



Suction Flow Control Device in new constructed water wells

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April 1998

Well construction entails five distinct processes .The drilling operation, casing installation, well screen installation, gravel placing (gravel packing), and developing the well to ensure sand free operation at maximum yield.(When dealing with wells drilled in unconsolidated formations).

No matter which drilling method is selected ,it is of great important to take whatever time is needed for obtaining all required information .Samples should be collected at regular intervals ,a record of the formations encountered should be maintained when the hole is drilled.

Selected formation samples should be mechanically analyzed for grain size distribution, grain size distribution curves should then be prepared to identify compositional differences in the aquifer and gravel packing evaluations , as well as well screens slot openings.

The drilling department of Mekorot Water Company Ltd , among their other activities ,the department is involved also in searching ways to improve well construction methods and performance by means of reducing effects responsible for wells deterioration caused by the clogging of well screens because of chemical and/or biological reasons ,sand pumping , as well as aspects which are related to ways of improving well performance by means of reducing well losses .

For the last three years Mekorot is using in some of well's rehabilitation projects, where sand pumping is encountered an innovation brought by a Belgian company EUFOR International S.A. called Euacastream, Suction Flow Control Device , which reduces the problem of sand pumping.

The essence of the system installed in wells is to equalize the inflows (uniform ,low and horizontal velocities) over the total length of the active screen section. The installation of the S.F.C.D improves of the flow conditions in the well and allows to maximize flow rates with satisfactory conditions of production: Sand and turbidities will be eliminated or strongly reduced ; biofouling encrustation so far as existing will be retarded (slowing down and dispersing of clogging effect):life span of the well will be increased , maintenance costs will be reduced.



The use of the Suction Flow Control Device was experienced in more than 15 rehabilitation jobs, in wells where sand pumping enabled to use those wells for water supply. The results from those rehabilitation jobs were satisfactory in most cases, in some wells the sand in the water almost disappeared, in others wells the amount of sand was significantly reduced.

Considering the knowledge gained, experience and all written literature that deals with the S.F.C.D, Mekorot went one step further, and made use of the S.F.C.D. as a part of the basic design and construction of new drilled well.

In a new water well field, 8 wells were designed, constructed and completed with accordance to the regular standards and specifications for drilling wells in unconsolidated formations, especially all specifications and standards and calculations for screens and gravel pack selection.

The 8 wells were screened with 10 " Johnson screens, slot no 20-40 and packed with quartzitic gravel 0.8-1.2 & 1.5-2.5 mm respectively. The ninth well in this project, was drilled in the same manner as the others, the reverse circulation method, samples were collected for sieve analyses (see attached). Keeping in mind the use of the S.F.C.D. the well was screened with 12" Johnson screen slot no 60, and gravel packed with 2.5-4.5 mm quartzitic gravel. From precaution point of view, as it is the first test case, larger dimensions were not taken.

All data needed for the S.F.C.D. to be designed for this specific well were collected and sent with accordance to a detailed questionnaire given by the Belgian company.

The S.F.C.D that was designed and manufactured for the well, was installed in the well, in the same procedure like as it was in the rehabilitation works, it was the final work to be done in the well. After all drilling works were completed, a turbine pump was installed for well developing and testing.

The procedures for developing the well were carried out as standards are specifying for developing wells in unconsolidated aquifers, after the developing was completed, the well was tested to its maximum yield of 160 m³/h. The water extracted from the well were totally free of sand and turbidities. There was no significant difference between all the other wells and this one, concerning the yield, and other hydrogeological parameters.

Conclusions :

In respect to the above the following points should be considered :

1. Very few wells were drilled in such construction with the S.F.C.D as a part of well completion, so not much information and articles are.



2. In spite of the large screen slots width and big gravel size , the pumped water were clear from sand and other turbidities.
3. The expectations to get better hydraulic performances did not come into expression , in spite of the well construction, the 'b' value in the step drawdown test , appears to be higher than expected , for reasons yet unexplained.
4. During the developing stages, the specific capacity raise from 7.5 m³/h\m to 12.7 m³/h\m. Such high magnitude in rising of the specific capacity is unknown in other wells in the field.
5. The use of large screens openings and large gravel size have an effect on the cost , and life span of the well , for reasons mentioned earlier.
6. Finally , "One swallow dose not make a spring " , much more studies and tests should be done to investigating and learn this new approach ,to enable the implementation of the Suction Flow Device Control .

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