# An Investigation the Results of ME-MS81D Tests on Clay Lenses of Asmari Formation

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## Abstract

*One of the most common Analysis Methods of Major and Minor Elements in Rock and Sediment Samples is x-ray Fluorescence (XRF).The Most Important Limitation of This Method Is High Detection Limit In Normal Condition Is about 100 PPM. To Solve This Problem the More Developed Techniques with Lower Detection Limit Should Be Used. We Can Point To ICP-MS And ICP-AES Methods As Some Examples. In Order To Analyze Elements in Clay Lenses of ASMARI Formation Located In the Right Side Base IN SHAHID ABBASPOUR Dam, Sampling Was Performed and This Analysis, By ALSCHEMEX Laboratory Group, Was Send To Canada. In The Used Analysis Method That Is A Combination Method Called ME-MS81D, For The First Time 38 Trace Elements Using The ICP-MS And Also 14 Major and Minor Elements As Oxide Using The ICP-AES, Analyzed In The Range Of Study. Finally The Results Of These Experiments To Sedimentary Tracing Operations Of SABZAB Spring Located In the Right Side Base Of The Mentioned Dam Were Used And Also The Were Compared With Results Of XRD Experiments By Khuzestan Water & Power Authority, And Hydraulic relationship Of Spring With The Dam Reservoir Was Investigated.*

**Key Word**: *XRF – XRD – ICPMS – ICPAES – Clay Lenses – Detection Limit.*

## Introduction

Sabzab Karstic spring is located at the right abutment of S. abbaspour dam. So a lot of studies have been done parallel with the dam structural studies. Changes in turbidity of the Karstic spring have made this question that, is this turbidity because of the relationship between the spring and dam reservoir or because of physical erosion of right abutment or is that related with the spring basin. Every one of these factors can be important in making danger for dam stability. For answering these questions the spring should be detected. To receive this purpose different methods and different kinds of tracers can be used. Tracers can be divided in different groups based on measurement methods such as Isotope tracers, color measuring tracers and sediment tracers. In this study sediment tracers have been used. In this method at the first step XRF experiments should come off with the samples. And hydraulic relationship between spring and reservoir was characterized after comparing the results of experiments and interpreting the Clay samples of Asmari formation with the other samples in sediment tracing experiments.

## Geographical situation of studied field

S. Abbaspour dam is one of the largest concrete dams in Iran that is located at the southwest of Iran in Khuzestan state. It is located as 210Km far from northeast of Ahwaz and 55Km

from northeast of Msjed Soleman and 490Km from Stuary of Karun river in a place called Bard Ghomchi of Andika division on Karun river. S. Abbaspour dam is built on the Asmari formation at the south crest of Kamarun anticline as the SABZ AB Karstic spring with UTM of 360000 to 385000 ME and 3535000 to 3560000 MN and 10 CMS discharge is situated at the right abutment of dam. The studying field is related to Ahwaz by the Ahwaz-Masjed Soleyman asphalt road and it is 190Km far from Ahwaz.

**Geology of studying field**

The studying field is located on the Komaroun anticline and this anticline is situated on one of the main Geological and structural units of Iran called Zagros zone. This zone is consist of complex of anticlines and centerlines. In the Komaroun anticline there are of different formations made of Carbonate, Marl, subversion and evaporation. These formations are related since Saint Oligocene to present age and they are consist of Asmaei, Gachsaran, Mishan, Aghajari, Lahberi, Bakhtyari konglomera and present Hypothesis according to age. Based on studies right abutment of dam is located on the Asmari formation and SABZ AB spring basin is situated on the Aghajari and Gachsaran formations.

Morphology of the zone is depended on structure and lithology. Asmary formation is consist of cream and brown layers. There are hursh and swell stones in this formation and it forms hard parts of Zagros zone(Darvishzadeh,1370). Gachsaran and Aghajari formations unlike Asmari formation form the low elevation parts of Komaroun anticline.

**Methods**

Now adays geochemical analysis methods have been progressed for studying (Adabi1383). One of these methods is to separation the formations(Abarghani ،1379 ؛ Adabi& Abarghani 1380),separation the formation borders (Adabi & Mirab shabestari,1380)) 1992 ،Derry et al. ؛ 1992، Brasier et al. ؛ 1995 ، Kaufman and Knoll ؛ 1995 ،Iyer et al. ؛1997 ،Adabi).

Totally 9 samples where taken from SABZ AB sediment, dam reservoir, right abutment of dam(asmary formation) and the spring basin(Gachsaran and Aghajari formations) and finally 6 samples where selected for experiments.

Before the experiments, samples where under the preparation process such as drying, jabbing, dividing, softening and sieving.

Selected method for this research is a compilational method which is called ME-MS81D. In this complex method which is used by ALSCHEMEX laboratory group in Canada, there are two steps of analysis on the samples. At the first step 38 rare elements based on PPM by using ICP-MS and at the second step 14 main and secondary elements in case of oxide based on percent by using ICP-AES will be analyzed. After preparation, the results for different samples will be analyzed (Table1) and finally based on existed information, source of turbidity of SABZ AB spring will be characterized.

**Results and suggestions**

According to the results amount of analyzed elements and oxides in the sample of abutment is more than same factors in the sample of spring basin and they are more than same factors in the sample of spring. This situation can be analyzed as sediment in the basin (Gachsaran and Aghajari formations) enters the SABZ AB spring at the upstream from underground canals

and small springs and this turbid water depended on the slow slope moves to downstream (abutment).

There is an unanimity between results of XRD experiments and analysis of this research. Based on XRD experiments abutment is the source of turbidity and in the analysis of this research a complex of spring basin and abutment as a connected system is the main proof of turbidity.

**Special thanks**

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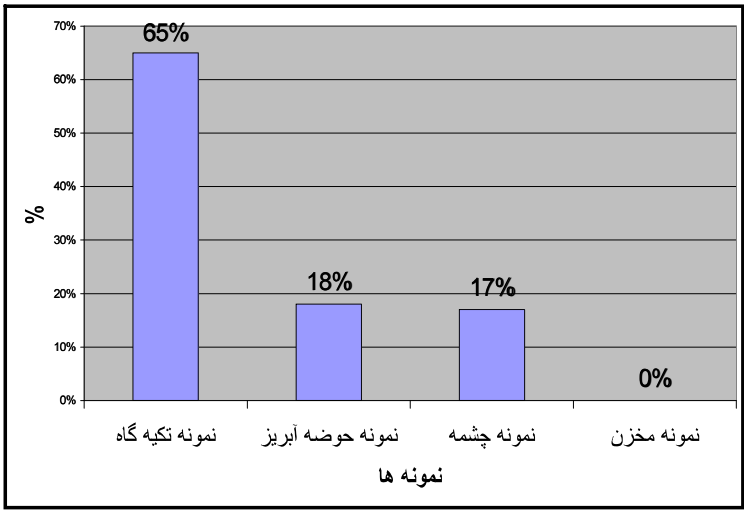
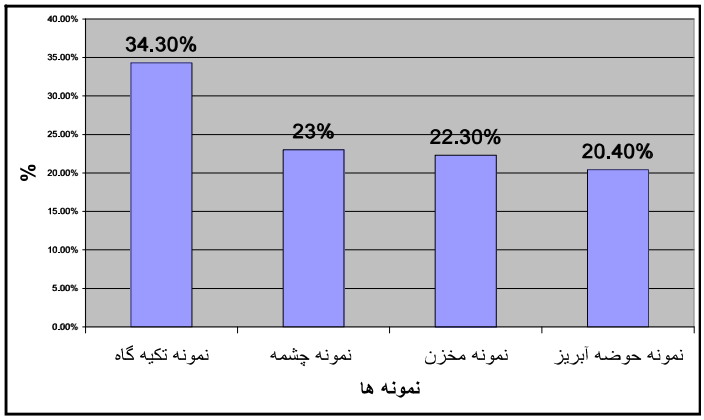
**Table1-Results of analysis of samples by ME-MS81D**

| Elements & Oxides | Samples | | | Elements & Oxides | Samples | | |
|---|---|---|---|---|---|---|---|
| | Dam abutment | Dam reservoir | SABZ Ab spring | | Dam abutment | Dam reservoir | SABZ Ab spring |
| **Ag** | <1 | <1 | <1 | **Ta** | 0.8 | 0.5 | 0.5 |
| **Ba** | 164.0 | 198.5 | 232 | **Tb** | 0.60 | 0.38 | 0.39 |
| **Ce** | 41.3 | 28.0 | 27.3 | **Th** | 6.12 | 4.04 | 3.98 |
| **Co** | 12.6 | 13.5 | 13.4 | **Ti** | <0.5 | <0.5 | <0.5 |
| **Cr** | 310 | 160 | 150 | **Tm** | 0.31 | 0.20 | 0.20 |
| **Cs** | 9.90 | 5.29 | 4.60 | **U** | 3.77 | 2.47 | 2.52 |
| **Cu** | 34 | 36 | 54 | **V** | 93 | 88 | 81 |
| **Dy** | 3.65 | 2.28 | 2.23 | **W** | 2 | 2 | 1 |
| **Er** | 2.22 | 1.42 | 1.35 | **Y** | 20.1 | 13.3 | 12.9 |
| **Eu** | 0.98 | 0.69 | 0.64 | **Yb** | 1.99 | 1.26 | 1.18 |
| **Ga** | 10.1 | 7.8 | 7.0 | **Zn** | 81 | 71 | 152 |
| **Gd** | 4.19 | 2.76 | 2.72 | **Zr** | 223 | 89 | 91 |
| **Hf** | 6.3 | 2.4 | 2.6 | **$Sio_2$** | 39.7 | 26.8 | 22.4 |
| **Ho** | 0.69 | 0.47 | 0.47 | **$Al_2o_3$** | 7.92 | 6.04 | 5.46 |
| **La** | 20.8 | 14.6 | 13.7 | **$Fe_2o_3$** | 3.45 | 3.41 | 3.77 |
| **Lu** | 0.32 | 0.20 | 0.21 | **Cao** | 15.58 | 27.6 | 30.6 |
| **Mo** | 2 | 2 | 2 | **Mgo** | 7.44 | 5.07 | 5.09 |
| **Nb** | 10.3 | 6.9 | 6.4 | **$Na_2o$** | 0.67 | 0.35 | 0.32 |
| **Nd** | 18.0 | 12.1 | 12.0 | **$K_2o$** | 1.78 | 1.10 | 0.99 |
| **Ni** | 87 | 81 | 76 | **$Cr_2o_3$** | 0.05 | 0.02 | 0.02 |
| **Pb** | 11 | 26 | 38 | **$Tio_2$** | 0.59 | 0.39 | 0.37 |
| **Pr** | 4.78 | 3.30 | 3.15 | **Mno** | 0.06 | 0.17 | 0.19 |
| **Rb** | 52.6 | 37.4 | 33.7 | **$P_2o_5$** | 0.19 | 0.13 | 0.13 |
| **Sm** | 3.45 | 2.35 | 2.45 | **Sro** | 0.03 | 0.06 | 0.11 |
| **Sn** | 2 | 1 | 2 | **Bao** | 0.02 | 0.02 | 0.02 |
| **Sr** | 222 | 508 | 864 | **Loi** | 22.3 | 28.7 | 30.9 |




**Picture1- percent of elements and oxide in different samples**




**Picture2- Proccess of abutment,spring, reservoir and basin in uranium**