. One of the most important concerns is the environmental effects of Iran's nuclear program, there are doubts of Iran's capability to maintain safe operating environment for the nuclear reactors. In case a reactor exploded for any reason, the environment will totally crumble.

Discussion: historically, nuclear accidents have proven that nuclear reactors are not safe, Iran's reactors are not exceptional case. Chernobyl accident, Hiroshima, and Nagasaki bombing have proven that the radioactive isotopes are dangerous and a threat to the human beings as well as the environment. If something like Chernobyl accident happened, the Persian Gulf ecology will be irreparable detriment. The major concern is the location of the reactors, those reactors are on the coast of the Persian Gulf, so, if something wrong happen the other Arab states in the Persian Gulf will suffer dramatically. The environment will be totally destroyed, the people should be moved toward the west of the Persian Gulf at least 500 km, and the governments will pay a lot to recover the environment. Even if nothing happen to the reactors, the nuclear waste are a another concern due to the lack of information about the disposal of the resulting radioactive waste.

Conclusion: Iran's nuclear technology is a great threat in the Persian Gulf, all the other Arab states are concerned, and the atmosphere in the Persian Gulf became critical. Therefore, all the Gulf countries should make emergency national plans to avoid the consequences of such operating failure.

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Iran Nuclear Threat – An Environmental perspective

Introduction:

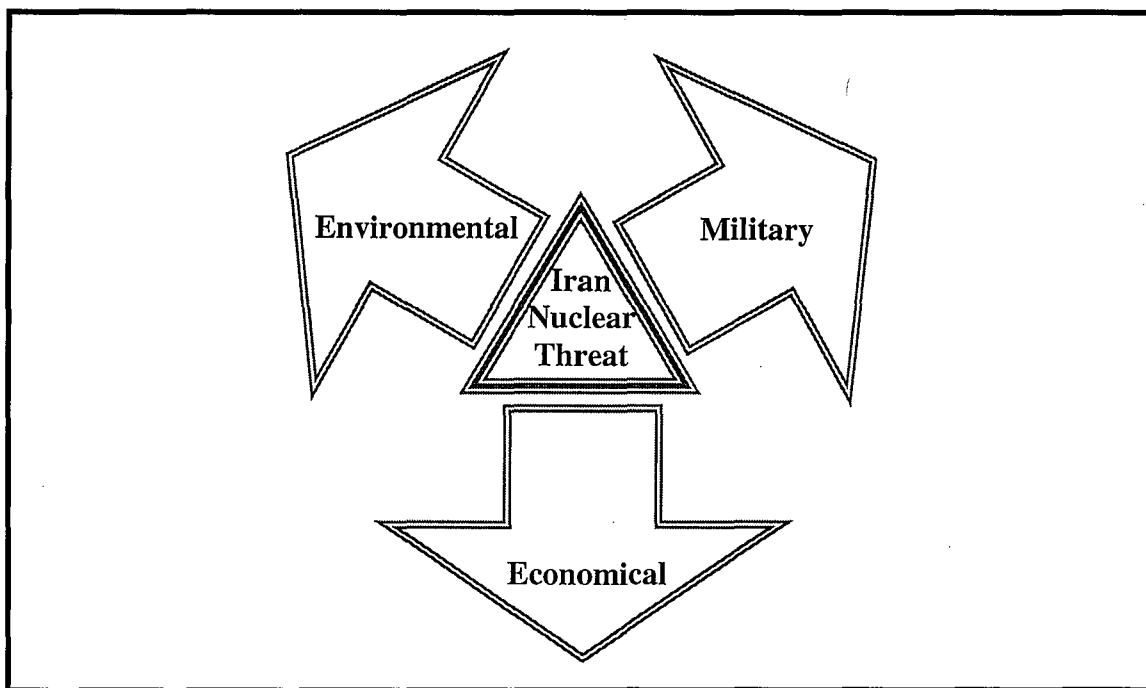
Iran's inclination towards using the nuclear power is a great intimidation for the entire Persian Gulf environment. It is a growing concern for the whole Middle East that if an Iranian nuclear reactor explodes for any reason – human, technical fault or even a preemptive strike - the environment will totally crumble. The entire region will have to pay a lot and the most affected area will be the environment. Hence, it is necessary to look at this issue from an environmental point of view. Why should Iran cease to develop the nuclear reactor, and how will it be hazardous for the Persian Gulf? Those are the important questions to be discussed. The climate is already changing over the next years for various reasons and this nuclear threat will be an additional perilous menace not only for the Persian Gulf region, but also for the rest of the world.

Most of the studies of the Iranian Nuclear program consider the military perspective on Iran's possession of nuclear technology. While the military ramifications and dangers have been considered, other concerns have been overlooked. There are two other perspectives that should be considered as threats due to the Persian Gulf's geographical nature; those are the environmental and the economical threats. The economical threat can be divided as follow:

1. The arm race; the balance of power in the Persian Gulf would be disturbed, as the Arab countries of the region are expecting Iran to develop nuclear weapons.
2. The economical effects if nuclear weapons are developed and used in the area, or in case a nuclear disaster takes place like the one in Ukraine –Chernobyl reactor.

The arm race has already begun; all the gulf countries are concerned about the Iranian nuclear technology. Saudi Arabia has signed a \$20 Billion deal with the U.S. for supply of modern arms¹ as a part of a diplomatic offensive against the growing influence of Iran in the volatile region². Similarly, France also signed military deals worth £2 billion to construct nuclear power projects in some of the Arab states in the Persian Gulf³.

The economical effects might affect the whole world. As the region becomes contaminated, it will affect the oil exports from that region, which will increase oil prices dramatically. Also, the other Persian Gulf States will pay billions of dollars for medical care, evacuation, and restoring the environment.



The subject of this paper is specifically the environmental effects of Iran's nuclear program. But to study this subject it is necessary to have a look at the history of Iran's nuclear program. The strong ambition of Iran to have nuclear technology is a great threat

for the other neighboring countries and the whole atmosphere in the gulf has become critical.

The History of Iran's Nuclear Program:

Iran's nuclear program was started in the 1950s. However, Iran's interest in possessing the nuclear technology dates back to the U.S. Atoms for Peace Program. Thus Iran's "controversial" nuclear program goes back to 1960s when the framework of bilateral agreement with the U.S. was laid. The American government was very supportive of Iran's Shah, Mohammad Reza Pahlavi. The Shah of Iran wanted to use the nuclear power at that time, the purpose behind that was to save the oil resources of the country. Thus, the Shah initiated the nuclear program and developed an ambitious plan to produce 23,000 Mega Watts from the nuclear power by the end of the century. The alliance of Shah with the United States remained till 1979. After the revolution of 1979, the Shah was overthrown and the tie ups were temporarily stalled.

When this program was resumed, Iran decided to take the minimum help of the Western countries. The foundation of Iran's nuclear program was laid after 1953. In the same year, a civil nuclear program was established under the U.S. Atoms for Peace Program. The Atomic Energy Organization of Iran (AEOI) established Teheran Nuclear Research Centre. The U.S. supplied five mega watts nuclear reactor to the Teheran Research Centre. This reactor was in operation in 1967. This reactor was fuelled by highly enriched uranium. Iran signed Nuclear Non-proliferation Treaty (NPT) in 1968 which was ratified in 1970. Shah approved plans to construct up to 23 nuclear power stations by the year 2000 with U.S. help. Currently, Iran is involved in exploring different sites, uranium mines, and nuclear reactors.

Nuclear Reactor Technology:

A nuclear reactor is a device in which nuclear chain reactions are initiated, controlled, and sustained at a steady rate, as opposed to a nuclear bomb, in which a chain occurs in a fraction of a second and is uncontrolled causing an explosion⁴. As a result of the nuclear chain reaction, fission products, gamma-ray, free neutrons, and large amounts of energy are released⁵; this energy can be used as nuclear power or nuclear weapons. To get this power, nuclear fuels are used, and the most common nuclear fuels are uranium-235, and plutonium-239. The fission produces some dangerous radioactive isotopes, which makes the disposal process of spent fuel dangerous and complex; some of the most dangerous isotopes are plutonium-239⁶, strontium-90⁷, cesium-137⁸, and iodine-131⁹.

Isotopes affects on humans:

Plutonium-239: The half-life of this isotope is 24,110 years¹⁰; there is sufficient evidence that inhalation of plutonium-239 aerosols cause lung cancer, liver cancer and bone sarcoma¹¹.

Cesium-137: It is one of the most dangerous radioisotopes to the environment; the half-life of this radioisotope is up to 30.23 years,¹² which indicates that with the high activity radioactive, it will last for many years in the environment and is absorbed in living cells. It can also cause cancer 10, 20, or 30 years from the time of ingestion, inhalation, or absorption, providing sufficient materials enters the body¹³.

Strontium-90: It's also one of the most dangerous radioisotopes to the environment. The half life of this radioisotope is 28.8 years¹⁴. Together with Cesium, it was one of the most dangerous isotopes and caused major health problems after the Chernobyl disaster¹⁵.

Strontium has biochemical behavior similar to calcium. After entering the organism, most often by ingestion with contaminated food or water, some of it deposited in bones and bone marrow, and some remain in blood and soft tissues. It can cause cancer, bone cancer, and leukemia¹⁶.

Iodine-131: The half-life of this radioisotope is about 8 days,¹⁷ however, when Iodine-131 is present in high levels in the environment from the radioactive fallouts; it can be absorbed through contaminated food and will accumulate in the thyroid. It may cause thyroid cancer; other risks include the possibility of non-cancerous growths and thyroiditis¹⁸.

Nuclear ambition of Iran and the Threat to the Persian Gulf:

Nuclear terrorism is a difficult observable fact which has been investigated unsatisfactorily. It is necessary to develop a system to prevent nuclear terrorism and to reduce its negative ecological effects. Therefore, all the Gulf countries should come together to face the terrorism. Iran's nuclear ambition has flashed an armed race in the Persian Gulf. All the countries in this region are getting more and more concerned about the nuclear threat of Iran, as well as Iran's growing hostility towards the west. All of the Gulf countries are seriously thinking about the immense nuclear obsession of Iran which is going to destabilize them. The major concern for all of them is the adverse effect of Iran's nuclear threat. The Persian Gulf ecology will be in irreparable detriment if Iran is proceeding to its nuclear program.

The other Arab States outlook:

Iran's nuclear power plant is located 75 miles (120Km.) from the boarder of Kuwait. In case there is a leakage, it would devastate Kuwait's water supply totally¹⁹.

One Kuwaiti journalist has expressed his concern about the Iran's nuclear ambition. He says:

The Iranian nuclear dossier is more dangerous than the Israeli one, and for several reasons. First, the Iranian nuclear reactor is not on the Caspian Sea, but near the Gulf, and six countries use the water of the Gulf for drinking. If the Gulf water is contaminated, six countries will die of thirst. This is not the case with regard to Israel. The same goes for the decision-making. Even though Israel has had nuclear weapons since the 1960s... Despite the 1973 war and the Arab victory over Israel, it did not even threaten to use these weapons. Even during the missile attack on Israel in 1991, it did not threaten to use these weapons. On the other hand, we are familiar with the irrationality of the Iranian approach. Once they obtain this weapon... This was also the case with Saddam. When he obtained chemical weapons of mass destruction, he immediately used them against the Iranians and the Kurds²⁰.

An Editorial in Daily Al-Watan states:

The main problem in the Iranian issue is concern for the environment and future dangers, in the event of a nuclear leak that could pollute the entire Gulf region. What increases concerns about an ecological disaster is Iran's reliance first and foremost on Russian nuclear technology. The safety of this technology cannot be trusted, particularly after the well-known Chernobyl disaster that caused radioactive ecological pollution in extensive regions of the world²¹.

The history of environmental disasters in the world makes us pause and think before investing or dealing in the nuclear field or allowing others to go by, it's threatening the existence of the entire region. The nuclear radiation and nuclear energy are both complex and thorny subjects, where the nuclear power scientists spent ages in research to reach the decision where the nuclear energy would be used to produce electricity.

Are Nuclear Reactors Safe?

Despite assurances by the nuclear scientists regarding the safety of nuclear reactors, the dropping of atom bombs on Hiroshima and Nagasaki have toppled these guarantees, and created concerns and fears of the devastating effects of nuclear energy.

There are some other major nuclear disasters in the world behind these fears. The worst was the technical nuclear radiation leakage from the Chernobyl reactor. In the Soviet republic of Ukraine in 1986, the radioactive leakage killed thousands and maimed millions of people. If this kind of incident can occur in an advanced country, similar incidents may occur in a less developed country like Iran.

Iran is exposed to weak earthquakes almost everyday, as it lies on the fault line. Therefore, and through the Iranian earthquakes history record,²² the uncertainty is surrounding the extent of the Iranian reactor requirements for nuclear facilities in terms of seismic nature to the reactor site and geologic characteristics and its ability to carry landslides.

Experts believe that a technical error or negligence in the operation and maintenance -which is not ruled out due to the lack of experience of the Iranians- would lead to high water vapor pressure in the reactor core, so critical to prevent closure of the reactor, which will cause the melting of aluminum and then the reactor explosion as a result of the hydrogen gas, leading in turn to destroy the reactor roof and the combustion of graphite rods. Experts believe the fire will remain alive for a period of ten days while spreading radioactive material high in the air.

Dr. Al-Nasser drew a terrible scenario of what could happen if the Bushehr reactor exploded, saying that this radioactive material from the reactor will spread in the

air and will be transmitted by the wind, where some of this radioactive materials will fall on the ground such as Plutonium, at a distance of 30 kilometers from Bushehr, which means in the Persian Gulf²³. While Cesium and Iodine will be intensified on aerosols to reach all the Gulf States and Yemen and Egypt border!²⁴ Also, some radioactive Drupes will be released by the explosion to cover vast areas of the globe.²⁵

As a result of these repercussions, citizens of the Gulf States should be moved from their land. After the Chernobyl explosion, people where moved to areas further than 100 kilometers from the explosion site, but Dr. Al-Nasser believed that this distance is not safe, and one should preferably be at a distance beyond 500 kilometers²⁶. Where would the Gulf population go? It's important to note that the contaminated land could be used only after about 50 to 100 years.

Dr. Al-Nasser refers to the danger of any radiation leaks on the Gulf waters which will contaminate it, and may lead to possibly a water-war in the region. The real danger lies in the nuclear pollution of the Gulf²⁷.

If this devilish scenario didn't happen, and the Gulf population remained in their land, there is another scenario that is more disastrous; some scientists would say that if the United States struck the Iranian installations, the radiation will leak to the waters of the Persian Gulf, leading to a contamination of the water, particularly since the vast majority of the Gulf countries in the region depend on the desalination of the Gulf water itself. If contaminated, the gulf water won't be drinkable even with desalination²⁸.

The Aftermath of Hiroshima:

The atomic bombings of Hiroshima and Nagasaki, in August 1945 have provided

unique insights into the long-term health effects of nuclear radiation. Hibakusha is the term widely used in Japan referring to the victims of the atomic bombing of Hiroshima and Nagasaki, the Japanese word translates literally to "explosion-affected people."²⁹ Researchers have studied and followed the lives of more than fifty thousand Hibakusha over the last sixty years who have significant exposure to the bombs' effects. Studies have revealed that these Hibakusha have about a 30 percent higher than normal chance of dying from cancer, including leukemia and cancers of the lungs, colon, stomach, and other organs³⁰. The ratio of those who suffer from cancer, leukemia, cataracts and thyroid and chromosome disorder are higher among Hibakusha than the other Japanese³¹.

The aftermath of Chernobyl:

The contaminated area caused by Chernobyl explosion is approximately 100,000 square miles,³² which equals the area of the Persian Gulf³³. According to the World Health Organization, the high levels of radiation in the area caused a dramatic rise in the thyroid gland cancer among children³⁴. The initial explosion killed 31 operators, firemen, and first aid workers, plus several thousand were hospitalized³⁵. It ruined the "Red Forest" – so called because the pine trees went red and died in response to a massive blast of radiation³⁶. In post disaster cleanup operation, a majority of 4 km² of the forest was bulldozed and buried³⁷, nevertheless, that region still one of the most contaminated areas in the world³⁸. If the same accident happens to the Iranian reactor, it will ruin the Persian Gulf forever. Extremely radioactive fallout can ruin the soil and many trees in the region will die as well.

How does Iran disposes its nuclear waste?

According to the International Atomic Energy Agency Report GOV/2003/75 "Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran," the Director General Report had identified some critical failures as follow:³⁹

1. Failure to report the import of natural uranium metal in 1994 and its subsequent transfer for use in laser enrichment experiments, including the production of enriched uranium, the loss of nuclear material during these operations, and the production and transfer of resulting waste⁴⁰.
2. Failure to report the production of UO₂, UO₃, UF₄, UF₆ and AUC from imported depleted UO₂, depleted U₃O₈ and natural U₃O₈, and the production and transfer of resulting wastes⁴¹.

In this report, Iranian radioactive wastes locations couldn't be identified, which means that Iran is hiding the disposal locations of these wastes. If it was legally disposed why should Iran hide the truth?

Any activity or process of producing radioactive material generates radioactive wastes. The nuclear reactor in Iran can produce byproducts such as radioactive wastes which can cause severe biological effects in the Persian Gulf.

Even if it was legally disposed, the question is where is the place of such wastes? It's known that scientists didn't find a proper way to dispose the nuclear wastes so far, except storing them in containers in hope that one day someone will find a solution, which is not disposal by any means; it's just containment. The plutonium has a half-life of 24,100 years⁴², and during that period of time, it remains as a threat for the environment.

If – for any reason – the radioactive effluent discharged into the Persian Gulf, this contaminated waste will totally affect the water in Persian Gulf. Thus, the various fishes and ocean vegetations will be contaminated. That will affect not only to the ecological system, but also to the health of human beings, because most of the countries in this region are dependant on drinking distillate water from the Gulf itself.

Since the early 80's, the U.S. Department of Energy has struggled to find a disposal facility for the radioactive wastes. They started by selecting nine locations in six states in 1983; three out of those locations were approved by the president for intensive scientific study called site characterization⁴³. In 1987, Congress directed the U.S. Department of Energy to study only one of those; it was Yucca Mountain, Nevada⁴⁴. In 2002, the U.S. cast the final legislative vote approving the development of a repository at Yucca Mountain⁴⁵. In the same year, President Bush signed the resolution allowing the Department of Energy to take the next step to establish a repository in that area⁴⁶. Since that time, the U.S. Department of Energy has been trying to file a repository license application with the Nuclear Regulatory Commission.

According to the U.S. Department of Energy officials, in time, the constructions of the repository site needs more than \$1 billion annually⁴⁷, but the project opponents have limited annual payouts to about \$400 million⁴⁸. Ward Sproat, director of the Office of Civilian Radioactive Waste Management said: "Until we get this issue fixed I can't, nor anyone else, tell you with any degree of certainty when the repository is going to open". It's clear here that this struggle and friction is happening due to the importance

and sensitivity of this project. The question is; do the Iranian officials care that much about the same issue?

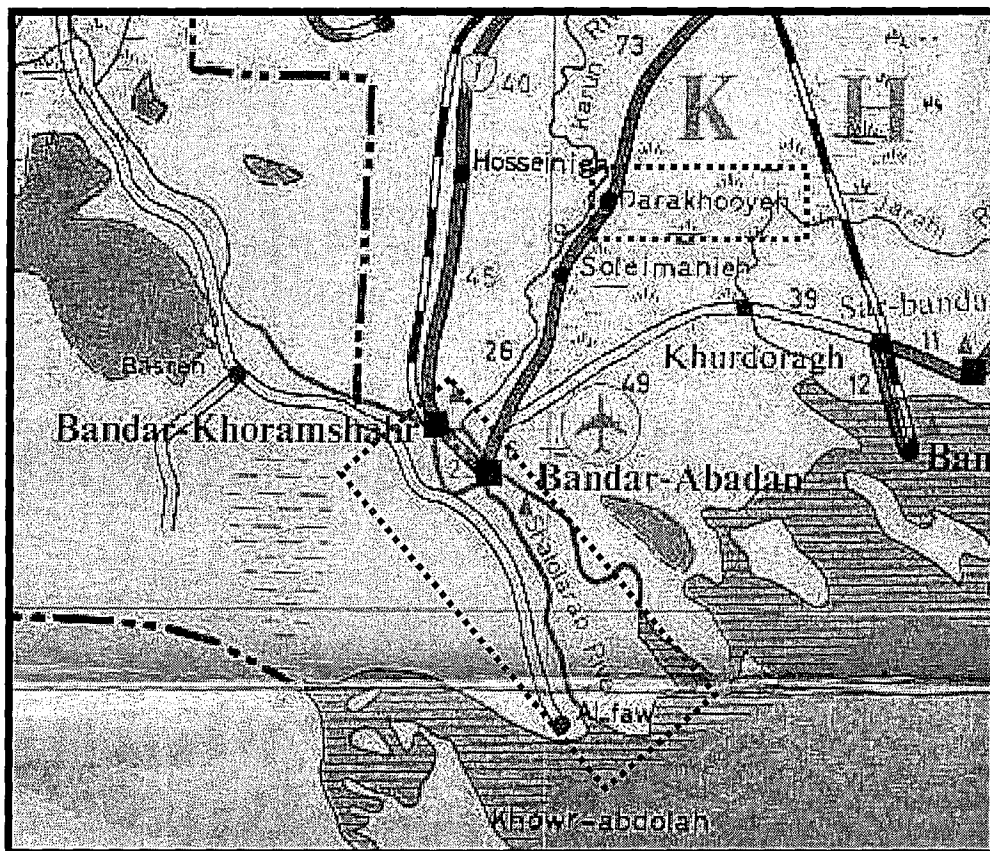
Sproat stated: "Through the Department of Energy licensing Support Network, the public can view scientific data, geologic and engineering studies, and other detailed analyses related to Department of Energy license application for the nation's spent fuel and high-level waste repository to be located at Yucca Mountain⁴⁹". One more question here: will anyone in the Persian Gulf hear a statement soon - Or even on the long run - from any Iranian officials regarding this issue?

Darkhovin Nuclear Power Plant:

Ahmad Fayyazbakhsh, the deputy head of Iran's Atomic Energy Organization announced to reporters in Tehran in January 2008 that Darkhovin nuclear power plant will become operational in 2016⁵⁰.

Darkhovin town is located 40 miles north east from Al-Basrah, Iraq; and 20 miles from Euphrates River; north of the town is the Karoun River. For 450 miles, this river rises from Zard Kuh Mountains, and continues to the Persian Gulf, forking into two primary branches, one of them joins Shatt Al-Arab, emptying into the Persian Gulf⁵¹.

Satt Al-Arab is a river in southern Iraq of some 125 miles in length, formed by the confluence of the Euphrates and Tigris north of Al-Basrah⁵². This region is regarded as the largest date palm forest in the world⁵³.



A Darkhovin nuclear power plant would charge highly radioactive wastes directly into Karun River. It's not far from happening, as in the United States, the major rivers which are the source of water have been contaminated dreadfully. Among them is the Colombia River⁵⁴, from 1943 to 1987⁵⁵, coolant waters from nuclear reactors at Hanford Reservation in Washington State were continuously discharged into the Colombia River.

Rivers from other parts of the world also have been polluted. It happened in Chelyabinsk⁵⁶ nuclear weapon site in Russia when Lake Karachay was polluted with radio active waste, which released radioactive material into the surrounding rivers as a result of heavy rains⁵⁷. Then, in 1957, the site exploded⁵⁸ which resulted in dispersing of the radioactive clouds over hundreds of square miles of an agricultural region and contamination of numerous rivers and lakes.

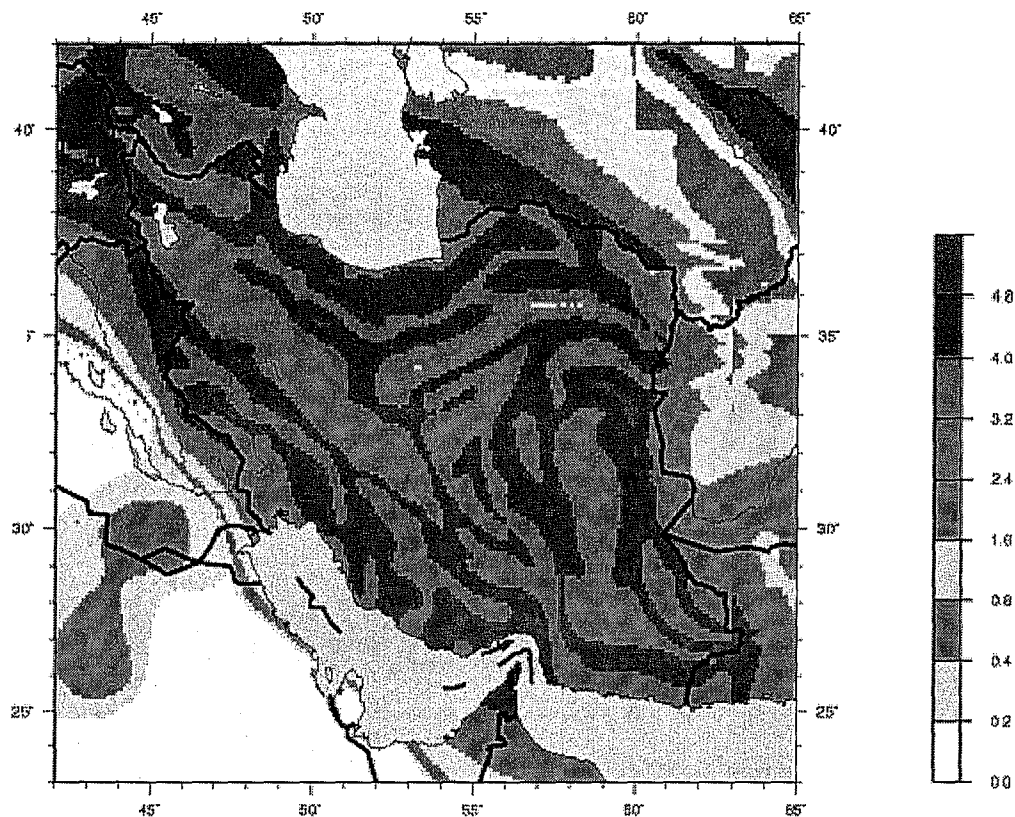
The same situation can happen with the Iranian rivers like Karun River, not only will the water of this river contaminate, the forests of date palms that depend on Shatt Al-Arab -which is linked to the Karun River- will be destroyed.

Seismic Hazard Assessment of Iran

The Iranian plateau is one of the seismically active areas of the world and frequently suffers destructive and catastrophic earthquakes that cause heavy loss of human life and widespread damage⁵⁹. Here are some facts about the recent earthquakes in the last decade⁶⁰:

1. 31st of March 2006: Western Iran – M 6.1 Fatalities 70.
2. 27th of November 2005: Southern Iran M – 6.0 Fatalities 13.
3. 22nd of February 2005: Central Iran – M 6.4 Fatalities 612
4. 28th of May 2004: Northern Iran – M 6.3 Fatalities 35.
5. 26th of December 2003: Southeastern Iran – M 6.6 Fatalities 31,000.
6. 21st of August 2003: Southeastern Iran – M 5.9.
7. 22nd of June 2002: Western Iran – M6.5 Fatalities 261.
8. 14th of March 1998: Northern Iran – M 6.6.
9. 10th of May 1997: Northern Iran – M 7.3 Fatalities 1,567.

With that, the location of the Iranian Nuclear Reactor will cause a sever damage to the surrounding area in case it has been struck by an earth quick. The map below shows the Seismic Hazard Assessment of Iran⁶¹



Peak Ground Acceleration (m/s^2) with 10% Probability of Exceedance in 50 Years

The global warming:

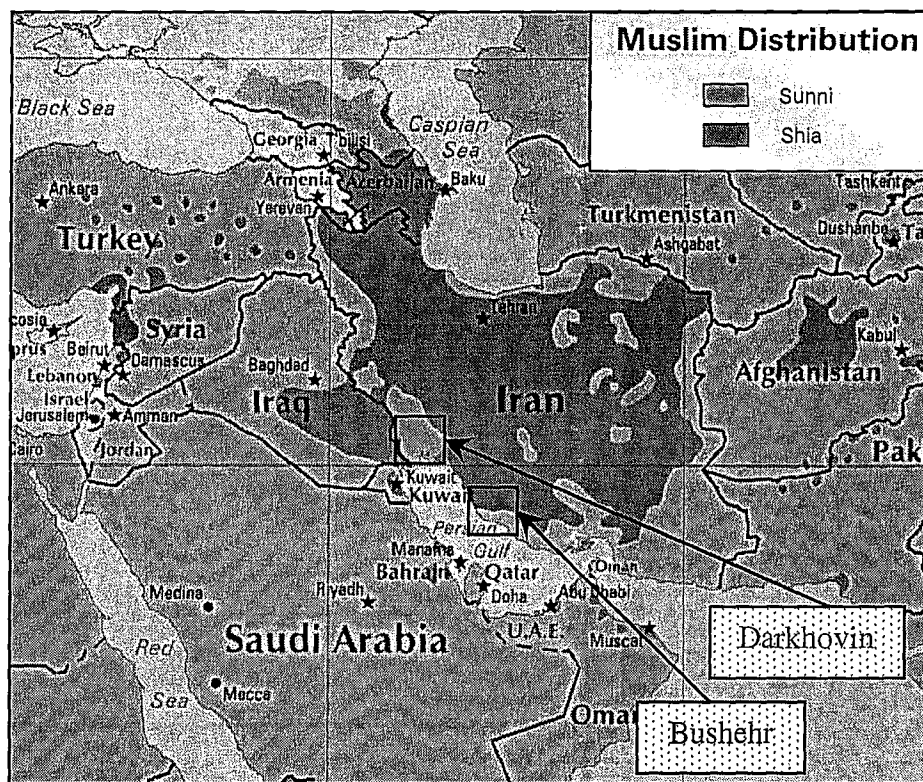
In these recent years, it is found that the climate on our planet is changing drastically; it is getting warmer. The Persian Gulf is not an exception. Greenhouse gases are naturally found in the atmosphere. They generally function as a trap for the heat of the sun in the lower atmosphere. Hence due to their function, the Earth remains warm and the life on the Earth remains balanced. In its absence, the mean temperature of the Earth would be about (-2°F) rather than the present mean temperature of about (59°F)⁶². Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. With that, any increase of the greenhouse components will lead to increased greenhouse effects on the Earth.

The claim that the nuclear energy is environment friendly might be right in first sight if we look only to an operational nuclear reactor; it doesn't produce as much CO₂ comparing to coal or gas-burning power stations, but the truth is that uranium ore mining, refining, and enrichment required a huge amount of fossil energy. In a recent study, Jan Willem Storm van Leeuwen and Philip Smith approved that the total amount of fossil energy consumption in this process emits equal or maybe larger CO₂ than the amount emitted by a coal or gas-burning power stations⁶³, also, building the reactor, radioactive waste disposal, and dismounting the reactor after it reached its useful life, all of this needs a huge amount of energy, most of it must be obtained –unfortunately- from fossil fuels⁶⁴.

Geopolitics:

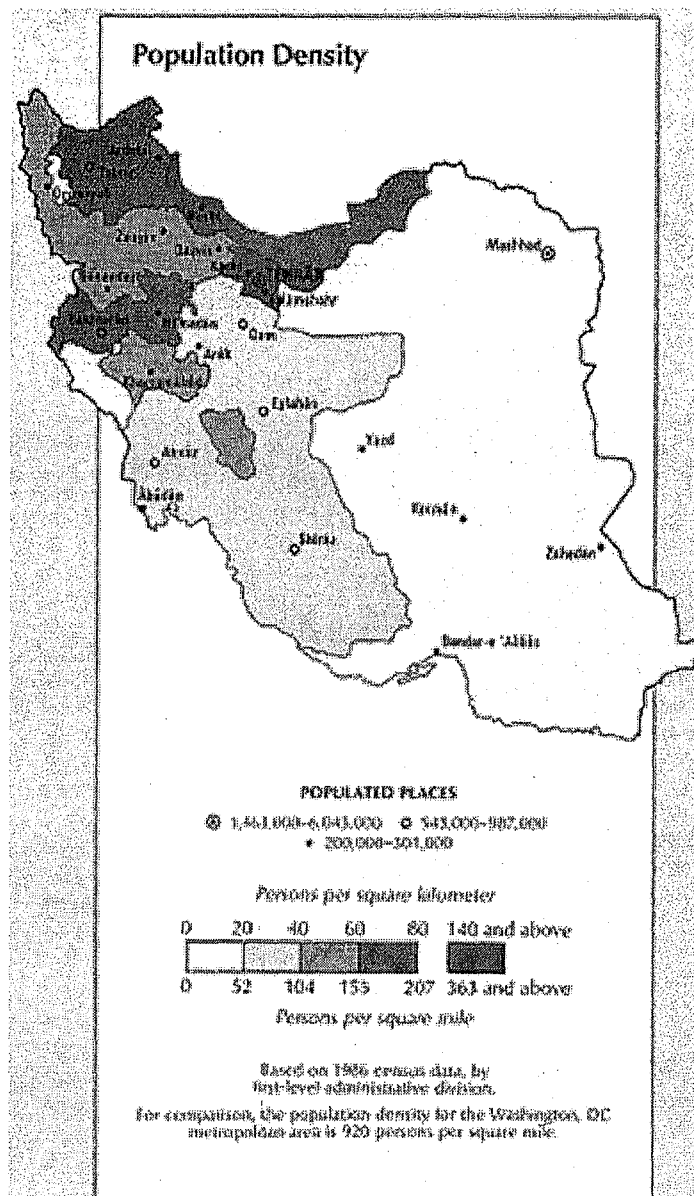
The Iranians officials know the extent of a potential hazard to the environment in case something went wrong in any of the nuclear reactors, that's why they selected the reactors sites carefully; carefully –in this case- means away from the Iranian Shiites.

Most of the Sunni Arabs who live in Iran are living on the Persian Gulf coastline⁶⁵. The majority of the population in Darkhovin town is Sunnis, see the map below:



<http://en.wikipedia.org/wiki/Image:MuslimDistribution2.jpg>

It's difficult to say that luck has played an important role in making Sunni grouping areas the best locations to build a nuclear reactor. If we look at it from another point of view, monsoon and wind directions in the Persian Gulf are generally north, north east, or north west, if things went wrong in any of those reactors, the radioactive materials will drift with the wind southward to the other Arab States. Other suitable sites to build such reactors are available for the Iranians to choose from, most of the eastern side of the Iranian plateau is less populated, see the map below:



During war, nuclear reactors become strategic targets. Therefore the Iranian officials chose those locations to force the other Gulf States not to support any kind of attack against the reactors. The location of those reactors is a hidden message to the other neighboring States saying: "Even if you don't like it, accept it. Harm is mutual."

Water Supply:

Underneath the nuclear reactors, the environmental contamination in forms of groundwater pollution may occur. A nuclear accident of any of the Iranian reactors will be a great threat for the water supply in Iran and the other countries in the Persian Gulf. Especially the ground water beneath the reactors sites can become contaminated due to the radioactive particles, which may be sealed into cavities by the blast or it can be absorbed by the underground rocks. Therefore the radioactive particles like long lived plutonium 239 can travel with the underground water. Chester David Rail in his book, *Groundwater Contamination* writes, "In some instances, the ground water contamination is contained and poses no immediate risk to people and the environment, however, in other areas the contamination is extensive enough to have polluted not only the surrounding soils but also vast areas⁶⁶." The radioactive particles can be sealed into the cavities by the blast of the reactor explosion. The contamination consists of widely distributed plumes of several volatile organic compounds, hydrocarbons, and some dissolved metals.

The total use of water in Iran is 93.1 billion m³ and it mainly comes from the ground water (55%), and surface water (45%). There is a significant increase in the withdrawal from groundwater. The water need in Iran is increasing and naturally the accessibility of water has already decreased from 7000 m³ per capita in 1981 to 2000 m³ in 2001⁶⁷.

The role of groundwater in the arid and semi-arid areas like Iran is very important. Iran is already facing the problem of water shortage and in such cases if the groundwater gets contaminated there will be an acute and serious shortage of fresh and

pure groundwater. This can be applicable to the entire Persian Gulf region because the contamination will not be limited to Iran only but it will spread all over the Middle East region. Such contaminated water will not be useful either for drinking purpose or for agricultural purpose.

A nuclear explosion in any of the reactors will lead to massive heat, radioactive dust, and a harsh ecology. Some of the radioactive materials can be discharged directly into the ground. The long lived radioactive elements can be effective for hundreds and thousands of years. With that, the land may loss to desertification. Fresh water will be polluted with hazardous radioactive materials. Also, there is a danger for farm animals and poultry in the Persian Gulf as they can drink the contaminated water and then it will become a problem for the meat, milk, and eggs as the nuclear contamination spreads from the animals and poultry to their meat, milk and eggs. Also, due to the rainfall or the contaminated water on which the vegetables are dependent, it may carry radio nuclides into the cavities of the fresh leafy vegetables, which in return will affect humans, animals, and poultry.

Conclusion:

The nuclear threat to the Persian Gulf will be harmful to both the human health and global environment. Health and environmental problems will arise in the entire Middle East due to the large quantities of radioactive hazardous material and toxic metals including Iodine, Cesium-137, Strontium, and Plutonium⁶⁸ as a result from the reactor explosion. All of the Gulf countries are seriously thinking about the immense nuclear obsession of Iran which is going to destabilize them. The major concern for all of them is

the adverse effect of Iran's nuclear threat. The Persian Gulf ecology will be in irreparable detriment if Iran is proceeding to its nuclear program. Therefore, all the Gulf countries should make emergency national plans to avoid the consequences of such operating failure.

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