

## **The Investigation of Heavy metal (Sn-Pb) Concentration in Ground Water Resources and Their Environmental Effects, Case Study: North Chardoly Plain, West of Iran**

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### **Abstract**

*The studied area is located in Kurdistan area, West of Iran and. This region has important role in agricultural economy of Iran. There are two different volcanic activity zones in the above mentioned area. The late phase of these volcanisms as hydrothermal fluid flow is observable as different hot springs in this region. The mixing of the hydrothermal with soil and groundwater caused water resources contamination which leads to occurrence of various human endemic diseases in Chardoly plain.*

**Key words:** *Chardoly plain, groundwater resources, heavy metals, hot spring, pollution.*

### **Introduction**

The studied area with 1050km<sup>2</sup> basin spreading is located in North East of Hamadan city, West of Iran. This area consisting of main parts of Great Chardoly plain (Qorveh, Kurdistan) and a part of little Chardoly plain has important role in agricultural economy of Iran. (Asad Abad, Hamadan). (Figure 1) This plain is limited to Bahar- Asad Abad from S-SW, Sonqor from West, Qorveh from NW and Goltapeh from NE trends. Chardoly plain has the main lithology of this region consists from Jurassic-Triassic metamorphic unites, and Eocene unites.(Figure 2) In addition, we can see gabbro-gabbrodiorite, diorite-granodiorite and syenite in this area. The main Cenozoic volcanic activity in this area has a parallel linear relation with Sanandaj-Sirjan and grate Zagross trust. [1]

The Chardoly aquifer consisted from the erosion productions of the studied area reliefs as a Quaternary aquifer basin. Its spreading is about 389km<sup>2</sup> that 254 km<sup>2</sup> of them is consist of main water tables area. It is consisted from clay, sand, gravel and their particles are showing magmatic, metamorphic, marl and silt. The main part of aquifer basement is formed from metamorphic and igneous rock in southern part, marl-shale in central parts and clay-marl-silt and some igneous rocks in Northern parts.

### **Discussion.**

There are two different volcanic activity zones in already mentioned area :(A)Offshore volcanics, (B)Quaternary volcanic activity.[4] The Quaternary volcanics in this area are

synchronized with final magmatic phase in Iran, which is in fumarolic-desulphurization status.[5] (Figure 3).

The said conditions continued with widespread hydrothermal activities. The latest phases of magmatic differentiation in this area characterized with widespread geothermal activities, the existences of various hot springs, some altered zones and different metallic-nonmetallic mineralization. Various Sn-As-Au mineralization are discernable in all parts of this region that leads to existence of various environmental and health problems for native peoples.

The main water resources of the studied aquifers are meteoric raining, and additionally, various mountainous streams. Based on recent statistical investigations, there are 302 deep well, 767 semi deep well in Chardoly plain, with their average debbies about 23.8 lit./S & 8 lit./S. Additionally 380 wells with 1.6 lit./S average debbies and 54 subterranean canal with about 1.9 lit./S debbies are reported from Chardoly plain.

The main aim of this work is the investigation of Pb-Sb concentration in Chardoly plain and its comparison with known standards. For this reason, 14 water samples are taking from different parts of Chardoly plain. After sample preparing processes, they analyzed with Atomic Absorption Spectrometry (AAS) method. The analysis results honesty are assayed with EZ-Test-Kitt in field and Silver Diethyl Ditch Carbonate Spectrometric method (SDDC) in laboratory works.

Antimony is one of the heavy metals that have a main role in water resources pollution in this area. For example 300 ppb concentration of this metal in Baba-Gör-Gör hot spring that located at SE of Bijar. (Figure: 4). [2]. The presence of antimony ion in soils causes to plants contamination. Maximum occurrence of Sn in environment should be less than 5-10mgr/lit. (Figure: 5).

Lead, another heavy metal is abundant pollutant factor in water resources of this area. While the maximum amount of lead in water resources should be 100ppb, the existence of 340ppb in Pir-Saleh area and 300ppb in Baba-Gör-Gör hot spring is the main factor of water pollution in the studied area. Lead as a toxic element result to nervous system, anemia, poisoning and dead. Maximum presence of lead in soils is less than 0.1ppm. [3] (Figure: 6).

The environmental pollution in studied area is a natural process and has not an anthropogenic origin, because it is depended from geological characteristics of mentioned area.

The Qorveh-Bijar and Chardoly people are under water toxicity threat. The mixing of hydrothermal fluids and ground waters caused to occurrence of toxicity with heavy metals and metalloids and their following diseases for native peoples. The lead and antimony are the main threat factors in Qorveh-Bijar-Chardoly regions water resources toxicity. The rate of these metals is higher than standard limit in PirSaleh and Baba Gör-Gör hot springs.

## **Conclusion**

The existence of various endemic diseases epidemics in Kurdistan area depended on water resources pollution with heavy metals and metalloids. In this case, the main factors for water contamination are antimony, lead and arsenic.

The young magmatism related geothermal – hydrothermal activity is affected in concentration of heavy metals in ground waters. Lead and antimony are the dangerous elements in studied area and there are high amount of them in PirSaleh and Baba Gör-Gör hot springs.

## References

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Figure 1: -The Studied area and its location on Iran map.

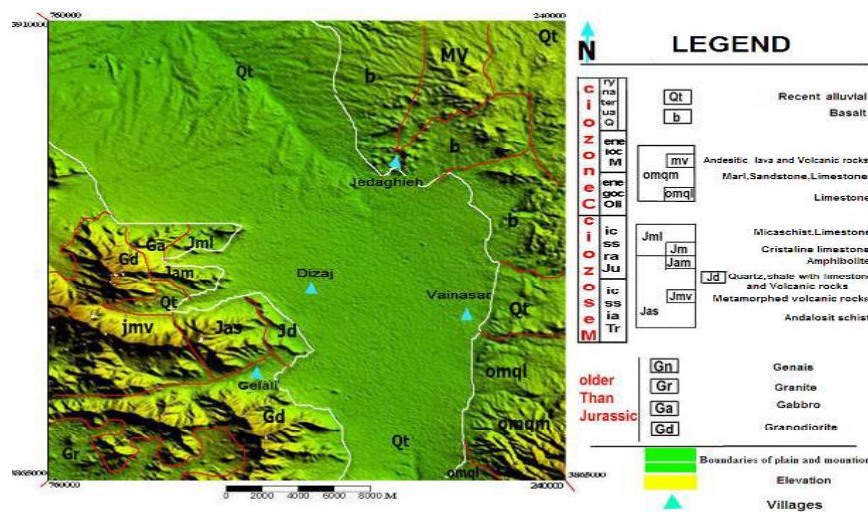


Figure 2: Landsat image of studied area and lithology separation on it. [2]

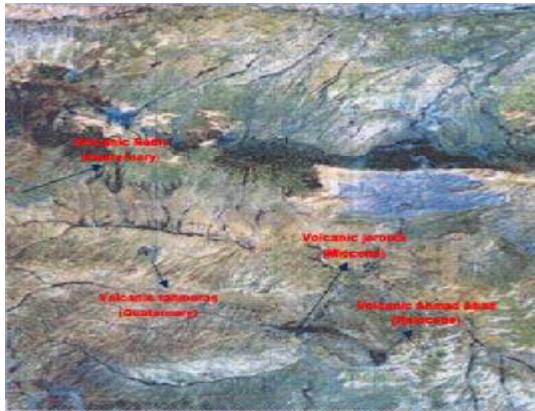


Figure 3: Volcanoes of studied area.



Figure 4: Babagörgör hot spring in Qorveh area.

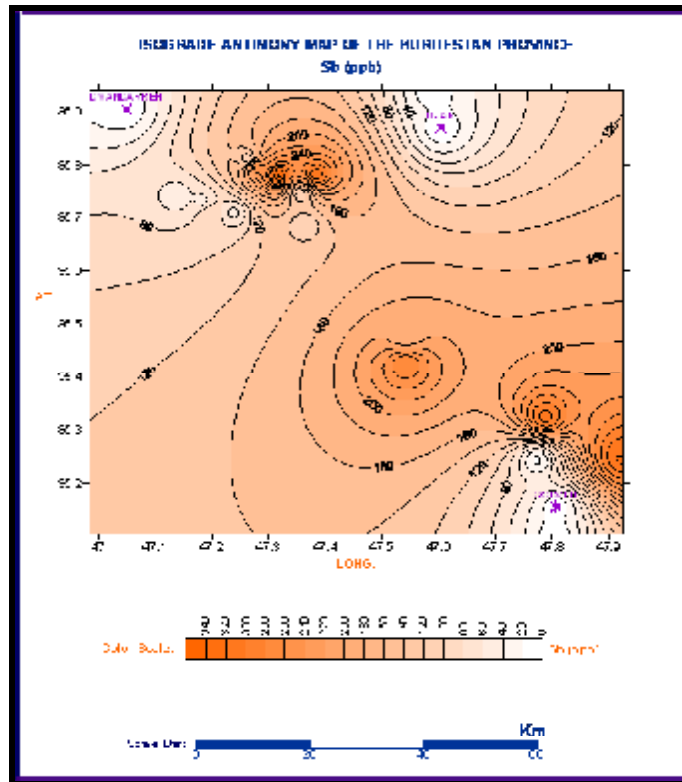


Figure 5: Spreading of Sb contamination in Qorveh- Bijar area. [6]

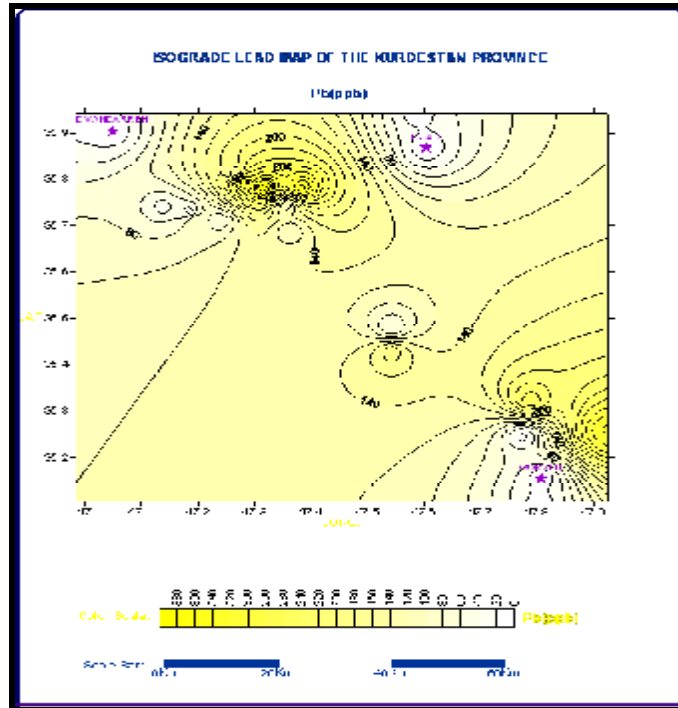


Figure 6: Spreading of Pb contamination in Qorveh- Bijar area. [6]