

Radiated Disi

*The \$1 billion Disi Water Conveyance Project was launched in July, intended to pump 100 million cubic meters of water to Amman annually, and seemingly resolving Jordan's short-term water shortages. However, the project has been surrounded by controversy after independent studies found the water to contain high concentrations of radiation. **Tarek Abu Dehays**, CEO of Aquatreat and a leading water-treatment specialist, explains to **Jordan Business** how grave the radiation problem really is, why the studies' results are not definitive and what needs to be done to keep the water safe.*



Q There have been various projections about how much water Disi will actually hold and how long the water will last. What is your professional opinion?

A: The official contract states 100 million cubic meters per year. Today, to the best of my knowledge, they haven't reached that point, but rather about 50% of that. Will they be able to reach it? It is too early to tell. They have finished most of the drilling, but there is a lot of finishing, testing and connecting of the wells still to be done.

Q: How long do you think the water will be available to supply the Kingdom?

A: There are various studies with different predictions. However, the first study that was done for Disi, which goes back to 1985, projected 50 to 100 years, but since then Saudis have been pumping a lot of extra water, about 1.5 to two times more than Jordan has. I don't think anyone can give an exact prediction on how long the water will last. You have to remember that Disi, at the end of the day, only supplies a partial need of Jordan, to make up for the deficit of the water. Disi is also meant to relieve the stress from other areas across the Kingdom because water going to Amman has been sourced from all area in Jordan, so now they can return the water to those places. I would say Disi currently provides less than 10% of Jordan's water needs; of course, with the influx of refugees, we definitely have an increased need.

Q: Do the predictions forecasting how long the water will last take into consideration population increases or potential sudden influxes like we are seeing now?

A: The algorithms take into consideration a normal population increase, such as 3% to 4% per annum. A few years ago, no one thought the Iraqis and Syrians would be here. No one saw that Jordan would go from three million people in the 1990s to seven million today. I remember being part of the team for Jordan's water strategy in 2010, and even then we had a deficit of 250 million cubic meters, and that was before the Syrian problem we have now. Regardless, these issues don't affect how much water you can take from Disi. It does not

affect the supply, just the demand. I believe we can still get 50 years worth of water from Disi, but it is a question of consumption.

Q: After the opening of Disi, it was announced that water pumping would increase in Amman, as would the price of water to cover the increased pumping. Some point out that given Disi's limited resources, it should be used to compensate rather than increase pumping frequency. In other words, some Amman residents get water once or twice a week, while others get more, and Disi water should be used to balance this distribution out rather than draw from the limited resource to increase water pumping overall. Would this not avoid or at least constrain any substantial raises while keeping the resource intact?

A: These are two different issues. The pumping of water will increase and houses will have more water yes, because there will be more water coming into Amman. As for distribution, you will be able to increase it because if you have water in area X and take it to area Y and now Y is getting water from Disi, then X can stop giving water to Y. Specifically, I

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think what will happen is someone who gets water three times a week will get it four times and someone who gets it once a week will get much closer to having it four times a week. However, the cost of water will not increase because of increased distribution on its own, as the cost of water reaching Amman already takes into account production, transportation and distribution. Since Amman will take its water from different sources, and different sources including Disi can cost different amounts of money, then the average of that price will go up. In terms of distribution, I do not think that full-time distribution means more water consumption. In the 1980s, we used to have full-time distribution and I don't believe per person consumption has increased.

Q: There has been a lot of controversy and double speak by the government regarding the issue of radiation levels in the water. Do you believe that there are unhealthy amounts of radiation in Disi?

A: Basically, the World Health Organization (WHO) gives us the parameters we should be within to be able to consume water and those numbers are being researched and changed all the time. Yes, there is radiation in Disi, but the radiation amount is typical to what you would find in underground fossil water. When you have radiation in your water, you have two options: you either treat it or you mix it. There are many ways to treat the water, but most are expensive. The second option, mixing it, mixes the water with radiation with "cleaner" water to reduce the concentration. Mixing, however, can be difficult to control. You must have capable water technicians constantly monitoring the mixing. If you mix too much, you are using too much water and time, while if you don't mix enough, the radiation will be too high. Also, another problem with mixing is that it is temperamental. You cannot mix water in the morning and think it will be the same at the end of the day. It is a very precise process and the concentration needs to be checked continually. The cost of this is tremendous because you have to continuously take samples. Another factor people forget is when you mix water from different resources you cannot just check radiation. You have to check for everything else. If the level of iron is 1% above the accepted level in one sample and you mix it with a sample also above the iron limit, then you are in trouble – even if the radiation is in normal limits. We call it mass balance.

Q: So, do you believe the water should be mixed?

A: I do believe mixing is the best solution and to be honest, mixing is the only solution we can afford. If we start treating the water, the cost per unit of water will go up from JD0.9 to JD1.5 or JD2. Another commonly used process to get rid of radiation is reverse osmosis, but this is also costly and the end result is highly radioactive waste – where are you going to dump that?

Q: Some claim that Jordan does not have the amount of water that is needed to dilute Disi water to normal levels. ❏

What are your thoughts?

A: Well, we don't know yet. We have many variations of the predictions of how much radiation there really is ranging from one, five, 10 and 30 times the amount of radiation that the WHO says is healthy. If the numbers are one or five times, then it is easy. If the radiation is 30 times more concentrated than it

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should be, then we are in trouble. It is too early to tell how much of a problem or how difficult the solution will be. It could be as easy as mixing small quantities and this is where I think the government should be more transparent. Different studies yielded different results because we don't have many sources to test from and many numbers are being taken from one study to another. Secondly, different wells have different samples, and different samples have different qualities.

Q: What specifically do you think the government should be more transparent about?

A: [They should say] this is how much radiation we have and this is what we are going to do with it. What really got to me is that on the same day the minister was saying we do have radiation and we are going to solve that, other officials were being quoted in the newspapers saying there is no radiation. It is a known fact that there is radiation, but we do not know how much, we do not know how bad it is and no one can give you that number yet.

Q: If radiation is intrinsic in water being dug up that deep, how did no one foresee the potential issue of excessive radiation in Disi?

A: The initial studies for Disi were conducted many years ago and equipment to test radiation was not readily available, especially decades ago. Even today, there aren't many labs in the region that can really test it. That is why mixing can be expensive because you would have to have many tests. Essentially, I don't think radiation testing was

around when they did the first tests and trials for Disi. That is why nobody ever thought about it. Water treatment is a changing science and is still evolving, while radiation was never something that people thought about when the Disi project was first considered years ago. I mean even in the US, people did not realize lead was poisonous until the 1990s. In the late 2000s, there was a report that there could be radiation and that broke the ice on the topic and that is when they started.

Q: Aqaba residents have been drawing from those wells that studies claim have excessive radiation in them a few decades now and still maintain the second lowest cancer rate in the country. Why is the water being mixed for Amman residents if those in Aqaba have supposedly been drawing from it safely for years?

A: That is a hard question. Honestly, I asked myself that question, how could they drink for 30 years from that water with no apparent side effects? And if you go to Aqaba, Disi water seems to be the cleanest. I have never heard Aqaba complaining about radiation. I do know that they test the water in Aqaba, but radiation is not something that would be tested for regularly.

Q: How should the project move forward taking into account the possibility of unhealthy amounts of radiation in the water?

A: We have to do three things. One, calculate the amount of radiation from Disi. Second, we need to run simulations because sometimes a well will have too much radiation one day and you need to know which wells you should stop on

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some days and use on others. For example, the worst-case scenario is when all the wells ready for pumping that day are the

ones with too much radiation. Third, do simulations to figure out how to mix the water to keep it within WHO standards, coming up with rules and regulations and plans to shut down the plants for a day or two when the radiation exceeds healthy levels. You might reach a point one day when you cannot mix it enough so you must shut down the plant for a little while. You have to understand, things like this do change. Water is not like buying a TV and installing it where it is the same device for years. Every mix will be different from the other, and keeping things closely monitored will cost a lot of money. However, most countries do this. Even in Jordan, samples of water are being tested four to five times from different agencies. We had a plant in Ras Al Ain and when it used to rain heavily you had high pollution and the plant was stopped temporarily. Radiation will not be that cyclic, but it is just another factor you need to monitor in water control. This is not really my concern, personally. The biggest question is not just that. After we produce Disi and we keep it under good control and mix it and its all fine and dandy, how long will that water last us? Not long. Disi will only help with the deficit, but after a few years, we will have a new looming shortage. ■

