Southern district

הנדסת איכות מים
מרחב הדרום

מרחב דרום

MEKOROT
ISRAEL NATIONAL WATER CO.
Southern district

הנדסת איכות מים
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מקורות
חברת המים הלאומית
מרחב דרום

Date: 22.08.13

To: Avraham Ben Yosef – acting VP of Engineering & Technology

Reference: **<u>Hexa-Cover Floating Cover Pilot for Zohar B Reservoir, Shafdan</u>**

1. Enclosed please find our summary report for the experiment undertaken on Zohar B Reservoir to test Hexa Cover floating cover. The experiment continued for one year and was terminated in July, 2013.

Yours Sincerely,
Efraim Farkash
Spatial Water Quality Engineer

cc:
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<u>Pilot: Hexa Cover Floating Modular Cover on Zohar B Reservoir, Shafdan – Summary Report</u>

1. <u>General</u>

Zohar B Reservoir is a wastewater reclamation reservoir with a volume of 10,000 m^3, a water surface area of 3,500 m^2 and a depth of about 4.0 meters. As with other open reservoirs, this reservoir is also susceptible to infiltration of the water by environmental

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pollution, and, during spring and summer months, when the water surface is exposed to the sunlight for prolonged periods, algae growth in the reservoir waters will occasionally increase. A high concentration of algae present in water supplied to the region creates difficulties in the operation of irrigation systems as a result of filter blockages, and may lead to subsequent complaints on water quality.

A solution proven to be efficient in forestalling these hazards is a reservoir cover to prevent water surface exposure (eg. covering of Noga Reservoir in 2009). Up to now, usage has been made of flexible sheeting to cover the reservoirs; however, despite the high level of efficiency for a cover of this type in the improvement of quality in water supplied from the reservoir, its high cost and the maintenance required for the cover following installation have hampered progress in the covering of Shafdan reservoirs.

2. Testing of Hexa-Cover in a Pilot Project on Zohar B Reservoir (Shafdan)

In an attempt to evaluate an efficient means of coverage at low cost over time in comparison with the existing floating covers in use, a modular floating cover known as Hexa-Cover was selected, comprised of hexagon-shaped cover units made of polypropylene. The modular covers are constructed of a large quantity of small cover units floating on the surface of the reservoir, thus creating a layer preventing exposure of the reservoir's water surface.

As there are no physical connections between the cover units, the efficiency of the coverage will depend upon the structure of the cover units and their ability to densely align themselves on the surface of the reservoir water, as well as under environmental conditions (wind, reservoir water level). As a result, a difficulty may arise in attaining full coverage of the water surface, and therefore, this coverage is not suitable for potable water reservoirs, but may provide a satisfactory response in the prevention of hazards described above, for reservoirs containing wastewaters and water for irrigation, eg. Shafdan reservoirs.

In September, 2010, a decision was made to test a Hexa Cover modular cover as a pilot on Zohar B Reservoir. The test was undertaken during 2011-2013, with the cover being distributed on 29.07.12 (with 100,000 Hexa Cover units at a combined weight of approximately 25 tons, photograph #1). Before the cover was applied, the reservoir was emptied and cleaned.

2.1. The original test plan included two stages, where the water quality in the reservoir was frequently monitored:

In the first stage, the reservoir was monitored for a year before coverage, as a control reference (June, 2011 to July, 2012).

In the second stage, following cover distribution, water quality was monitored for another year (beginning July, 2012), to test the effect of the coverage on water quality. Monitoring of the water quality for this test was planned to continue to July, 2013, when the test would be terminated.

2.2. The measures for evaluation of success in the test as detailed in the plan designed by members of the pilot team, is represented in the following table:

3.

No.	Characteristic tested	Weight(%)	Measure for success	
1	Water quality	50	Aerobic conditions exist	More than 3 mg of oxygen dissolved in water column
2			Acceptable filtering abilities	More than 5 minutes to blockage of manual filter gauge
3	Decrease in evaporation	30	Decrease of at least 50%	
4	Cover's physical functioning	15	Alignment of cover units to create full cover layer on water surface, maintaining function even with change in reservoir water level. Illustrated mechanical strength and durability to weathering of cover units.	
5	Scope of maintenance	5	Minimal maintenance required (quality only)	

2.3. Water quality measures tested during testing period:

a. field tests: cloudiness, dissolved oxygen concentration, reaction, temperature, electrical conductivity, filtering abilities (manual filter gauge).

b. laboratory tests: suspended particle concentration , zooplankton and bacterial counts, chlorophyl concentration, general bacterial count.

Tests were undertaken every two weeks, except for filter tests which were undertaken once a week most of the time, and no less than once every two weeks throughout the testing period.

2.4. Physical functioning of the cover was tested visually throughout the testing period, to evaluate maintenance of defined measures.

Photograph 1: Distribution of cover via unloading of cover units from truck directly onto reservoir waters (29.07.12). The cover units aligned themselves independently to create a cover layer on the reservoir surface:

3. Test Results

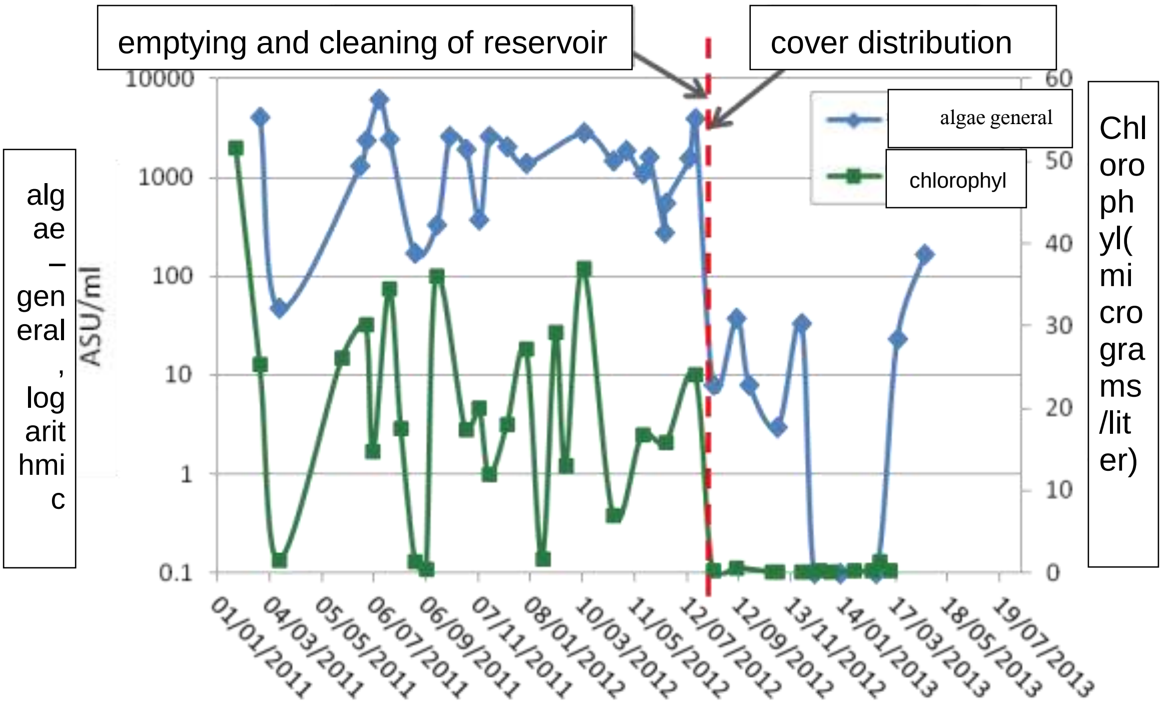
3.1. Effect of Hexa Cover on reservoir water quality:

A number of water quality measures were evaluated throughout the testing period, to examine the effect of the cover on reservoir water quality. An evaluation of success regarding water quality (table in paragraph 2.2) involved an evaluation of the cover's ability to maintain exisitng aerobic conditions in reservoir water (concentration of dissolved oxygen), and the prevention of potential filter blockages (acceptable filtering abilities), affected mainly by the increased development of algae in reservoir water. The results displayed in the following charts comprise data to May 2013, in accordance with their availability in the system during the preparation of this report.

3.1.1. A central factor in the potential of reservoir water to cause filter blockages in the irrigation systems is the concentration of algae in the water. This data is represented by the measure ASU/ml, calculated via the quantity of existing algae in a 1 ml sample of tested water from the covered area. An algae concentration of at least 5,000 ASU/ml would be considered to be strong potential for creating filter blockages in the irrigation system. Another measure reflecting the concentration of algae in reservoir water is the concentration of chlorophyl in the water, as chlorophyl is a pigment appearing in algae in large quantities.

The concentrations of algae and chlorophyl measured in Zohar B Reservoir before and after cover distribution are presented in chart #1 (algae concentrations are respresented in logarythmic values).

Chart 1: General Concentration of Algae (ASU units per ml) and of Chlorophyl (micrograms/liter) in Zohar B Reservoir water from 2011-2013:



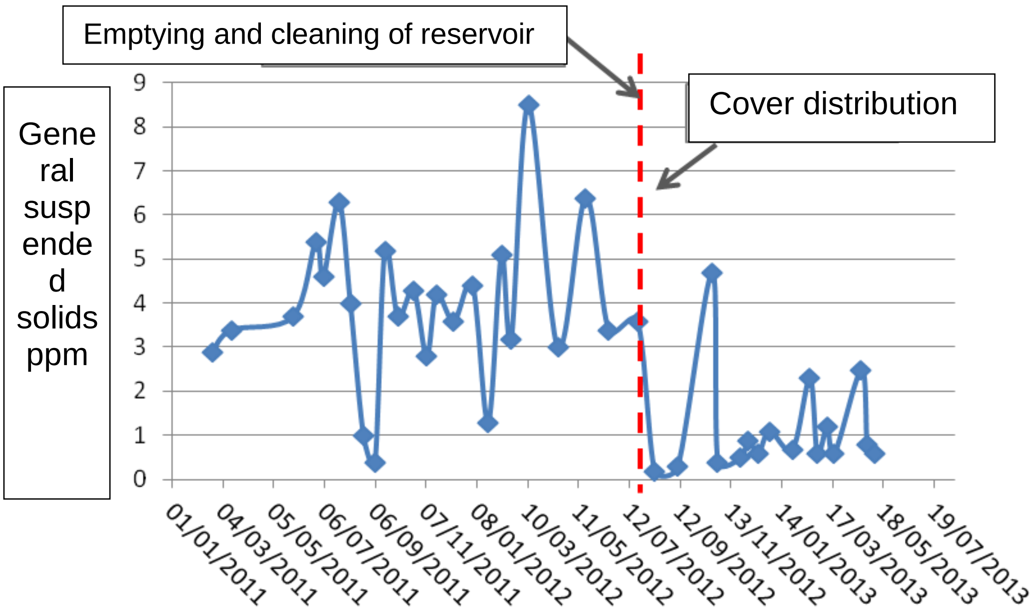
The data in chart 1 shows that prior to cover distribution, an algae concentration of 2,000-6,000 ASU/ml was noted. Following cover distribution, a considerable decrease by Up to 3 order of magnitudes the concentration of algae began, with values of 3 - 170 ASU/ml, and in some of the samples, a result of 0 being obtained. This data is also supported by a similar decrease in chlorophyll concentrations measured in reservoir water before and after cover distribution: when the reservoir surface was exposed, chlorophyll concentrations ranged from 10-30 mg/l most of the time; following cover of the reservoir, a decrease began by up to 3 times the chlorophyll concentrations measured, to a range of only 0.1-0.3 mg/l.

The development of algae in an exposed reservoir usually increases in spring and summer, due to the prolonged time period in which the water surface is exposed to sunlight, and one can clearly see from the data that following cover distribution, even during March-April, 2013, the concentration of algae was minimal in comparison to a parallel time period before cover distribution.

The potential of the water to cause filter blockages was also measured with a manual filter gauge. In all tests performed on reservoir water following cover distribution, an acceptable filter level of more than 10 minutes was obtained, pointing to high water quality, with unproblematic algae concentrations. This is despite blockages after a few seconds from blooming algae, which occurred frequently in the reservoir (about once every two weeks) during the period prior to cover distribution, in the hot seasons.

Another piece of data related to existing algae quantities in reservoir water is general concentration of suspended solids, of which algae constitute a considerable portion. Chart #2 shows the concentrations of suspended solids measured in Zohar B Reservoir from 2011-2013:

Chart 2: General concentration of Suspended Solids (105°C, ppm) in Zohar B reservoir Water during 2011-2013:

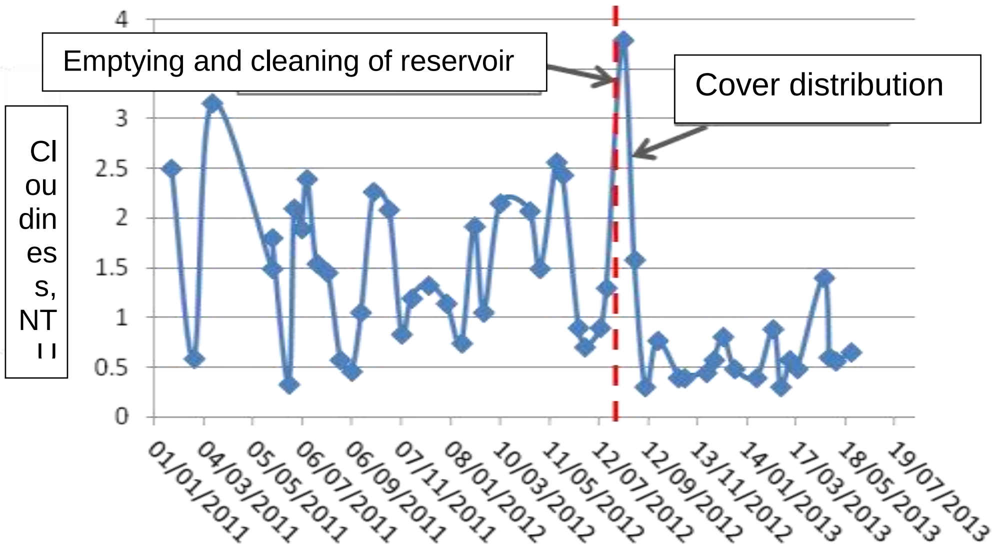


The data shown in the charts corresponds to the phenomena identified earlier, and one can clearly see that following cover distribution, a considerable decrease began in concentration of suspended solids measured in the reservoir, from a concentration of 3-6 ppm during most of the period prior to coverage (average 1.8), to a concentration of around 0.7 ppm for most of the period following coverage (average 0.8).

3.1.2. The concentrations of algae and suspended solids in reservoir water will directly affect the water's potential to cause filter blockages in the region's irrigation systems. This potential can also be evaluated by examining water cloudiness. Cloudiness data (NTU) measured in Zohar B Reservoir throughout the testing period is shown in chart #3.

From the data, one can see that prior to cover distribution, cloudiness values usually ranged from 1.0 to 2.5 NTU (average 1.5 NTU). In the two measurements performed on the reservoir directly following cover distribution (Aug. 12 and Aug. 26, 2012), high cloudiness values of 3.8 and 1.6 NTU were obtained. However, in the period following this, the cloudiness values measured dropped considerably in comparison to the pre-cover period, ranging most of the time from 0.4 to 0.8 NTU (average 0.6 NTU), which points to a significant improvement in reservoir water quality following cover distribution.

Chart 3: Cloudiness values (NTU) in Zohar B Reservoir waters from 2011-2013

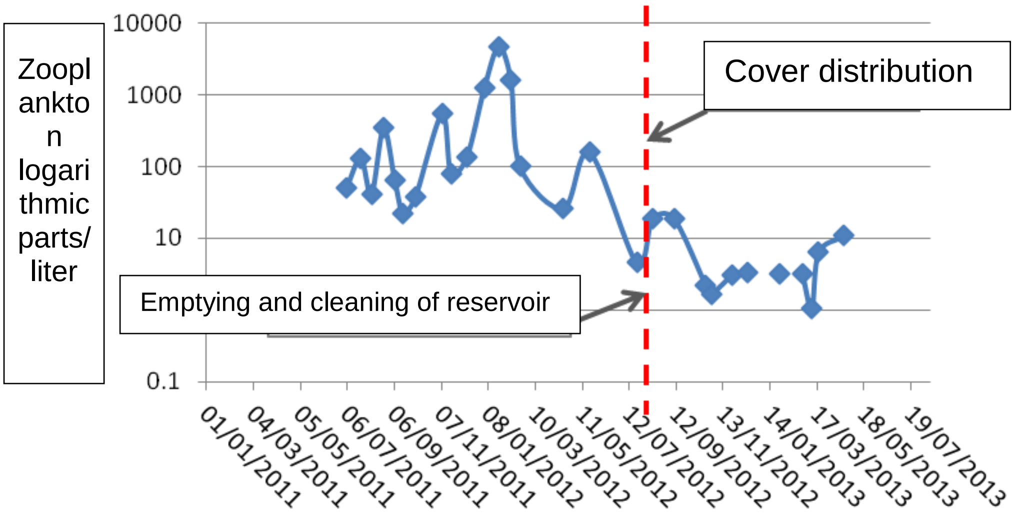


3.1.3. Another element that can be found in exposed reservoir waters and that may constitute a potential for filter blockages in irrigation systems is zooplankton, which is measured in number of parts per liter. Similar to algae concentrations mentioned as being a potential factor for filter blockages, a comparable concentration value for zooplankton that would constitute a medium to high potential for filter blockages in irrigation systems would be 50-150 parts/liter (in accordance with various types of zooplankton).

The zooplankton concentrations (logarithmic value, parts/liter) measured in Zohar B Reservoir throughout the testing period are presented in chart #4.

In the chart, one can see that during the pre-cover period, much higher concentrations of zooplankton than the level defined as constituting a high potential to filter blockages were measured, ranging from dozens to hundreds of parts/liter during most of the testing period, with an average value of approximately 600 parts/liter. Following cover distribution, a significant decrease began, up to 3 order of magnitudes the concentrations measured, ranging from 0-20 parts/liter, with an average value of approximately 4 parts/liter.

Chart 4: Zooplankton concentration (ppm) from 2011-2013:



3.1.4. The concentration of dissolved oxygen in the water is significant in maintaining aerobic conditions in reservoir water, which enables the breakdown of existing organic matter in the presence of oxygen, as well as enabling the subsistence of other oxygen-consuming life, such as algae and fish. If the water does not contain a high enough concentration of dissolved oxygen in it, i.e. the conditions are anaerobic, the oxidation of organic materials that are not in the presence of oxygen will cause the emission of gases characteristic to the process (hydrogen sulfide, H_2S), which, when emitted into the atmosphere, may cause a stench in the reservoir region. In addition, a high concentration of hydrogen sulfide in supplied water will cause blockages in the irrigation systems, necessitating a high level of chlorine in the water, making it difficult to maintain the level of chlorine necessary to prevent the development of bacterial pollution along the system supply lines. Maintaining aerobic conditions in reservoir water (a concentration of dissolved oxygen higher than 3 ppm) will ensure that the stench does not develop. Chart #5 shows dissolved oxygen concentrations measured in reservoir water, beginning in 2011. From the data in the chart, a comparison can be made of dissolved oxygen concentrations following reservoir coverage (on 29.07.12) with concentrations measured prior to coverage. The data in the chart will show that following cover distribution, a decrease began in dissolved oxygen concentration, in comparison to pre-cover levels; however, the cover enabled aerobic conditions in the water, expressed in a dissolved oxygen concentration of more than 3 ppm. Before reservoir coverage, the dissolved oxygen concentration was measured at between 5 and 7 ppm (excluding individual deviations), and following coverage, it steadied to between 3 and 4 ppm (excluding individual deviations).

Dissolved oxygen concentrations in reservoir water is greatly affected by the concentration of algae in the water, as algae produce oxygen via photosynthesis during the day. Thus the decrease in dissolved oxygen concentration following reservoir coverage can be explained by the significant decrease observed in algae concentration.

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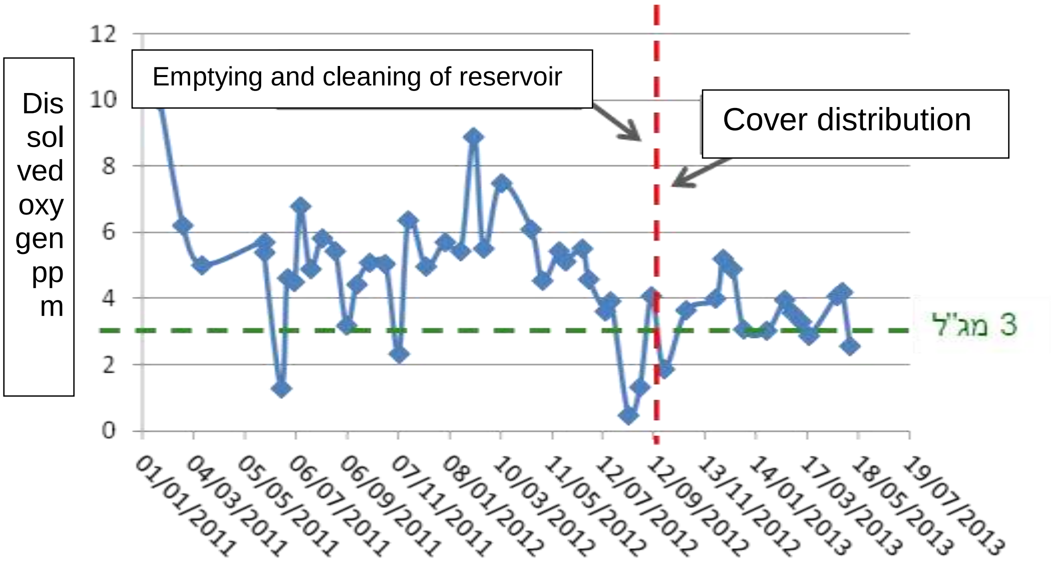
Chart 5: Concentration of Dissolved Oxygen (ppm) in Zohar B Reservoir water from 2011-2013.



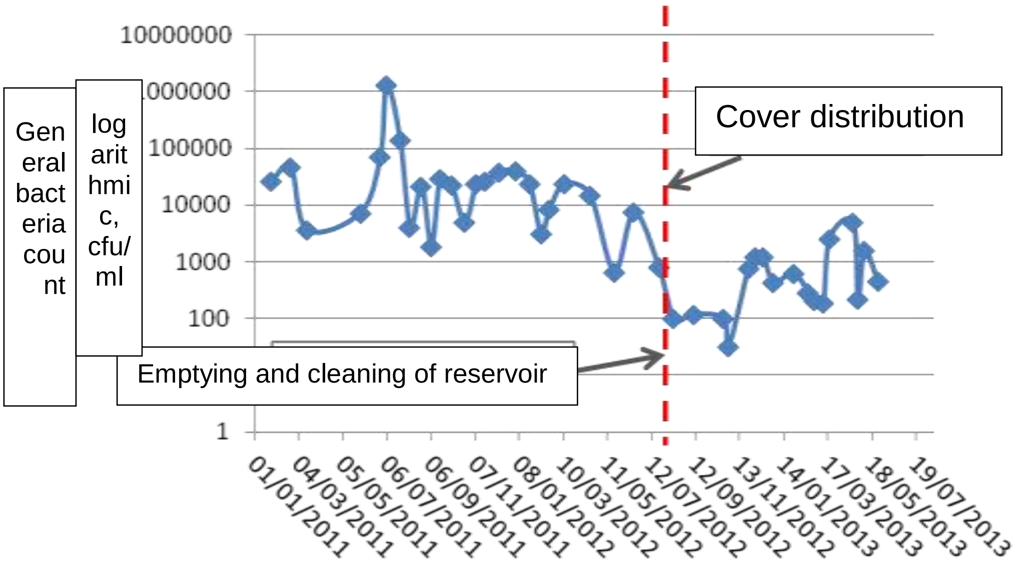
3.1.5. Among other things, exposed reservoir water will encourage the development of bacterial colonies in high concentrations. The bacteria develop with the arrival of birds to the reservoir and exposure of the water surface to the air. An exposed water surface constitutes an attractive source for fish-eating birds and other creatures found in the wetlands, and during their presence at the reservoir and its surroundings, will result in an increase in bacterial colonies in reservoir water from the birds' excretions, which contain bacteria, and from the direct transfer of bacteria from the bodies of the birds to reservoir water.

An examination of the efficiency of the Hexa Cover on Zohar B Reservoir also included its effect on this measure, which is represented in the test by the overall concentration of bacteria in the reservoir.

The bacteria concentrations (cfu/ml) measured in the reservoir water throughout the testing period are presented in chart #6. A comparison of bacterial concentrations before and after cover distribution will reveal that the reservoir cover resulted in a decrease by up to 3 order of magnitudes the overall bacterial concentration in reservoir water, from concentrations ranging around 30,000 colonies/ml before coverage to lower than 1,000 throughout most of the testing period following coverage (average concentration of 890 colonies/ml).

This fact may be explained by the ability of the cover to prevent bird access to the water surface, and the decrease in attraction of the birds to the reservoir as a result of concealing the water surface. In addition to direct factors in prevention of the development of bacteria in reservoir water due to the cover, the decrease in bacteria concentrations also stems from the thinning out of the breeding ground and nutrients in reservoir water necessary for the existence of bacterial colonies. The reduction of algae in reservoir water following cover distribution will reduce the quantity of available organic matter for breakdown later on; this organic matter is a source of nutrients for bacteria, such that the potential of bacteria development in high concentrations following coverage is significantly smaller.

Chart 6: Overall Bacteria concentration (cfu/ml) in Zohar B Reservoir water from 2011-2013



3.1.6. The change in water quality that commenced following cover distribution in Zohar B Reservoir, and whish is presented in previous paragraphs, is also expressed in the responses of consumers in the reservoir region. Before coverage, these consumers often suffered from difficulties in the operation of irrigation systems, stemming from high algae concentrations in the water supplied, particularly during the hot season (March-September). In these cases, consumers submitted complaints to the company on poor water quality, requiring response and handling by staff from the water quality department. This treatment included, among other things, travelling to the consumers to perform water quality tests to identify the source of the problem. Following cover distribution, the consumers in the reservoir region reported a significant improvement in the quality of water supplied to them, and expressed a high degree of satisfaction in their ability to operate the irrigation systems without the problems they encountered in operation of the system during the pre-cover period.

3.1.7. The high algae concentrations in Zohar B Reservoir prior to coverage necessitated frequent treatment s at the reservoir to prevent the increased development of algae, particularly in hot seasons (March-September). These treatments included tests for reservoir water quality, and the distribution of copper sulphate to suppress the blooming of algae. These types of treatments were undertaken at an average frequency of up to 5 times a month during the hot seasons in years prior to reservoir coverage. In the period following cover distribution, following the improvement in water quality expressed in low algae concentrations measured, no treatments of this type have been required at the reservoir.

3.1.8. Another component in Mekorot's customary treatment for prevention of algae development in open reservoirs is the fish populations recommended by the company's reservoir biologist. The role of the fish is to prevent increased development of algae and snails in reservoirs. Fish populations were not introduced to Zohar B Reservoir following cover distribution, from the assumption that prevention of algae development in the reservoir waters by coverage would negate the need for fish in the reservoir. As stated previously, algae development in the reservoir was almost completely prevented by the coverage; however, during an analysis of the reservoir bottom undertaken on 27.06.13, following emptying (approximately one year following cover distribution), it was discovered that during the period of coverage, Cerithium snails multiplied on the reservoir floor with no interference. During the analysis, a quantity of approximately 100 snails per m^2

was observed on extended areas of the reservoir bottom, in sizes that pointed to their development for prolonged periods.

Photograph 2: Approximately 40 Cerithium snails on the reservoir bottom following drainage and emptying, during analysis of the reservoir bottom on 26.06.13:

The presence of snails in reservoir waters constitutes a potential for their development throughout the irrigation sources and systems of consumers in the region, following their passage with the waters supplied from the reservoir. Their presence in the irrigation systems may cause filter and other blockages. These findings necessitate the maintaining of fish populations that feed on snails, even in a reservoir covered with Hexa Cover. As dissolved oxygen and algae concentrations measured in the reservoirs with Hexa Cover were lower in comparison to those in other open reservoirs that had permanent fish populations, further testing will be required on the survivability of designated fish in Zohar B Reservoir under coverage, for the prevention of snail development.

3.1.9. Shafdan open air reservoirs enable the accumulation of sediment on the reservoir bottoms. The sources of these sediments include dust particles in the air hitting the water surface, and the breakdown products of the biomass developing in the reservoir, which included algae, fish and bacteria. In an attempt to evaluate the influence of Hexa Cover on the accumulation of sediment on the reservoir bottom, an analysis was undertaken on 27.07.13, after the reservoir had been drained and emptied for this purpose.

During the analysis, a layer of muddy sediment at a thickness of a few mm and up to 1.5 cm was observed on the reservoir bottom. This quantity of sediment had accumulated during an 11-month period, from the day of cover distribution. As an analysis of this type has not been regularly performed at Shafdan reservoirs in the past, we cannot compare the quantity observed to accumulated quantities in uncovered reservoirs; however, it appears to be particularly low, in comparison to the approximately 50 cm of sediments observed during cleaning of the reservoir prior to coverage, and which had accumulated over a 5-year period. The low quantity of sediment observed in the covered reservoir may be the result of obstruction of some of the dust carried in the air by the cover units and its being blown away, as well as a result of the considerable decrease in quantity of biomass existing in the reservoir during the year it was covered, in comparison to the biomass that existed in the reservoir prior to covering. This difference stems from the lack of fish populations in the covered reservoir, and, as a result, the non-accumulation of organic sediment and biomass originating from fish and their excretions, the minimal algae concentrations and non-use of Copper Sulphates.

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Photograph 3: Sediment layer of approximately only 4 mm at center bottom of reservoir. Unit covers rest on the bottom, following drainage of reservoir.

3.2. Physical functioning of the cover:

3.2.1.The functioning of the cover at Zohar B Reservoir underwent frequent visual tested during the period following coverage: throughout this period, it appears that the cover layer responded well to changes in reservoir water levels, where, with reduction in water level and in water surface area, the extra cover units aligned themselves at the inner edge of the reservoir, and, with an increase in water level and water surface area, they floated back, realigning themselves to create a sealed cover layer.

Photograph 4: Stabilization of cover units on inner edge of reservoir during reduction in water levels, while maintaining a sealed cover layer on reservoir surface.

3.2.2. The cover layer creates two coverage areas, as seen in photographs 5 and 6: In areas where the cover units align themselves uniformly across the water surface without overlapping, the water surface is fully covered.

In areas where the cover units float loosely on the surface, there is a little overlap among the units, where edges of the units are sunk in the water. In this manner, less than full coverage is attained, with minimal areas where water surface is exposed. The exposure of these minimal areas to sunlight, with a portion of some of these cover units being underwater, enables the limited development of algae on the surface of the cover units and the reservoir. Factoring in the entire Hexa Cover area of the surface of Zohar B Reservoir, one can estimate the ability of this type of coverage to protect the water surface covered at a rate of approximately 95%.

Photograph 5: Two types of cover regions: the first, where cover units are uniformly aligned to create a full sealing of the water surface, and the second, where cover units float loosely on the water, enabling minimal exposure of the water surface:

Photograph 6: Partial sinking of cover units in areas where the units float loosely, creating exposure of a small area of water surface. In addition, it enables the blooming of algae on the units that are submerged.

3.2.3. Throughout the testing period with Hexa Cover units distributed in Zohar B Reservoir, the cover units showed themselves to be fully resilient to wear, with no defects in any of them. They also showed themselves to be fully resilient to the winds that occasionally swept the reservoir surface, and no units were observed to be scattered beyond the water surface area or along the upper inner edge of the reservoir.

3.3. During the period following cover distribution, no maintenance activities were required to ensure proper cover function.

3.4. The measure of cover effect on water evaporation was not undertaken as planned during the test. Nevertheless, in accordance with the ability of the cover to prevent exposure of reservoir water at an estimated rate of 95%, one can assume that due to the cover, the quantity of water evaporating from the reservoir decreased.

4. Cost of Hexa Cover on Zohar B Reservoir

Within the framework of preparation for the pilot test, the civil engineering department performed a cost analysis for the Hexa Cover on Zohar B Reservoir, and later compared the calculated cost with estimated costs for standard floating cover.

Aside from the cover structure, the two types of cover were differentiated by other factors which rendered the cost of Hexa Cover significantly lower than standard cover:

- Lifespan of cover – for calculation purposes, a lifespan of 15 years was taken into account for the standard cover. In actuality, a guarantee of 10 years is granted to Hexa Cover and 25 years expected lifetime.
- Area required for cover – the standard floating cover requires a larger cover area than that required for Hexa Cover, because standard cover is installed beginning from the reservoir circumference in a manner that permanently covers dry areas as well. Hexa Cover enables cover of reservoir water surface only, such that total coverage area required is lower.
- Supplementary work – standard cover requires preparation activities on the reservoir basin for cover installation, as well as installation of a drainage system for runoff

accumulating at the external side of the cover. These activities are not required at all for Hexa Cover.

- Regular maintenance – standard cover requires regular maintenance throughout the lifespan of the cover, including sheet repairs, cover inflation for cleaning entry, sheet repairs for reservoir ground sealing, and treatments for the runoff drainage system above the cover. For Hexa Cover, maintenance amounts to partial or full removal of cover units only, at much lower cost, for treatment of ground sealing sheets or reservoir cleaning.
- Taking into account all above costs for 15 years of Hexa Cover on Zohar B Reservoir, total costs for cover and maintenance are significantly lower than for standard reservoir cover.

  The low costs for cover and maintenance at Zohar B Reservoir with Hexa Cover in comparison to costs for standard coverage are maintained, despite the higher cost per m^2 for Hexa Cover; however, the total cost is significantly lower for Hexa Cover because the coverage area is much smaller and maintenance is less expensive than for standard cover.

5. Summary and Conclusions

For an evaluation of the measure of success for Hexa Cover in maintaining the objectives defined at the beginning of the test and before coverage, an evaluation for success was undertaken for each factor, according to results detailed in previous paragraphs.

As no test for the effect of the cover on water evaporation was undertaken, the other factors were recalculated to obtain a general measure of success, excluding the factor of water evaporation.

The calculated measures of success for each factor, as well as the overall measure of success for the cover are detailed in the following table:

No.	Factor	Influence	Measure for success		Rate of factor success	Calculation of factor influence in overall rate of success
		35.7%	Aerobic conditions exist	More than 3 mg of oxygen dissolved in water column	85%	30.4%
2	Water quality	35.7%	Acceptable filtering abilities	More than 5 minutes to blockage of manual filter gauge	100%	35.7%
3	Physical functioning of cover	21.4%	Alignment of cover units to create full coverage of water surface, maintaining function even with changing water levels, showing mechanical strength and durability against wear of cover units		90%	19.3%
4	Scope of maintenance	7.1%	Minimal maintenance required		100%	7.1%
Total success						92.5%

- From the data in the above table, one can see that in general, Hexa Cover on Zohar B Reservoir has succeeded in maintaining the objectives defined for it in the test, at a high rate of 92.5%.
- Hexa Cover has a strong ability to improve reservoir water quality, due to prevention of algae development.
- The improvement in reservoir water quality following cover distribution was noted by regional consumers immediately, as well as in the period following distribution; consumers reported a high level of satisfaction from water quality following reservoir coverage.
- The improvement in reservoir water quality following cover distribution has completely cancelled the need for reservoir treatments to prevent algae development, including the scattering of copper sulfates and populating the waters with fish.

- Not populating the reservoir waters with fish during the test enabled the increased development of Cerithium snails along the bottom of the reservoir. To prevent development of these snails under Hexa Cover in future, it will be necessary to populate the waters with snail-eating fish. The survivability of these fish in the conditions existing under Hexa Cover (relatively lower concentration of dissolved oxygen and availability of nutrients as result of significantly lower concentration of algae) will be tested in future.
- Hexa Cover showed high resilience to environmental conditions during the test.
- Hexa Cover enabled the existence of aerobic conditions in reservoir waters, where average concentrations of dissolved oxygen measured were maintained at a level of approximately 3 mg/l.
- Hexa Cover created a cover layer of approximately 95% of reservoir water surface. As a result there was limited algae development both in reservoir water and on the surface of the small quantity of cover units that were partially submerged.
- Hexa Cover creates conditions enabling the existence of fish in limited quantities: a low but sufficient algae concentration, nutrients in required quantities, the bacteria colonies required to prevent water toxins.
- The overall cost estimated for Hexa Cover and maintenance in Zohar B Reservoir is significantly lower than the overall cost for standard cover and maintenance for an identical time period, constituting an estimated mere 35% of the cost of standard cover.

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