Studying of Hydro geological and Sedimentary tracing in the Sabzab Spring based on right abutment stability effects (S. Abbaspour Dam)

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Abstract

*Study and control interactive behavior the karstic spring which is available in the dam reservoir in order to identity of relation between them with stability of dam body is very important. One of problem relate to karstic spring in dams is water escaping and erosion of mainstay structure. In this research in order to study reasons of muddle water of Sabzab spring on the right hand of S. Abbaspour dam, sedimentary searching method has selected. Sedimentary detection using **XRD** tests over dam reservoir, formation of Cheshmeh catchment, structure. Also in the following study; Hydrochemistry tests, drawing conductivity (EC), temperature, variation of water level (W,L) & turbidity (Muddling) for years of 2002 until 2006 in place of big spring, two main spring MP1, MP2, dam reservoir & river in exit of dam (TAIL, WATER) have done. After this pragmatism, spring source discharge will determine with clay water. This karstic spring doesn't have any hydraulic relation with reservoir. Spring Sediment will be increased through limestone formation layers at some month of years.*

Key words:

1) introduction:

S. Abbaspour dam is located in 210 km distance of the north east of Ahwaz city, & 55 Km north east of Masjed soleman city & in 490 Km from Karun river. Building of this dam started at 1969 to 1355 complete and dam reservoir will be started. This dam from type concreate dam of height 200 meter from base & useful capacity 1446 meter cubic million & total volume 3139 meter cubic million. Length of dam crown is 380 meter too.

By extended Demarton classification, S. Abbaspour dam is located in arid zone. Dam body on the calcite Asmari formation in the south crest of Kamaron is located. Karstic spring Sabzab with discharge 15 CMS over second in right base of this dam is located. This spring in the one of right base gallery of dam is spring of two main branch: MP1, MP2. Showing spring in exit of dam to river (Tail Water) is located. In order to tracing there is various types of method. As a result we can divide tracers to the several groups: isotope tracer, colorimetric tracer, sedimentary tracer and so on.

In this research has been used from sentimental searching method that introduction of this is study of tests XRD over derived sampling. After comparing result of tests & interpreting clay samples of Asmari formation with other under test samples of sedimentary tracer. Finding originates & hydraulic relation spring with dam reservoir has been studied.

2) argument:

2-1) sedimentary tracing:

In order to know minerals with using off Diffract metric x-ray, electric that is located in the electromagnetic field with frequently those equal fields frequently is. One ray off x-ray can one electromagnetic that passes from space, due to all electrons to will vibration. As a result; every electron can one tolerance that electromagnetic. This ways separate join together and two ways consequent coatome comprise. Amplitude way depend on numbers of electron way and deference phase interactive. When one ray of X-rays, in one of crystal network penetrates, one ray only in spatial directions. Of course it needs that descatered ways by individual atom in observe direct with together, usually in order to make easy, crystal network as a collection of parallel surface that to **d** distance from together. Imagine that all the atoms in this surface is located. Environment needed for.

In this research, first of all Asmari formation litology with use off geology map of area & several visiting desert field is study & a given place for clay sampling including: reservoir semimetal, right hand.

Over XRD test mineral of Mika, Chlorite, Montmorylonayt, ilit, polygorskit in samples & for first time mineral of polygorskit in Asmari formation & clay of Sabzab spring identify & as a tracer for tracing of Sabzab spring, used.

2-2-hydrochemical studies

to complete studying of tracking studies and to be sure from achieved results, hydro chemical studies and examining of conductivity, temperature, fluctuation of W.L. and turbidity had done so finally this results compared with sedimentary results. For doing hydro chemical studies of big spring, prepared samples in 2 steps from right abutments galleries,mp1, mp2 and exit point of big spring, reservoir and tail water and case study of one drain in the galleries. These samples were prepared on feb-mar 2006 and apr 2006.

in these samples, main materials(ca,mg,na,k,cl,so4,no3 ,bi-carbonate)and all of salts in lab, were calculated. Temperature, electrical conduct and turbidity parameters, continuously were measured by dam stability experts.

To analysis, compare and get more reliable results, newer tests were done on only exit point results on Sep- Oct 1988 and were prepared graphs.

Prepared graphs include Radial, Stif, Durov, Piper, Scholer that their interpretations have been done. By using Piper graph, you can distinguish type of water.

Figure 5, show chemical analysis results of all types of water on Piper graph. Piper graph shows chemical characteristics of water by relative density of particles, not by absolute density and can show so many samples on the one diagram. Piper graph, divided by 3 separate fields, so show percentage of anions and cations in triangle fields and composite positions in lozenge field.

As you see on Piper graph, gathered samples on 2005, are divided two groups. Gathered samples from exit point of big spring, mp1, mp2 show different results of sulphate related to other samples and their positions in Piper graph, show this difference well. Reason of this difference is SO4 values in water of big spring in Gachsaran formation, before entrance to Asmari formation.

This is important reason to discontinuously connect between big spring and S. Abbaspour reservoir. according to Piper graph, gathered water samples from exit point of big spring, mp1,mp2 have more than 50% carbonate and on the other hand, soil-alkaline and weak acid are powerful.

In the drain, tail water samples, none of Anion- Cation couple can pass to 50%. refer to drawing graph for Mehr 67 samples, type of water of big spring,mp2 are similar to each other and are different from tail water. Therefore, Piper graphs related to gathered samples, in different times, include difference of type of water and difference of water supply gathered from reservoir and drain, tail water with water of big spring, mp2,mp1. for presenting of perfect description from analysis results of gathered samples, Durov graphs(graph no.6), are going to evaluate the same time, ion relatives with all of solution solids density and ph of used water samples. As was seen, in Durov graph, analysis results and interpretations, confirm Piper graph.

Refer to TDS fluctuations, samples belonged to exit point of Big Spring, mp1, mp2, accurately are similar to each other and have the least value of TDS (330).

Only one sample has max TDS value. This matter, has a direct connections to rain and flood discharge parameters. Another important point is, this graph has a big similar of ph between mp1, mp2 samples and exit point of spring. In Durov no.6 graph,by TDS difference, samples belong to exit point of spring, mp1, mp2, have the same value and have max value of TDS (304). Another point of this graph is big similarity of ph between mp1,mp2 and exit point of spring. So their ph is 7.5. in Durov graph, drawn for 1367 samples, refer to TDS difference ,samples belong to mp2, big spring, have almost the same value and have TDS about 365-370. as was seen, Durov graph in each graph, confirm results of analysis and Piper graph interpretations. So, results from this graph, confirm difference of water supply gathered from reservoir and drain water, tail water with big spring, mp1, mp2 water .

For examining and showing of ability of water usage and also for showing hydro chemical connection and presenting of mix models, Scholer graph was drawn. Scholer graphs show clear waters with CA-Mg type. Important point in this graph is increasing sulphate ion in gathered samples from spring and also increasing cl ion in samples gathered from reservoir. it's possible to see clearly above point in all time of gathering sample.

Stif and Radial graphs were drawn for all samples and all times of sampling. These graphs like other hydro chemical graphs, show differences, especially CL ion and sulphate in samples belong to spring and gathered samples from reservoir and rivers. As said before, hydrochemistry studies show clearly passing water from Gachsaran formation in spring field before entrance to Asmari formation. So hydrochemistry confirm results of studies in hydrology and it's connection with spring parameters.

2-3- study of hydrochemistry and hydrologic parameters

one of the most effective hydrologic parameters for analyzing of spring parameters is the rain. Variation of raining was examined versus variation of turbidity and tail water. Based on area and drought and wet regims in recent years, rain variation graph of S. Abbaspour dam has been drawn (Fig .7). Conductivity parameter (EC) is one of the elements were examined in hydrochemistry studies. Adjustment of mp1, mp2 and big spring in field (500 ± 5) in graph of this entire studies span is clear. This parameter is evaluable with small decrease and unadjusted in reservoir & tail water. Variation of reservoir and tail water is similar to each other and as was said before, there is unadjusted with mp1, mp2 &big spring. Results of next years of this parameter are completely similar to 2002. Also, variation of EC, TDS and temperature in 2002 to 2006 were compared.

It's clear that, this analysis will be determined with other parameters and track studies and watery regime of spring and dam reservoir and probable connection will be examined. Refer to special face of spring in the way, H.W., turbidity, conductivity and temperature in all exit point of big spring, mp1, mp2, dam reservoir and tail water were drawn and evaluated. Graphs that are below, present position of hydrochemistry and hydrological parameters for years 2002 to 2006.Fig.8 shows variations of H.W. in mp1, mp2 and tail water in 2002.

This variations of elevation is from 372 to 373 so that, this variations are completely similar to each other and this adjustment is fully similar to variation of elevation in big spring. For example, variation of big spring is similar to fluctuation of 371 to 372 m. it's necessary to say, variation of elevation in mp1 and mp2 and big spring were similar to each other but there is not any proportion with reservoir and elevation in river or tail water. Variation of elevation in this period is 375. Elevations in 2003 are fully similar to 2002 and there is only about 1m falling especially in reservoir elevation that is belonging to reduction of raining. Results In 2004 and 2005 are similar to 2002. Another parameter is temperature. By viewing variation of temperature in above places and mentioned years, shows suitable adjusting between variations of temperature in mp1, mp2 and big spring with $20 \pm 2^{\circ c}$. But variation of temperature with reservoir and tail water is different (variation after $10 - 30^{\circ c}$) Fig.9 in years 2003 to 2005 , we can see too.

Third parameter is EC. Fig. no.10 shows full adjustment with mp1,mp2 and big spring $((500 \pm 50)$.

Variation of reservoir and tail water is similar to each other and there is not proportion with mp1,mp2 and big spring. Next years are fully similar to 2002.

4th parameter is turbidity. Variation of turbidity show 3 step of peak in mp1, mp2 and big spring that is fully similar to each other. Max peak is 400 PPM on apr.2002. There is not turbidity in reservoir and turbidity of tail water is coming from entrance of big spring (Fig. no.11) on year 2003, only big peak on March and April can see in all vision except of reservoir from 100ppm in mp2 to 150ppm in mp1 and 350 PPM in big spring . In next years, there is not proportion between reservoir and tail water.

Rain graph shows frequently peaks in Dec in watery year. Max peak in Dec 2002-2003 equals 350mm. usually turbidity peak is proportion with elevation increasing that means rain in field. Therefore can result: increasing of discharge with delay after increasing H.W. and starting turbidity, show that water stay in way from first point to exit point.

3- Results

1) in XRD test on samples, inside clay samples of Asmari formation (abutment),clayey mineral , chlorite, montmorilonite and polygorskit were defined .

According to polygorskit mineral is very sensitive structurally, and with small temperature variation and pressure, converts to other clay minerals, in short period, place could be reliable.

2) There is polygorskit mineral only in samples of Asmari formation and big spring.

The results confirm exactly source of spring clay and denied hydraulic connection with reservoirs.

3) according to hydrochemical graphs includes Piper, Scholer,Durov, Stiff and radial, there is difference in sulphate ion and chlor between big spring , mp1,mp2 with reservoir and tail

water. Its reason is in source of these waters. Water of big spring has more sulphate ion. This point cause's separation in samples belongs to spring in all period. That it is strong reason to confirm hydraulic disconnection between big spring and reservoir.

4) Examination of graph of head water variation in mp1, mp2 and exit point of Big Spring in all periods 2002 to 2006, show isotropic fluctuations, so, this fluctuation doesn't have any proportion with reservoir.

5) Examination of rain variation graph in S. Abbaspour station as a source station shows peaks in raining hydrograph with a travel time and created by a delay in exit point of spring, so show in influence of raining in spring field.

6) Variation of temperature graphs in mentioned years, show there is good proportion between variation of temperature in mp1, mp2& big spring(2-20) , but this variations don't have adjustment with variation of temperature in reservoir and tail water $(10-3^{\circ c})$

7) Based on graphs, examination of EC parameter, show there is good proportion in mp1, mp2 &big spring. But this parameter had difficult variation in reservoir and tail water.

8) According to examination on turbidity variations show that peaks in mp1, mp2,big spring have a good proportion and there are not this peaks in exit point of reservoir and tail water. It's necessary to say, peaks of turbidity have a proportion with increasing H.W. and show rain in field. But in spring, increasing of discharge starts with a delay after increasing H.W. and turbidity that means period of water stay in the way from source to exit.

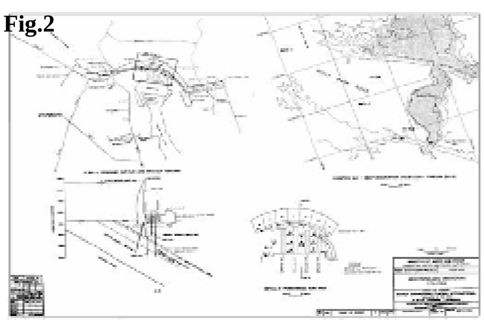
4-Acknowledgment

We appreciate Mr. Shahroei, manager of research and standard of KWPA.

5- Refrences:

1-liquidation phenomenon and role of clays in spreading of Karst on operation of reserving dams, M.H Ghobadi , 5th congress of Iranian geological society,1380

2-Khak Zad, Ahmad, Ramazani, Gahandar, introducing to knowledge of materials by using Difrectometry of X-ray, Gahad Daneshgahi of shahid Beheshti university , 1368



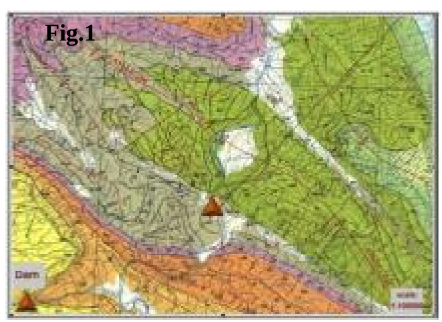
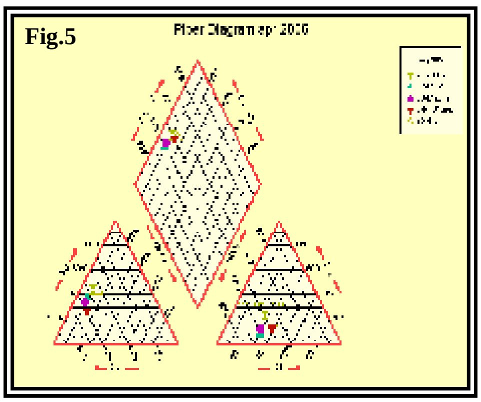


fig.1: map of geology in limit of case study and dam position and fig.2:position of green spring related to lake and body of S. Abbaspour

Fig.3 : view of sample gathering in mp1 place, abutment of dam . fig.4: view of turbidity of green spring at exit point



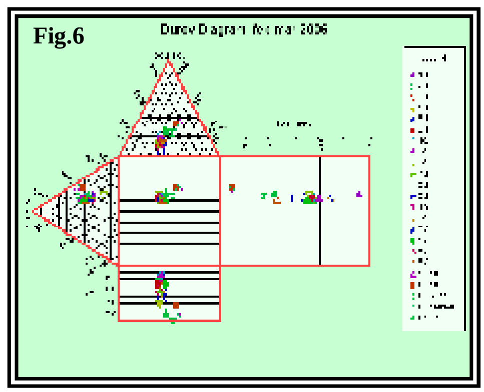


Fig.5: sample of piper graph on Farvardin 84 . fig 6: sample of Durov .Farvardin 84

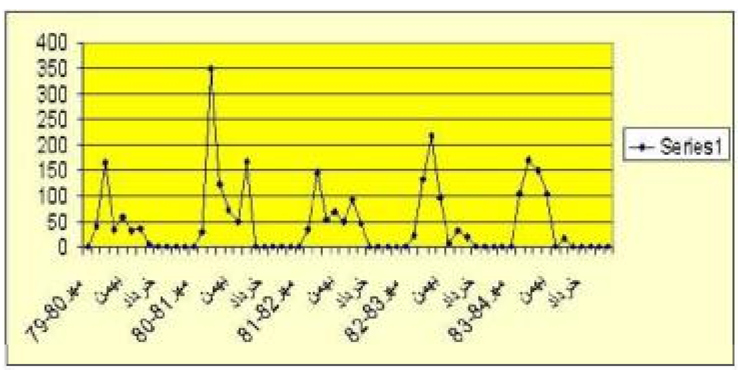
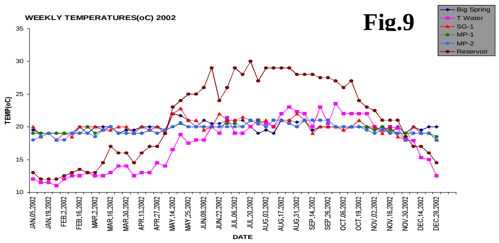


Fig.7: graph of raining variation on Shahid Abbaspour dam station



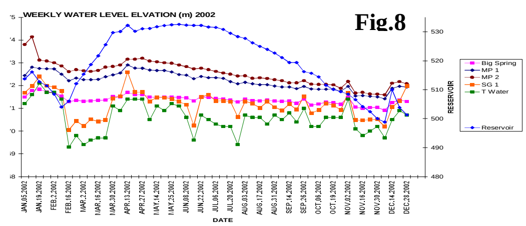
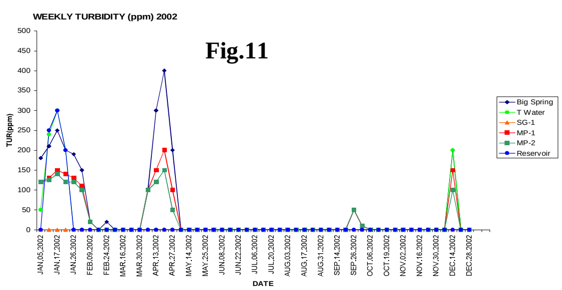


Fig.8: variation of L.L in positions: reservoir, exit point , mp1,mp2,tail water (year 2002)

Fig.9: variation of temperature in positions: reservoir, exit point , mp1,mp2,tail water (year 2002)



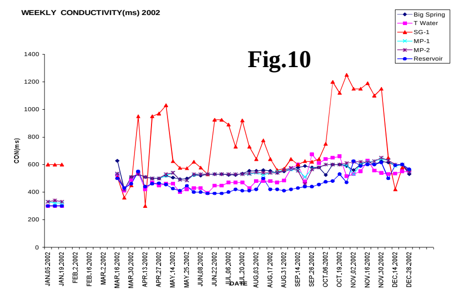


Fig.10: graph of variation of conductivity in selected positions (year 2002)

Fig.11: graph of variation of turbidity in selected positions (year 2002)