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### **Heavy Metals Contaminations in Environment and National Power**

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#### **ABSTRACT**

Although, growth of industries in world is accompanied with economy promotion, but in other side it has increases harms to environment and human being. By proper management and prevention before treatment, however we can reduce these undesired impacts. Contaminations of soil are one of the issues, which have a specified importance around industrial zones and populated civic centers. Escalating levels of heavy metals in soil and consequently in plants and animals hazard environment and human health.

Furthermore, existence of heavy metals in industrial wastes and resulted environmental problems of improper removal of those require these wastes to be filtered before discharge to environment or sewerage collection systems. As most of industries have high levels of contaminations in regions, then they are amongst important and threatening factors of underground waters quality in plain lands. Human consequences of global changes in environment also have significant affect social problems and interrelationships with global and states security. In this article, it is tried in the first step to identify threatening factors to environment and various species of contaminations from plumbum and zinc industries and then reveal strategies to deal with these known factors and preventing their functions.

**KEYWORDS :** heavy metals, contaminations of industries, global security, environment.

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## **1. INTRODUCTION:**

Extraction processes consume huge amounts of energy, which are maintained by fossil fuels consumption. These fuels are not renewable and their producing and consuming limitations in desired processes and their vital and inevitable necessities require optimized consuming of these fuels. On the other hand, problems of environmental contaminations, observing environmental issues and international conditions together with liabilities are necessary. Irregular consuming of fossil fuels and lack of observing global standards may tighten life circumference of contemporary human more closely. Heavy metals can enter into environment through human or land resources. Natural resources of heavy metals may considered to be volcanic rocks, sedimentations and alteration and air exposure of soil and artificial resources can be impacts of human activities such as mining , agriculture and industrial operations. Mine industry provides essential materials for human survive and development and in other end, human activities take human beings survival and exploiting environment by increasing contaminations. Hence, in many countries, environmental effects of mining are assessed and some related standards were ultimately established to soil contamination due to mining activities and levels of contaminations in water, soil and plants arisen of this industry. The most important hazards are mine rich regions, abandoned sulfide mines, acid drained water of mine and abandoned wastes in these regions. Wastes have high concentrations of different elements where are released under specified conditions of environment and enter into water and soil resources, then basic concentrations of elements in soils of mine rich regions and zones are very high.<sup>1</sup>

## **2. IMPACT OF HEAVY METALS ON ENVIRONMENT**

Some heavy metals such as arsenic, cadmium, plumbum, chrome and mercury are very toxin and cause serious harms to human health. Considering this fact that mineral resources and specially metallic mineral rocks contain significant levels of heavy metals and potentially toxin substances, exposure of surface and underground waters with host rock and mineral bulks and traces and exposure of rocks to air in mines cause release of diversified elements and huge amounts of heavy materials and potentially toxin substances would be remained in low level debris and surrounding soils. Contamination load of this industry is caused by following major parts :

A – Industrial drainage ; 100-150 m<sup>3</sup> as per day

B – Human waste waters ; 50 – 75 m<sup>3</sup> as per day where discharge to surface

Waters

C- Debris of plumbum old abandoned mines

D – Heavy vehicles exhausts smoke and resulted smokes of coal industrial

Consumptions

E - Mining and plumbum processing and its related supplies

F - Water, food and inhaled air where are contaminated by plumbum

These assessed contaminations in eight European states also may be seen in the following diagram for 1990-2003.

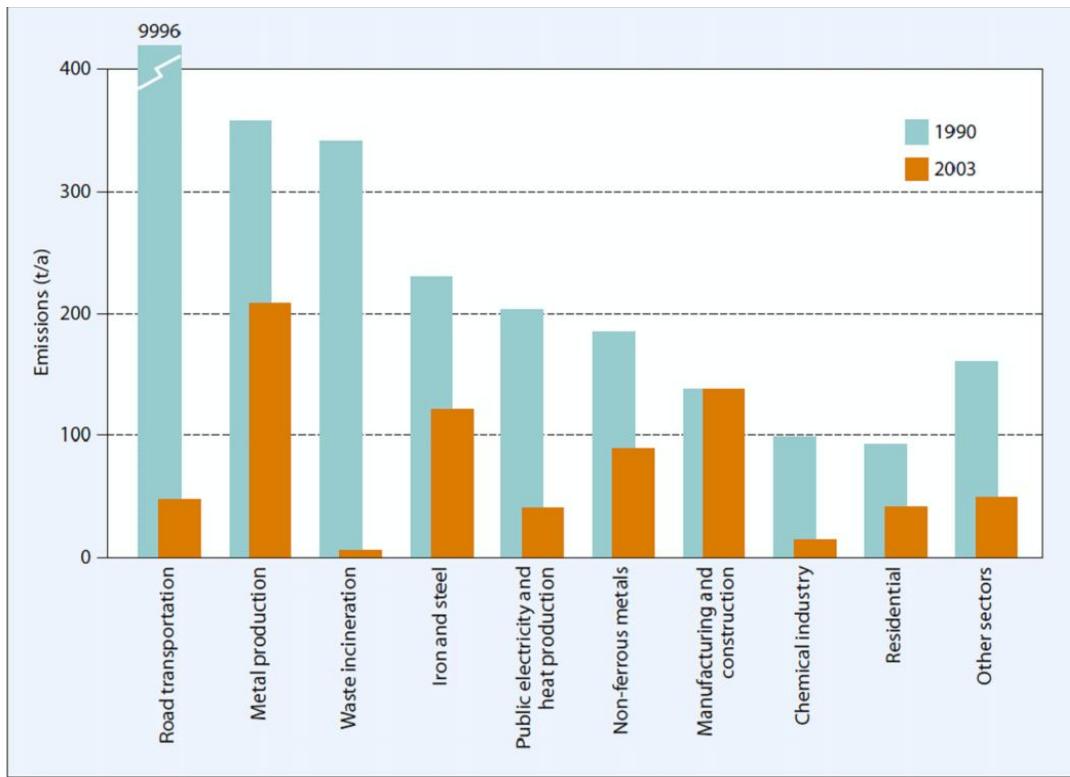


Fig.1. Anthropogenic lead emission sources in eight countries of the EMEP region in 1990 and 2003(12)

### 3. REGARDING ABOVE MENTIONED CASES, HEAVY METALS CONTAMINATIONS IN DETAILS ARE AS FOLLOWING:

3-1-plumbum impact on environment

3-2- plumbum impact on water contamination

3-3- plumbum impact on soil contamination

3-4- plumbum impact on air pollution

3-5- plumbum impact on plants contaminations

3-6-plumbum impact on human health

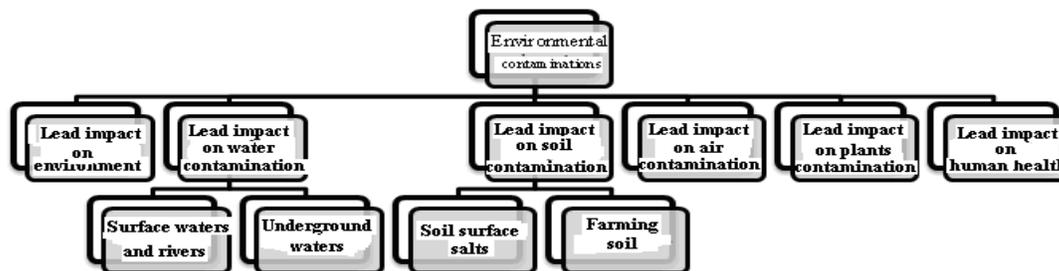


Fig. 2. plumbum and zinc industries contaminations (Authors)

### **3-1-Plumbum Impact on Environmental Contamination**

In recent years, there is a particular attention to generated plumbum contamination from industrial and non-industrial origins. Some studies demonstrate that oceans surfaces has 10 times more plumbum contaminants comparing to beginning time of their development (about 2 millions Years ago). Furthermore, it is 5000 years since humane have been contaminating water, soil and air with plumbum and human per se has been exposed to plumbum contamination from three thousands years ago up to this date by utilizing plumbum tools and cutleries and dishes <sup>2</sup>.

Diplomatic proceedings have been accelerated in order to develop consensus to set up a large list of environmental problems where is a sign of understanding that global environmental spoiling is a real threat for all nations and people of the world .<sup>3</sup>

Although there are organizations for environment protection in developed countries, but there are also organizations in developing countries that sacrifice environment for their own economic profits. This destruction is conducted through 4 procedures which are inhibiting third world's development:

- Demolition of natural resources
- Environmental contamination
- Imposing consume of hazardous toxins
- Unsustainable development <sup>4</sup>

Moreover, in new world's glance to environment issue, this issue is at the top priority and peak of the matters regarding nations security affairs. Total imposed neglects leads to face numerous crises and challenges with in domain of world's environment, while environment is deeply linked to all domains such as security, health and well being, economy, societies and policies of all nations. Environmental contamination stems to diversified resources. By developments in human civilization and progresses in technologies and increasing growth of population, now the world is faced to a problem named as contamination in air and land where threats life of earth's habitants. Regarding this problem, environmental contamination is under serious attention of state administrators in all countries. Today, environmental situation is such that habitants of a city and even a country are not secured of contamination impacts.

If snow falls in Norway, it is accompanied by pollutants that are generated in Germany and England. Acid rain in Canada is caused by pollutants rooted in US. Sometimes in Athena, people are forced to close factories and restrict traffic due to severe air pollution. Other cities in the world such as Mexico city, Rome and Tehran also involved struggle with air pollution problem. Contaminations of seas, rivers, lakes, oceans and jungles also make controversial environmental discourses <sup>5, 13</sup>.

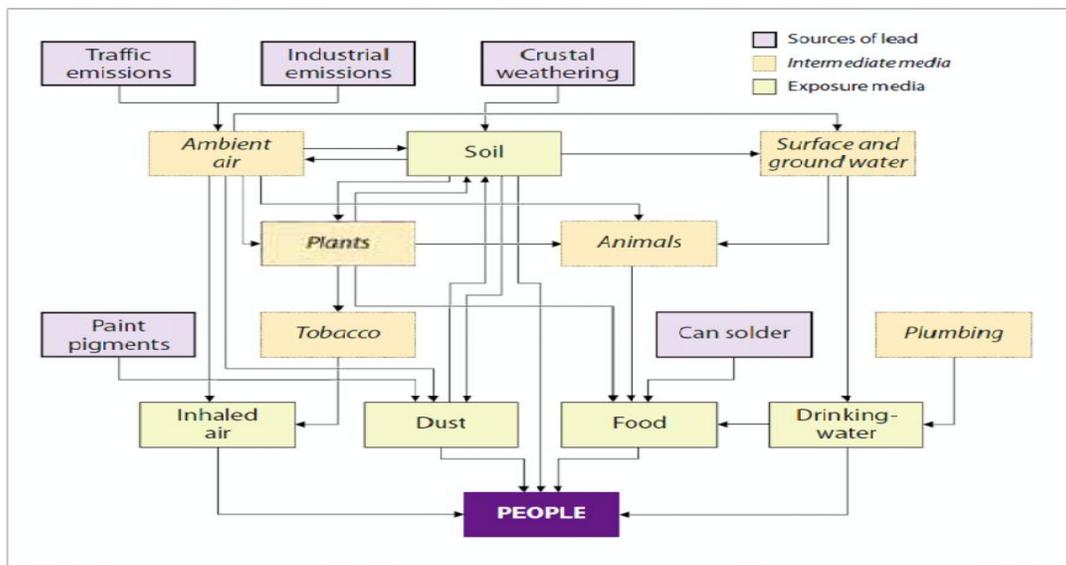


Fig. 3.sources and routes of plumbum exposure in the general population.(14)

### ***3-2-Plumbum on Waters Contaminations***

Dispersion and contamination of plumbum in environment is not only pollute air and soil but also extend to waters. Today, most of the rivers, seas and surface waters are exposed to plumbum contamination extracted from industries, agricultural activities, mining and vehicles smokes. In potable waters, plumbum hardly reaches to higher levels than permissible ones and this only occurs when water Ph is acidity and it flows through metallic pipes and leads to resolving contained plumbum in pipes then plumbum concentrations in water will be increased. In regions with acidic waters, increasing water Ph level by adding alkaline agents such as calcium carbonate will eliminate contamination threat. Contaminant resources of surface and underground waters included drainage waters, arisen currents by leaching process and permeable water flows of waste dams , mining pits and mining activities. In plumbum mines with sulfuric minerals; acid is generated by sulfides oxidation and resulted acidic water has more strength as to perform heavy metals leaching process within these regions and after passing different regions increases levels of contaminations. Influential factors on quality of generated acid are type and level of sulfide, buffering capacity of minerals or wastes, exposure of minerals to acidification media, humidity and hydrology of region<sup>5</sup>.

Some bacteria such as thiobacillus Ferro-oxidants become factor of chemical reactions to oxidation minerals containing sulfur in order to produce acid. These bacteria create special problems in transit rocks depots and waste dams. By increase in levels of water acidity, leaching and mobility strengths of metals and other contaminations also increase. Typical elements and minerals which are accompanied with plumbum and zinc sources included mercury, tellurium, cobalt, thallium, pyrite and pyrrhotite. Decrease in Ph level has impact on solvability of these elements and minerals and make them ready to be transported by surface and underground waters. Surface and underground mines must be leached so as to provide extraction possibility. To do this , water can be pumped out directly from mine inner region or in mine location , water may be pumped out through dug wells via underground bed whereas this method leads to decrease in underground height level and develops an reverse cone in mine location. After termination of mining activities, water pumping is also stopped and in this case exposed water to sulfur minerals within an acidification medium (e.g. open top quarries and underground mines) will become acidic. In natural conditions, plumbum usually is less than 10 µgr/l and in most of countries the permissible level of lead in potable water is 50 µgr/l. plumbum activity in light waters is about 0.5 µgr/l and this difference is due to bicarbonate ions in hard waters<sup>9</sup>.

### ***3-3-Plumbum Impact on Soil Contamination***

Atmosphere plumbum is added to soil. It may point to resulted smoke of industries, output gases of cars exhausts and some chemical agents such as insecticides to be main sources of plumbum production. Moreover, plumbum ead adds to soil through chemical fertilizers and superphosphates. Remains of atmosphere's plumbum on leaves of trees also adds by rain water or directly via contacts with dried leaves with ground surface to soil. Concentration of plumbum in clean regions soil surfaces is about 10 – 20 µgr/gr of dried weight of soil and in farming soils it reaches to 2-200µgr/gr. Environmental effects of mining activities on soils is usually indicated by corrosion and contaminations. Corrosion may occur by cutting and eliminating plants due to mining activities. Under these conditions , some occasions such as snow melting causes more soil corrosions. Soil contaminations may be resulted of mining wastes and materials discharge, drainage water, leaching and penetrate of water from wastes dams. Furthermore, shifts of micro-particles in dried waste dams. Shifts of existed micro-particles in dried waste dams cause contaminations in soils. Other sources of soil contaminations are fuels, imposed chemical agents in floatation process, stored or used sanitary and cleansing solutions in certain locations. Polluted soils can be a source of contaminations for surface and underground waters and thus a transporter of contaminations to other domains. In some cases such as waste pools drainage or using minerals as construction materials, human beings deal with these polluted soils directly. Deposited plumbum on soils from atmosphere mostly are absorbed by clay particles of soils and the remaining that adds to soil as halogenated salts are ionized by soil dampness and by reactions with some anions as sulfate<sup>-2</sup> , phosphate<sup>-2</sup>, carbonate<sup>-2</sup> produces some salts such as plumbum sulfate which remains in surface areas of soil due to its water non-solvability property<sup>15</sup>.

Many studies were conducted related to penetration of heavy metals into soil environment in mining metal minerals and minerals generating regions. For example, in a study to evaluate contaminations loads in affected water, soil and debris of Kongjujeil plumbum mine in Republic of South Korea, deposits and minerals of soil including pyrite, chalcopyrite, Sphalerite, Galena, Malachite, Goethite. In study of heavy metals portions of Zn, Pb, Sb, Cu, Cd, As in surface soils, it is found that these metals have high concentrations in proximity of mines' domains<sup>16</sup>. And due to application of simple and insufficient methods in old mines; produced waste materials have very high metallic concentrations whereas by exposure of these materials to atmospheric factors all conditions of their release into water and soil media are maintained<sup>17</sup>. In a conducted study about assessment of agricultural soils and wastes contamination by heavy metals in an abandoned plumbum and zinc mine located at Kirki district in

northeast of Greece, wastes samples demonstrated very high concentrations of As, Cu, Cd, Pb and Zn. Soil samples of adjacent areas to mine also have high concentrations of heavy metals showing relationship between soil contamination and mining activities<sup>18</sup>.

### ***3-4-Plumbum Impact on Air Pollution***

Generally, two main periods are identified for increase in plumbum concentration of northern hemisphere. First era is resulted of rapid growth of industries in eighteenth and nineteenth centuries. Second era is resulted of traffic and motor vehicles developments after WWII. Engine of motor vehicles consumes oxygen of fresh air to convert mineral fuels to efficient physical work and reversely pumps outputs of consumption that are the same remaining parts of chemical reaction of oxygen and fuel into atmosphere. Number of pumped out gases are about 50 species where most of them are harmful and contaminating<sup>(6)</sup>. The most important gases are carbon oxide, nitrogen oxides, aldehydes, ethylene, aromatic hydrocarbons and plumbum. plumbum adds to gasoline in form of plumbum tetraethyl and tetra acetyl (in order to avoid engine strokes). Once gasoline is combusted, compress pressure in engine going up and at the end of compressive stroke, abnormal combustion of gasoline along with diffusion of sonic waves are generated inside engine. This procedure is called “engine impaired stroke”, it happens in combustion chamber when appropriate fuel was not selected due to high compress pressure. In order to prevent engine-impaired stroke, which reduce engine life, significantly, some chemical agents to fit strokes are used. As a result, in order to enhance efficiency of internal combustion engines a special kind of gasoline is required to regulate high compress coefficient of engine. In mining sites the rising dusts of dams dry surfaces or of wastes depots are prime sources of air pollutions. Wastes dams are not covered completely by water and because of this, particles of those parts that are out of water level are shifted by air blow. The major part of existed plumbum in atmosphere is in the form of micro-particles of inorganic plumbum salts. There also may be a little levels of plumbum organic vapors. plumbum particles of cars gasoline combustion are different from other plumbum particles of other sources. Sizes of these particles are between 0.01 micron to a few microns. More than 80% of air plumbum mixture is caused by gasoline. Duration of plumbum resistance in air depends on particles’ sizes and also plumbum addition procedure to gasoline. This duration time is estimated one to four weeks. Resulted plumbum from cars is deposited in lateral atmosphere of roads in different shapes and adds to soil and a part of that is entered animals and plants bodies. Concentration of plumbum at sides of roads and connecting

routes is related other than to distance from road, to some factors such as traffic volume, distance to other routes, permanent wind, season, time, date and atmospheric situation <sup>(15)</sup>.

Air pollution imposes significant loss to agricultural products. Furthermore, polluted air has destructive effects on plants, buildings and metals in cities because of having sulfuric acid component. Soot and suspended particles in air cause clothes, buildings' elevations, curtains and other households get dirty and washing times increase, then destructive economic impacts impose to people and nations.

### ***3-5-Plumbum and Zinc Impacts on Planet and Animal contaminations***

Plumbum that is not necessary for flourish and growth of plants is absorbed by vegetations and then plants are exposed to this poisonous element. In this case, other than harms to plant per se; animals and human beings that consume this plant are exposed to hazard of plumbum contamination. Exposed flora to plumbum contaminations are categorized in three classes of trees, weeds and agricultural plants. plumbum absorption is occurred in two ways :

A. Absorption through leaves and branches

B. Absorption through root

It is unlikely that insoluble plumbum salt be absorbed by roots of trees, but are absorbed by multibranched and surface roots of bushes and shrubs. Effective factors in plumbum absorption by soil are soil cathodic interchange capability, available phosphate in soil, fertilizers, other heavy metals, temperature, available organic substances in soil, plant age, specie and finally changes in environment. After absorption, plumbum moves easily inside plant. This shift is related to physical features of plant. First, plumbum is detected within root cells walls. In this stage, leaves are found with less levels of plumbum in them. Regarding plumbum compounds in plant, this is inferred that element is more likely available as insoluble unshaped compounds in plants. Level of plumbum with potential of harmfulness to plants reported in different amounts. But general idea is indicated that plumbum level in soils must be more than 1000 ppm to be capable of leaving undesired impacts on plant. Spite of all mentioned cases, unfortunately ; plumbum is so widely utilized by human beings that diffused amounts reach to 300,000 tons per year where is much more than 20,000 tons released plumbum by natural processes. The most significant sources of resulted plumbum contamination by human activities are gasoline and coal combustions and melting sulfide mineral rocks is rated third at a long distance from those two sources. Fortunately, three markets where plumbum have had important role in them for several decades are not available now. The most important market among these three is production of plumbum tetraethyl

$Pb(CH_2CH_3)_4$  and related compounds to this agent that were used as additives to gasoline and basically, these chemical agents productions are terminated in developed countries, however in some developing countries such as Mexico and South Africa are continues at level of local refineries. Using plumbum oxides in buildings paints, glass, ceramic and other chemical products is also reduced due to hazardous problems of plumbum where it is perceived to be one of the reasons of decrease in plumbum levels of people's body during recent decades. have reduced diffused substances drastically. Despite these regulations and treatments, even very little levels of plumbum can reduce trainability power of children. In reaction to environmental concerns in United States, its congress consider to ratify an act pertained to direct taxation for plumbum production. Although taxation may be perceived desirable theoretically and in environmental regards, but it has some undesired consequences. Because of close relationship of plumbum with other metals; taxation leads to decrease in local production of such metals as zinc, cadmium and bismuth in very large amounts and silver in little amounts<sup>15</sup>.

### ***3-6-Plumbum Impact on Human Health***

Plumbum is a toxic element and without any biological role. More known physiological impacts of plumbum are dizziness, anemia and loss of direction finding sense, coma and death. Actually it is alleged that Rome emperorship was fallen because of plumbum, because there are evidence of toxic consequences of plumbum in some leaders of Roman emperorship. This theory is endorsed by high level of plumbum that was found in bones of some noble figures of Rome emperorship. plumbum neurotic effect contains a wide spectrum of function reduction in neurotic cells up to brain infection. plumbum leaves most of these effects by successful competence with other vital elements in significant biochemical reactions. For example, plumbum causes anemia by replacing iron in necessary compounds of producing hemoglobin. Furthermore, through aggregation of plumbum in bones which are accounted as the main calcium source for human, calcium quantitative inefficiency may be caused. Despite all these negative impacts, this element is not known as a cancer generating factor. plumbum can be exited from body by consuming cyclic organic compounds such as Ethylene-diamine-tetraacetic acid (EDTA) that form plumbum stable solution complexes. There are two chronic and acute situations detected in plumbum toxicity. Acute toxicity causes by huge amount of plumbum and can be developed through three following procedures:

- A. Accidental toxicity
- B. Pharmaceutical toxicity
- C. Occupational toxicity

Accidental toxicity often has food related causes where edibles can be contaminated by plumbum salts. For example, it may point to existence of plumbum in food cans that are soldered by tin or potable water that flow inside plumbum conduits and because of fresh water acidity solve some amounts of plumbum.

Pharmaceutical toxicity is rare and plumbum often is used in producing hair lotions and some ointments and also toothpaste containers. Other acute toxicities of plumbum is occupational toxicity where is one of the important professional diseases and is oldest known toxicities. These cases of toxicities emerge in different forms and each of them has several consequences where could be seen at beginning or as aftermath. Acute consequences are usually shown at the beginning and chronic ones emerge later. Among acute consequences , it may point to changes in tooth gums, plumbum spasm, plumbum rickets, plumbum neurotic aftermaths, neurotic paralysis and anemia. Chronic consequences of plumbum toxicity included plumbum nephritis and disorders in genital system. Acute plumbum toxicities in labors who deal with this metal are very popular but currently, by accurate preventions and observing sanitary principles , these toxicities are less detected. Instead , numerous symptoms of chronic toxicities are reported in habitants of urban districts and specially in children. Some researchers accuse air plumbum for this contamination and believe that one third of daily plumbum intake of peoples in urban districts enters from air into their bodies. Level of plumbum in human body is related to different factors. Children are most vulnerable ones to plumbum contaminations. People's job also is effective in body plumbum level. Furthermore, residence location is an important factor of level of plumbum inside body. For example, plumbum concentration in people who live adjacent to heavy traffic load highways is higher than those who live adjacent to sea. plumbum level also in bodies of people who live in upper levels of buildings next to highways is lower than those who live in lower floors of the same building. Major portion of penetrated lead into human body is discharged by discharging processes and a small portion deposits into body. Level of entered plumbum into body round the clock is 150-400  $\mu$ gr where only 10% of this is absorbed by

Body Most of deposited amount of plumbum in body is available in kidney and liver where indicate discharge of plumbum from these organs<sup>15</sup>.

### **3-6-1-Entry paths of plumbum in to body**

- A. Digestion system
- B. Respiratory system
- C. Skin and mucus

### **3-6-2-Result disease of plumbum exposure:**

- Blindness
- plumbum causes anemia by replacing by iron inside body
- plumbum causes deficiencies in body calcium by aggregating inside bones
- High blood pressure
- Constipation
- Schizophrenia<sup>7</sup>

### **3-6-3-Symptoms of plumbum and zinc oontamination in body:**

- Deformation of VertebralColumn
- Disorders of neural system (Particularly in children and younger kids)
- Malfunction of brain and blood
- Loss of finding direction sense
- Sleeplessness
- Gastric disorders and toxicities
- Muscular pains
- Weight loss
- Dizziness
- Abortion in pregnant women

### **3-6-4- Acute effects of being exposed to plumbum and zinc:**

A- Blood effects: One of the harmful effects of plumbum is occurred on blood and blood generating tissues. plumbum almost inhibits all hemoglobin and globin biosynthesis steps<sup>8</sup>.

B- Neural effects: Early in this century, exposure to plumbum for long periods of time causes weakening effects in muscles and brain diseases in labors. These impacts were ignored for a long time. Today, most of neurologic attentions are related to children. In United States, significant records of blood plumbum from 40 mg/l has been reduced to 25.1 mg/l in 1985.

C- Renal effects : Kidney is main location of discharging absorbed plumbum by human body. Kidney also is one of the systems that affected by toxicity of plumbum. In most cases, inefficiency of kidney due to exposure of this organ to plumbum for a long period of time and resulting destruction of renal tissues is not occurred. However, irreversible destruction of kidney may occur because of long term abundant aggregation of plumbum. Neural tensions also may indicated along with these symptoms.

D- Reproduction related effects : Certain levels of plumbum toxicity may lead to infertility in men and abortion in women. Fetus is capable of toxicity because plumbum can penetrate through fetus wall. If plumbum level in men reach to more than 60-70 mg/l , then number and mobility of sperms decrease.

E- Cancer causing : Recently environmental protection agency (EPA) has assessed potential of plumbum and its compounds as involved factors in cancer generation accurately. International Agency for Research on Cancer (IARC) categorized plumbum in group B2 (Factors that may cause cancer in human) , but this issue is confined to evidence of plumbum phosphate and plumbumacetate<sup>15</sup>.

## **ENVIRONMENT AND WORLD SECURITY:**

One of the contemporary issues of world is environment protection. Environmental catastrophe is not only takes security and peace of human life but also threat life of human beings because of these currently in scientific and political summits ; discussion of environment protection is the most serious and sensitive one <sup>9</sup>.

Nowadays, most of problems and difficulties of environment are not accounted as a local or nation wide issue and regarding mutual and integrated relationship of environment and humanity macro-subjects such as economy, culture, development, politics and its particular issues as geopolitics, ethics , philosophy and spiritual knowledge and many other material and moral aspects of human life , each environmental problem at every size and even confined to contractual territories of a country is actually a problem for whole world and human kind.

Hence, environmental, ecologic along with other factors influence behavioral definition of nations and their behaviors also have their own specified environmental consequences. This mutual correlation provides two aspects of vulnerability and susceptibility amongst human societies. Thus four security approaches may be concluded where each of them has its type of scope to nature:

- 1) Environmental shortages can play roles as a factor of providing instability and fight.
- 2) Efforts for preparing for war or conducting war plumbum to nature corrosion and damage to that.
- 3) Subsidence of nature and its damages would be harmful to health, exploitation and welfare levels of human beings.
- 4) Improvement of nature's position and situation is effective in effective governance.

Each of the four mentioned approaches has its special scope of security where first and fourth approaches have realism of security while consider that as interpretation of release government of threat, two other approaches pay more attention to non-government players. Nonetheless, it seems that sensitive role and position of "environment" has been revealed for all political players and this may be

enough for a new process in order to redefine national security by considering “environmental” remarks. On this basis, it may predict that security studies path pointed to this new focal point in coming years<sup>10</sup>.

Consequences and impacts of environmental changes have not stopped within any physical territory and continue to its developing movement. Not only storms, floods, torrential rains, rain shortages and droughts, effects of ozone layer hole, entry of aerosols, global warming, glaciers melting in north and south poles and elevating level of open seas and ... overlook physical territories of countries and challenge many countries and states who have not any role in emerging of these problems, but in most of times aftermaths and consequences of these events brought much more important challenges (in different social, economic, political and ... aspects) and threat their security, because rush of migrates who flee from their own habitats due to natural disasters or in order to access new living resources to new regions, demolition of farm lands in a region of the world and its consequence of world prices reduction due to increase in demands of certain products, all are affected all aspects of human societies in a chain sequence and influence whole world like dominoes.

In first glance ,damages of ozone layer, global warming or glaciers melting in Hymalia or earth’s poles may have not any relationship with Iran’s political strategic decisions and due to this conception membership of treaties such as Kiyoto treaty and acceptance its confining liabilities and requirements has not any sense, but when global warming leads to intensive climate changes and imposes intolerable hotness to countries and troubles normal life and even impose turmoil and hazard to human life – weakness of ozone layer leads to raise ultra violet beams at hazardous levels and health of people will be severely under threat or rising of open waters of world is threatening port facilities in south of country , then overlooking to above mentioned issues concludes to surprise situation<sup>11</sup>.

## **ENVIRONMENT AND NATIONAL POWER**

National power of every country is resulted of its capability, many important factors get together to develop national power of a country. These factors assessed by different graphs and categorizations under experts views and each of those experts consider involved factors in national power to be important as his/her own view. But it is verified and certain that national power is a set of general important indices of a nation’s abilities where each index have potential to be assessed and categorized. Countries can be comparable in order of their national powers and thus it is important to elevate national power of a country. Furthermore, assessment and identification of threatening factors to national power

also is very important whereas one of the threatening factors may be damaging impacts of environment destruction.

According to conducted assessments of effective factors on national power pertaining different views , three factors have the most imposed abundance percents on national power components.

- A- Population and its quantitative and qualitative features
- B- Quality of leadership, management and quality of administration
- C- Natural resources, raw materials and mines

As it is shown in following Figure, environment is one of the important influencing factors on composing components of national power and able to impose serious hazards to it.

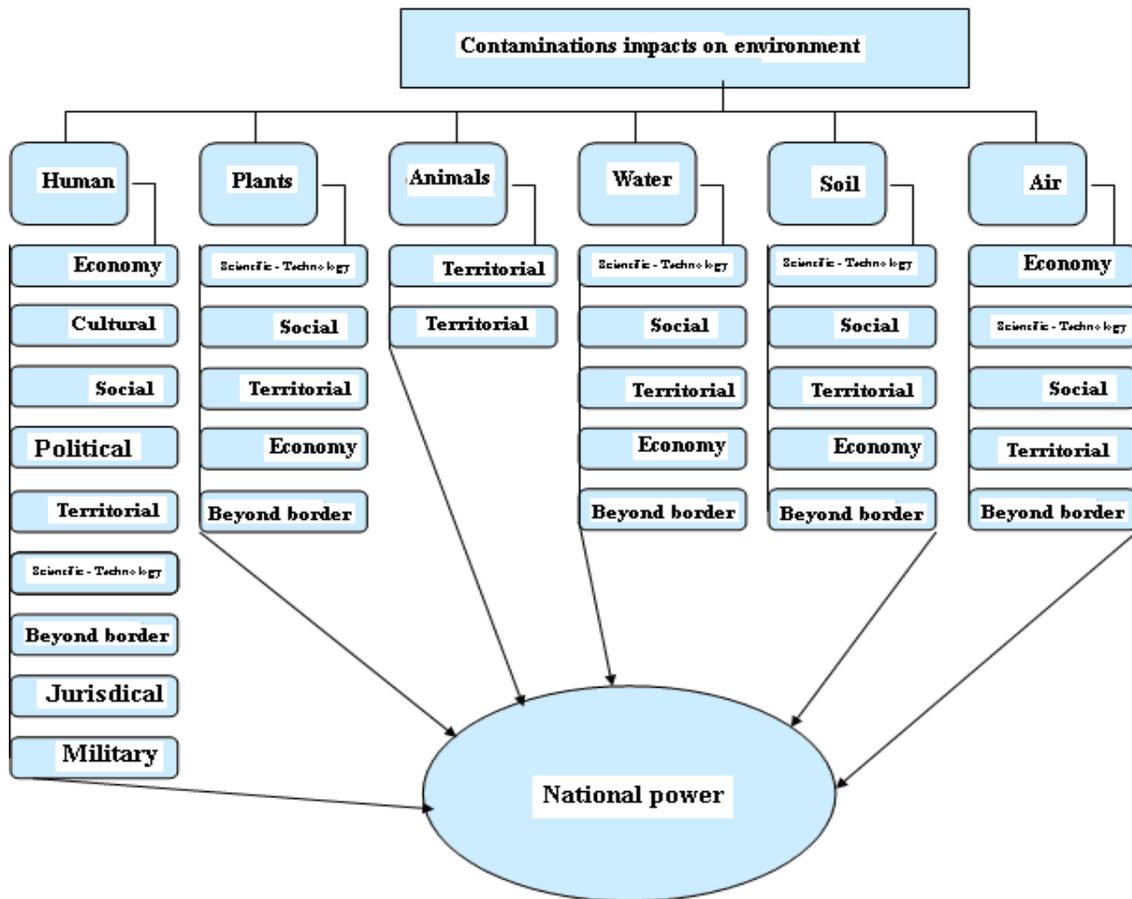


Fig. 4 – Conceptual model of environmental contamination impacts on national power (Source: Authors)

Destructive impacts of heavy metals on human beings who are developers of every country and national power of countries are more than ever depends on peoples may impose robust damages on

national power basis and fundamentals of nation power, security and social bases of every country. As mentioned above, population is one of the most important factors in national power of country and imposing damages on people causes elevations in public health costs and provide destructive economic effects. or in addition to this, by imposing damages on people, also physical and psychological in people, the military index is threatened as well.

Moreover, people can be effective by gross national product regarding scientific technology factor, level of studies as cultural factor, health cost as per individual and mortality regarding social factor and other factors.

In addition to all mentioned cases, level of used fresh water by population of a country as social factor , production index ,food, environment sustainability and water electricity generation as territorial factor, food stuff imports as economy factor, tourists attractions as beyond border factor; all are factors that affected by water, soil, air , animals and plants where if they are threatened by contaminations and this leads to damages for environmental factors and finally national power faces to significant hazards.

## **CONCLUSION**

By proper study of plumbum and zinc industries and growing route of these industries in the today's world, also significant impacts of these industries on environment; it is possible to find a proper and balanced relationship between mentioned industries and nature through provided strategies and reduce threatening risks of environment and nature and extremely hazards to human beings. Furthermore, resulted economic load of reducing contaminations of industries is not unknown for everyone , but it can be concluded by thinking more brightly that through reduction of contaminations and protecting environment it is possible to gain more of nature cycle during continuing years. Environmental contamination can certainly affect national security and national power of countries.

## **PURPOSE OF THIS ARTICLE**

Considering abundance of plumbum and zing industries in Islamic Republic of Iran , particularly in Zanjan province where is a pole of plumbum and zinc production and important impacts of this industry on ecosystem cycle and huge urban population were motivations in writing this article.

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