

THE QUALITY OF DRINKING WATER

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As defined in the Public Health Ordinance, 1940, drinking water is water intended for drinking, cooking, and the food industry. This water must be free of materials that are liable to impair public health or the quality of life.

Pursuant to the Public Health Ordinance, 1940 and the Public Health Regulations (Sanitary Drinking Water) -1974 (hereafter – the Regulations), enacted by the Minister of Health, the Ministry of Health (hereafter – the Ministry) has ultimate supervision over drinking water and is responsible for ensuring to sanitary quality.

The provisions of the Water Law- 1959 regarding the prevention of water pollution, grants powers to the Water Commissioner and the Minister of Environment, and to authorities that they empower by the law. These powers are in addition to the powers of the courts in this area.

In April-July 1999, the State Comptroller's Office examined the actions that the relevant bodies took to ensure sanitary drinking water. The audit was conducted in the Health ministry's Department of Environmental Quality, and at all the Ministry's District Health Offices. An examination was also conducted at Mekorot – the national water company (hereafter – Mekorot), at the Water Commissioner's Office (Water Quality Department, Hydrology Service, and Sewage Infrastructure Administration), at the Local Authorities' Water Sector Administration of the Ministry of Interior, and at the Ministry of Environment.¹

Actions to Ensure Sanitary Drinking Water

Israel has three primary sources of drinking water: water from Lake Kinneret [Sea of Galilee], located in the north of Israel, which is supplied by the national carrier; groundwater supplied by wells from the Coastal Aquifer, which spreads across the

¹ On the matter of the quality of drinking water, see also Annual Report 44 (p. 281).

coast between the Carmel in the north to the Gaza Strip in the south, and from the Mountain Aquifer, which lies east of the coastal plain, from the Carmel in the north to south of Beersheva; water from springs and river beds, mostly in the Western Galilee, the Upper Galilee, and the Golan Heights. Mekorot, local authorities, and private water associations control the water sources for the supply of drinking water.

Numerous pollutants harm the sanitary quality of the sources of drinking water. These pollutants include untreated household, industrial, and agricultural sewage; leakage of petroleum and hazardous materials, a grave source of pollution of groundwater in Israel; fertilizers and pesticides; irrigation with sewage water, and waste disposal sites. An increase in the concentration of chlorides and salts dissolved in the water also affects the water quality; in areas near the sea, a danger exists that seawater will penetrate the groundwater as a result of over-extraction and minimal rainfall, the latter a necessity to refill the reservoirs.

As a result of the above, the quality of the groundwater, primarily in the Coastal Aquifer, is deteriorating.²

The increase in pollution is primarily due to the following reasons: growing amounts of pollutants resulting from the increasing density of residential areas and industrial plants; increasing development of new chemicals for industry, some of which are carcinogenic; existence of previously unknown parasites; use of disinfectants in drinking water, which produce carcinogenic chemical compounds. Therefore, great diligence is necessary to protect water quality.

The National Water Carrier (Lake Kinneret)

Filtering the National Water Carrier: Water from Lake Kinneret is the source of the National Water Carrier. Some 60 percent of the water is supplied by Mekorot for household consumption. The water in the lake contains organic and inorganic materials that cause a high degree of turbidity and water pollution, and diminishes the

² On the matter of Israel's water sources and their quality, see also the State Comptroller's report "Management of the Water Sector in Israel," December 1990 (p. 16).

disinfecting capability of the chlorine in the water carrier. As a result, it is necessary to employ a great amount of disinfectant, which creates derivative compounds considered carcinogenic. In addition, intestinal parasites found in water of the lake withstand disinfection with with chlorine. The materials found in the water also give a detestable odor to the water.

Reducing the level of turbidity, conforming it to levels acceptable in western countries and solving the parasite problem is accomplished by filtering the water in the water carrier. In February 1992, regulations were enacted which require gradual reduction of the standard for maximum allowable turbidity, from five nephelometric³ units to one nephelometric unit, commencing in January 1996. An amendment to the regulations, passed in January 1996, postpones commencement of the regulation to January 1, 1997. Pursuant to the amendment, water in the water carrier must be filtered before it is supplied for home consumption. The regulations were further amended on January 1, 1997 to enable the Director General of the Ministry, or anyone empowered by him for purposes regarding the regulations, to allow, under certain circumstances, water to be supplied where the turbidity is no greater than three nephelometric units. At the end of December 1999, the Ministry granted Mekorot such approval, effective until April 30, 2000.

A committee appointed by the Water Commissioner in May 1993 recommended that a central filtering facility for water in the water carrier be established at the Eshkol site. The Water Commissioner adopted the recommendations. The committee also set a time schedule pursuant to which the facility would be operational by January 1997. Mekorot was supposed to build the facility. As of November 1999, when the audit was completed, the facility had not yet been built. In its response of November 1999 to the State Comptroller's Office, Mekorot stated that the Water Commissioner only assigned the project to it in early 1996, and, in early 1999, it published a pre-tender and began sorting the principal tender bids for building the facility and treating the water. According to Mekorot, the Ministry of Finance has not yet approved publication of the tender, and it has not yet reached agreement on accounting procedures with the government regarding the building, operation, and maintenance of the facility.

³ The unit for measuring turbidity.

In its response of October 1999, the Ministry of Finance explained to the State Comptroller's Office that, "setting the standard for level of turbidity was not accompanied by the requisite staff work to examine the cost of implementing the standards, the economic and health benefits to be generated by the standards, the most efficient means to economically achieve objectives, and the sharing of the cost of implementation of the standards by those required to bear the cost." The Ministry of Finance contended that, at work meetings between representatives of the Ministry of Health and officials of the Budgets Department, the Ministry of Health was requested to conduct the examination, but that the Ministry of Health was not carrying it out.

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Handling the matter of the decrease in the level of turbidity of water in the water carrier and solving the problem of parasites have continued for an extremely long time -- since 1991, without resolution. The decisions reached to build a filtering facility for the water carrier were not accompanied by a cost-effectiveness economic analysis or by an examination of the sources available for financing implementation. In Annual Report 44, the State Comptroller pointed out that the decision to build a filtering facility did not include a determination on the manner of financing the construction of the facility, and that "the question of funding is liable to delay construction of the facility."

Surface Water

Filtering of surface water: Drinking water is also supplied from some 50 springs and streams controlled by Mekorot, local authorities, and water associations. Surface water also has a high level of turbidity; therefore, the regulation regarding the maximum allowed turbidity requires installation of filtering devices for these sources. The committee that considered the matter of filtering the water in the water carrier recommended that filters also be installed in towns and villages that receive surface water. The Water Commissioner adopted this recommendation.

Examination by the State Comptroller found that filters have been installed where necessary for most surface-water sources under Mekorot's responsibility. However, according to Mekorot, the cost of operation and maintenance of these devices have yet to be budgeted by the Treasury.

A problem was found in building the filters for surface water under local authorities' responsibility. This problem exists primarily in 14 communities in the Upper Galilee, which receive water from springs or from the Dan project, and a separate facility is required for almost each one of the towns and villages. The water from these sources is extremely low-quality, urgently requiring filtering. The water-filtering problem in these 14 locations was mentioned as long ago as 1993, in Annual Report 44 of the State Comptroller, in the section on "Quality of Drinking Water," but has not yet been resolved.

According to the Ministry, the poor economic condition of these communities does not enable them to finance the establishment and maintenance of the filtering facilities. The Local Authorities Water Sector Administration of the Ministry of Interior, which coordinates financial assistance and grants for development and renovation of the water systems in local authorities, does not assist communities belonging to regional councils. According to the Ministry, the Water Sector Administration agreed to assist the communities, provided that a water association is founded to build the filter installations. In May 1999, the matter was discussed in the Prime Minister's Office, and it was agreed to set up a water corporation to be managed by the Upper Galilee Regional Council.

As of November 1999, the association had not yet been established.

Groundwater

Groundwater is supplied by means of some 1,400 wells controlled by Mekorot, local authorities, and water associations. The sanitary level of groundwater is affected by chemical and biological pollutants.

1. *Nitrates*: The organic materials in the pollutants break down, leading to a high level of nitrates in groundwater.

In recent years, the nitrate level in groundwater has increased. This phenomenon has occurred primarily in the coastal area, where the water sources are close to population centers and to industrial and agricultural areas. An increased accumulation of nitrates in groundwater is liable to create a health danger to the population using the water.

Regulations provide that the maximum level of nitrates allowed in drinking water is 90 milligrams per liter (hereafter - mg/l), while in European Union countries and in the United States, the maximum permissible level is 45 mg/l. As long ago as 1991, a committee appointed by the Director General of the Ministry recommended that the regulations be revised to establish a maximum level of 70 mg/l.

As of November 1999, the regulations had not been revised.

Figures gathered by the Central District of the Ministry regarding the level of nitrates in drinking water drillings in 1972, 1992, and 1998 indicate that, over the past 25 years, there has been a significant decrease in drillings under the responsibility of the local authorities and private water associations in the district -- from 350 a year in 1972 to 224 in 1998. The decrease has resulted primarily from the steady increase in the level of nitrates in the wells. The high nitrate level is especially grave in Hod Hasharon, which lies in the district. The quality of drinking water in most of the drillings operated by the private water associations does not meet the nitrate-level standard set in the Regulations. The Ministry sought to end use of drillings in which the nitrate level was higher than 90 mg/l, but some water associations continue to supply water that does not meet the standard. The Central District's Environmental Health Engineer stated that he warned the water associations that he would not grant them approval to supply water and to hasten the matter even requested the District's legal advisor to initiate legal proceedings against those water associations; but no legal action was taken.

Amending the regulations will lead to many other drillings being prohibited from supplying drinking water. To maintain a level of supply of drinking water, resources must be invested to improve the water in the wells. In recent years, a process has begun in which well water is used by purifying the nitrates by technological means and by building systems to mix well water with higher quality water, the objective being to prevent a shortage of drinking water in certain areas.

To reduce the level of nitrates in water sources, meaningful action must be taken to prevent pollution of the well water. This requires preventing the penetration of pollutants, and preventing residential building and factories near wells.

2. *Disinfecting the water:* To prevent incidence of disease from micro-biological pollution of groundwater, the water pumped from most drillings that supply drinking water undergo a process of disinfecting by use of chlorine. The Regulations require water suppliers to disinfect regularly and continuously the drinking water that they supply. This means that the water supplier – Mekorot, the local authority, and the water association – must install filters at the drillings.

Ministry documents indicate that facilities for disinfecting are installed at most drillings, but in several cases, primarily in small communities, operation and maintenance of these facilities continue to be problematic. Another problem is that local authorities and private suppliers do not oversee operation of the facilities. In some drillings, the disinfecting facility is not used, which affects the quality of the drinking water supplied. This problem occurs primarily in small communities in the Ministry's Northern District.

3. *Fluoride:* Fluoride is a natural ingredient in water. The Ministry states that research conducted in numerous countries indicates that the proper concentration of fluoride in water is the most efficient and inexpensive way to prevent tooth decay, particularly in children. Fluoride is not found at the required concentration levels in all water sources and therefore must be added artificially. According to Ministry figures,

as of July 1999, 61 fluoride-addition facilities operate in Israel. More than 2.8 million Israeli residents currently receive fluoridated water.

On December 3, 1998, the Regulations were amended to require the suppliers to add fluoride to water that they supply to communities containing more than 5,000 residents. The regulation applies when chemical tests show that the concentration of fluoride in the water is less than the minimal level set in the Regulations. Suppliers subject to the regulation must obtain Ministry approval before constructing or operating a fluoridation system. This amendment to the Regulations takes effect 30 months from the date of its publication.

The necessity of fluoridating water requires construction of facilities in various locations in Israel. It was found that the problem of funding the construction, operation, and maintenance of these facilities has not yet been resolved.

Duty to Install Water-Recharge Prevention Devices (RPD)

In November 1992, the Public Health Regulations (Installation of Device to Prevent Water Recharge) -1992 became effective. The regulations require installation of a water recharge prevention device at the head of the water system belonging to a business of a kind mentioned in the regulations, such as production or processing of chemicals; manufacture, cleaning, or coating of metals; rubber or plastic manufactures; laundering in a laundry or dry-cleaning establishment; and also at the head of a water system for farmland whose irrigation system employs a device to insert fertilizers and pesticides into the water system. The device required by the regulation is intended to prevent penetration of chemicals into the drinking-water system, which may result from malfunction, neglect, or ignorance.

The audit by the State Comptroller's Office showed that, as of November 1999, RPD devices had not been installed in all the locations set forth in the regulations. In effect, most of the Ministry's districts still do not have information on the number of derequired, and are conducting the relevant surveys.

According to the Ministry, states that thousands of devices have to be installed in both the business and agricultural sectors. For businesses, obtaining a business permit or approval of building plans for factories requires installation of a RPD device. However, in the agricultural sector, the problem of enforcement of the regulations is particularly grave because the main means of enforcement is the filing of a legal action, which is a lengthy process. In its November 1999 response to the State Comptroller's Office, the Ministry explained that, "Mekorot must act as a water supplier pursuant to the regulation. The company has trouble enforcing the regulation because of the great amount of activity involved, and the Ministry and Mekorot agreed to cooperate in improving enforcement of the regulation."

Handling of Health Nuisances

1. Prevention of penetration of pollutants into drinking-water sources and the carrier systems and their dissemination is necessary to ensure sanitary water. The Ministry's powers on handling health nuisances are primarily the following: approval of plans and facilities for treating and purifying sewage water, following household, industrial, workshop, and agricultural use; establishing standards for the treatment and purification of sewage water, and for irrigation using sewage water that underwent treatment in a purification facility; granting permits to irrigate with sewage water. The Ministry of Environment and the Water Commissioner have responsibility for preventing water pollution and protecting the water sources against pollutants.

(A) Sewage is a major potential source of pollution of groundwater by micro-biological pollutants and pollutants in organic material, heavy metals, and synthetic organic materials, among them carcinogenic materials. Sewage is also the major source of nitrates in groundwater, which are liable to make the water unsuitable for use as drinking water. The local authorities (Sewage) Law -1962, requires every Local Authority, on the order of the Minister of Interior, to install sewers in its jurisdiction or portion of it. Following the government's decision of April 1992 on "the national organizational structure on handling of sewage," the National Sewage Administration was established to improve implementation of sewage projects. Currently, the Sewage Infrastructure Administration, in the Ministry of National Infrastructure, acts in place

of the National Sewage Administration. Its primary function is to grant loans to local authorities to finance projects.

According to figures of the Sewage Infrastructure Administration, from 1994 to August 1999, 795 projects were completed. The sum invested in that period for projects in the planning, tender, or execution stages and or completed projects is estimated at NIS 3.6 billion. Loans given by the Sewage Infrastructure Administration amounted to NIS 2.25 billion.

The audit revealed that there continues to be great delay in erecting sewage infrastructure, including main collection facilities, transport lines to the treatment facilities, and construction of the treatment facilities. The problem is especially grave in towns and villages where minorities reside. Because of the delay in constructing internal sewage networks and in building sewage treatment centers, in minority communities, sewage discharge pollutes the drillings and has resulted in the closing of some drillings. The difficulty in collecting sewage fees and levies in these communities impairs the sources of financing operational and maintenance costs of the sewage treatment infrastructure.

The director of the Sewage Infrastructure Administration stated that the delay in executing the projects results primarily from the following: (1) The loans that it provides to local authorities to finance facilities to collect and purify sewage require the approval of the Ministry of Interior, which must first be convinced that the local authority can repay the loan. However, in some local authorities, revenues from sewage fees and levies are insufficient to repay the loans. (2) The Ministry of Finance opposes financing the internal transport systems, claiming that the local authorities are capable of and must finance these costs themselves from the sewage fees and levies. As noted, some local authorities do not generate sufficient revenues to finance the systems.

In its response to the State Comptroller's Office, the Ministry of Finance stated that sewage collection and purification facilities are operating like other infrastructure services where the users bear the entire cost of the service. Therefore, financing

construction should be borne by the residents who use them, and not the local authority, with the financing of the internal transport systems coming within this rule. This practice can be achieved by revising the fees and levies to reflect the real costs, which, if done, would cover the project's cost. However, the government benevolently assists the local authorities only in financing the collection and purification facilities.

The State Comptroller's Office is of the opinion that, to prevent sanitation nuisances and harm to water quality, it is necessary to accelerate the construction of sewage projects. It is also necessary to find a solution to funding the projects in those locations where the local authority is incapable of financing the project by itself.

(B) A function of the National Sewage Administration was to promote legislation for operating the water and sewage sector in the local authorities by means of business associations. Currently, most Local Authorities intermingle budgetary sources for regular municipal activity with the sources earmarked for activity related to supplying water and sewage infrastructure services. Therefore, the legislation's intent is, *inter alia*, to ensure that all the revenues from providing water and sewage services be earmarked for investment in water and sewage systems, their operation, and for providing services, as well as to raise capital for investment in the water and sewage sector. Such action would enable professional and efficient handling of these systems. As long ago as September 1992, the government decided to direct the Ministry of Interior and the Ministry of Finance to prepare, for government approval, a proposed law to operate the water and sewage sector in the local authorities through business associations. The proposed law is based, in part, on the principle that the local authorities will be required to transfer the water and sewage assets to companies that would be established for that purpose. The companies would be owned by one or by several local authorities that amalgamated.

In the end of October 1999, the proposed law was forwarded to the appropriate committee to prepare it for second and third readings in the Knesset. According to the Ministry of Finance, enactment of the proposed law, which ensures that all revenues generated from provision of water and sewage services would be directed to the water

and sewage sectors, would provide an overall solution for the system, including financing, operation, and efficient maintenance.

(C) Population growth and increase in the standard of living require an increasingly large allocation of fresh water for household use. The gap between the increase in potential use of fresh water is supposed to be covered in part by replacing fresh water for agricultural use with treated sewage water. The use of treated sewage water leads to salinity of ground water, primarily in the coastal area, and to pollution of the water sources. Expanding use of treated sewage water requires sanitary conditions, with minimal risk for the water sources and environment.

The rules for purification of sewage intended for irrigation are stated in the Public Health Rules (Purification of Sewage Water Intended for Irrigation), -1981. The standards for sewage water are set forth in the Public Health Regulations (Establishing Standards for Sewage Water) -1992. The regulations require every producer of sewage - local authority or factory - to treat in a purification the sewage that it produces, and they set the required level of purification. The regulations took effect in October 1993.

In practice, there have been delays in construction of the purification facilities, in part because of the delay in building the sewage collection facilities.

Documents of the Water Commissioner reveal that, in the opinion of entities involved in water quality, the existing regulations for purification of sewage water intended for irrigation are not sufficient and do not protect the groundwater. They should be revised, with additional pollutants being taken into account. The Water Commissioner appointed a committee to propose regulations relating to the use of treated sewagewater for irrigation on land over the Coastal Aquifer. According to documents, the committee will recommend that the regulations set the permissible levels of organic micro-pollutants in water used for irrigation. Those entities believe that it is necessary to prohibit use of treated sewage water for irrigation in the coastal area because the irrigation will make the groundwater saline.

(D) Sewage discharge above fresh water lines in the ground is an extremely serious sanitation health nuisance.

A survey conducted at the end of 1998 by the Ministry's Southern District revealed that above six water lines for which Mekorot is responsible, sewage is discharged into river beds, which is liable to pollute the groundwater. The District requested Mekorot to provide it with a time schedule for raising the water lines above the river beds, as was done in the past, to prevent pollution of the drinking water. As of November 1999, this action has not been taken.

In its response of November 1999 to the State Comptroller's Office, Mekorot explained that raising the water lines above the sewage discharge will not necessarily solve the problem, and that it is working in cooperation with the Ministry and the Ministry of Environment to solve the problem.

It is not superfluous to point out that such a health nuisance also is found in other areas of the country, and that a solution must be found as soon as possible.

(E) The responsibility of the Ministry of Environment to prevent water pollution is founded in the Water Law -1959. Pursuant to their power under this law, the Ministry of Environment and the Water Commissioner enacted, upon consultation with the Minister of Health, various regulations to prevent water pollution. The Water Law grants the courts power to impose a prison sentence or fine for polluting, and to order a person convicted of an offense to pay the costs necessary for purifying the water and whatever was polluted as a result of the offense. In recent years, the Ministry of Environment has taken measures against polluters, including issuing directives on suspicion of polluting water sources, following defects in the sewage systems and sewage discharge, and by filing indictments for committing offenses under the chapter of the Water Law dealing with prevention of water pollution.

However, it was found that, despite progress that was made, enforcement of the enactments on prevention of water pollution continues to be problematic.⁴

2. At the end of October 1995, the Public Health Regulations (Sanitary Conditions for Drinking-Water Drillings) -1995. The regulations provide directives to protect drinking-water drillings from pollution. It does this by establishing protection areas in which it is forbidden to build structures and facilities that are liable to pollute.

Approval of the district and local planning outlines are not dependent on compliance with the requirements for protective areas as stated in the regulations. Ministry representatives are members of the district planning and building committees. They also advise in deliberations of the local committees, but do not have the power to prevent approval of plans that do not comply with the regulations related to sanitary conditions for drinking-water drillings. The Ministry currently demands that the requirements of these regulations serve as a condition for obtaining planning and building committee approval of the plans and that the plans also require Ministry approval.

In the opinion of the State Comptroller's Office, the requirements for submitting building plans should also include data on protection areas as provided in the regulations, and that, in order to obtain plan approval, the requirements of the regulations must be met. Such action will prevent construction that is a potential source of pollution in the proximity of sources of drinking water.

The Drinking Water Administration

Following the findings of the State Comptroller's audit on the "Quality of Drinking Water," published in Annual Report 44, the Ministerial Committee on State Audit decided, in May 1994, to reinstate the Drinking Water Coordination Administration"

⁴ On this matter, see Annual Report 49 (p. 76)

(hereafter - the Administration), which is, in effect, a continuation of the inter-disciplinary committee that had previously been active in this area. The Administration did not recommence operations until April 1998, following a December 1997 decision of the inter-ministerial committee. It was decided that the Water Commissioner would head the Administration, and representatives of the Ministry of Interior, Ministry of Environment, Ministry of Finance, Ministry of Health, and the Geological Institute, in the Ministry of National Infrastructure. A Mekorot representative would be invited as necessary.

The principal objective in establishing the Administration was to centralize activity of the government ministries in preserving the quality of drinking water and to coordinate the ministries' activity. The Administration met twice in 1998, the last meeting being held in July.

As of November 1999, no additional meetings were held.

The Administration primarily discussed the following matters:

1. *Establishment of a central information system on water quality:* Various bodies monitor water quality. Each separately monitors the areas relevant to it. The data are not gathered in one location, and no procedure was established for transfer and dissemination of the information among the bodies. The State Comptroller's Office pointed out, as long ago as in its audit of 1993, the need to compile comprehensive data on water quality. The Administration agreed to establish a national information system that would concentrate all the necessary data on water quality. According to the Water Commissioner, development of the central information system will be completed by the middle of 2000.
2. *Establishment of a central system for monitoring the water:* Management of the quality and quantity of the groundwater reserves requires strict monitoring of changes in the chemical ingredients in the water. Ongoing monitoring can indicate the quality of water sources and the trends of changes in the concentration of certain materials, thus enabling evaluation of the long-term danger to the drinking water. Because the risk of pollution of the water is increasing and the existing systems have difficulty in

stopping the steady deterioration in water quality, it is especially important to establish a comprehensive system to monitor all the water sources. According to the director of the Hydrology Service, partial monitoring has begun concerning industrial sewage and fuels that are liable to pollute the Coastal Aquifer. In July 1998, Administration members were presented with a summary of a “monitoring convention” that would establish the principles for operation of the monitoring system. In addition, it was decided to forward the proposed convention to the Administration’s members for signing.

As of November 1999, the convention had not been signed.

Supervision over the Quality of Drinking Water

Examination of the Quality of Drinking Water

The drinking water supplied to residents is examined to determine its micro-biological, chemical, physical, hydrologic, and organoleptic (taste and scent) content. This is done to ensure that the water meets the sanitary standards stated in the Public Health Regulations (Sanitary Quality of Drinking Water).

The water sources for drinking water are held, as noted, by Mekorot, the local authorities, and private water associations. Responsibility for the various tests at the sources of the drinking water and at the locations where it enters the local water supply lies with the particular water supplier. The tests within the local water-supply system are the sole responsibility of the local authorities or the private water associations in their capacity as “supplier.” Supervision of execution of the tests is performed through the District Health Offices and the Ministry’s Environmental Health Department (hereafter – the Department).

1. *Micro-biological testing*: The micro-biological quality of drinking water is extremely important because micro-biological pollutants are liable to cause immediate incidence of disease to persons who consume it. The micro-biological tests are conducted at the drinking water sources, at locations where the drinking water enters the local water supply system, and in the local drinking-water supply system. The regulations stipulate the frequency of the tests.

(A) According to the environmental health engineers in the District Health Offices, there have not been reports of incidence of disease resulting from consumption of polluted water. Documents of the Department and of the District Health Offices indicate instances in which, following tests that revealed micro-biological pollution, it was necessary to boil the water in some communities.

It was also found that, in the past two years, four drillings were closed due to poor micro-biological quality. The poor quality resulted from pollution from sewage and proximity to another source of pollution.

(B) The local authorities and the water associations conduct micro-biological tests in accordance with a detailed sampling plan, which is established and supervised by the District Health Offices. In June 1999, the Department issued a report entitled “Sanitary Quality of Drinking Water in local authorities in Israel – Report on Micro-biological Tests in 1998.” The report includes the results of micro-biological tests conducted in 1998 by the Local Authorities and water associations according to the sampling plan. The report indicates that the micro-biological test results from 1989-1994 show an improvement in the micro-biological quality of the drinking water. In 1989, 8.4 percent of the water tests conducted nationwide indicated a presence of pollutants, while in 1994, pollutants were found in 3.5 percent of the tests.⁵ The results of the past four years were stable regarding the level of the micro-biological quality of the water – in 1995, 2.3 percent of the tests indicated that the water was polluted, and in 1998, that number was 2.0 percent. According to the Ministry, the improvement in the quality of the water results from the requirement that drinking water be disinfected, from the building of filtering facilities, and from improved maintenance of the water

⁵ The results are according to the old calculation of percentage of tests that showed a presence of pollutants. In making this calculation, no account was taken of tests that indicated water pollution where the results were acceptable when re-tested. In 1996, calculation of the percentage of tests indicating pollution was changed, and all deviant results were taken into account, even those where the retest results were acceptable.

supply systems. It should be noted that use of a large amount of disinfectants is also liable to cause injury to health. Additional improvement will occur only when the water in the carrier is filtered.

The report on the micro-biological tests further indicates that, in 1998, the percentage of positive tests for pollution in the Northern District increased. The highest rate of pollution from all the tests in the region was registered in Safed Sub-district – 10.4 percent, where there has been no significant improvement since 1992. The Central Region registered a moderate improvement: in Hasharon Sub-district, the water quality deteriorated, while in Ramla Sub-district there was substantial improvement. The most conspicuous decrease in the percentage of tests that indicated pollution was recorded in Ashkelon District and in the Southern District.

The report also showed that there were 22 communities, from among the 274 communities in Israel, in which at least 25 percent of the water samples tested positive for pollution. Most of these communities are small, and their water systems are owned by private water associations. These associations do not receive assistance – financial or technical – from the Water Sector Administration, which only handles water systems belonging to local authorities, or from any other source. The lack of sources for proper financing and technical assistance makes it impossible for these communities to build the infrastructure and install systems to treat drinking water to ensure their sanitary quality in accordance with the requirements set forth in the Regulations.

Annual Report 44 (p. 293) of the State Comptroller, of 1993, raised the matter of the failure of the Water Sector Administration to assist these communities. In its response of November 1999 to the State Comptroller's Office, the Ministry of Interior explained that, "The concern for providing proper drinking water to consumers lies with the local authorities, which collect a fee for supplying the water. This is in the context of ongoing maintenance of the water enterprises in each local authority."

In the opinion of the State Comptroller's Office, the organizational framework for supplying water does not have to affect the financial and technical assistance provided by the Water Sector Administration, and it should also assist the water associations to improve their water systems.

According to Ministry figures, in 1998, more than 77,000 micro-biological tests were performed. The figures show that, in 22 local authorities, which comprise eight percent of the total, samples of drinking water were not taken at the frequency required by regulations, and less than 75 percent of the tests called for in the Ministry's sampling plan were executed. Of them, seven local authorities tested less than 50 percent of the number required.

In the opinion of the State Comptroller's Office, the supervising authorities must ensure that the local authorities perform the tests as required by regulations.

(C) Mekorot performs micro-biological tests at its water sources and at points where water enters the municipal water supply systems. The tests are performed according to a plan established by Mekorot. Regulations state that a supplier shall provide, once a month, to the health authority in whose jurisdiction the water is taken, the results of all the tests performed by a recognized laboratory, of the water that it supplies during the month. In the State Comptroller's previous examination, of 1993, it was found that Mekorot indeed provides the reports as required, including the results of tests that indicate pollution, but that it does not include all deviant results in the report.

According to the District Health Offices, all of the tests with deviant results are not included in the report. In the opinion of the State Comptroller's Office, reports that do not include all the deviant results do not accurately reflect the situation and do not accomplish the objective that they are intended to achieve.

2. *Chemical tests:* The committee appointed in May 1991 by the Ministry's Director General to revise the Regulations recommended that standards be set for 21 chemicals that are not included in the existing regulations, and to revise the maximum permissible level for two standards of chemicals that are tested pursuant to the Regulations. The Director General adopted part of the recommendations in December 1992 and part in November 1993. The audit by the State Comptroller's Office revealed that it was not before the end of 1997 that a proposed draft to amend the Regulations was forwarded to the Labor and Welfare Committee of the Knesset. The proposed

amendment included, *inter alia*, the addition of some 30 chemical parameters for examination that had not existed at the time, revision of old standards, and changes in frequency of the testing.

It was found that the Ministry of Interior and the Ministry of Finance demanded that the proposed amendment of the regulations be postponed until the economic repercussions of the amendment could be examined. They also demanded that complete chemical be performed at all the drillings, to examine implementation of the Regulations and the results thereof, including the closing of drillings. At the end of the audit, August 1999, the local authorities began the testing. The State Comptroller's Office was informed that deliberations on amending the Regulations will recommence upon completion of the tests.

Chemical testing is performed only at the water sources and is done by the water suppliers. The Regulations set the frequency of testing. In recent years, there has been an increase in the level of chemical pollutants in the drinking water. They come from pesticides, plastics, heavy metals, and derivative compounds of materials used to disinfect water.

The risk of pollution from chemicals, among them carcinogenic materials, increases with construction and industrial development. The chemical ingredients in the water affect the human body when they are consumed over a lengthy period and are liable to cause prolonged injury. Today, most of the drillings meet Ministry standards to ensure the sanitary quality of drinking water, but some of these drillings contain an excessive amount of these pollutants. As noted, a committee to revise the Regulations recommended instituting a stricter standard for the maximum amount of chemical materials allowed, such that, if the regulations are amended in conformity with the spirit of the recommendations, more drillings will no longer meet the requisite standards.

The investment of numerous special resources are necessary to improve the chemical quality of the water sources. The current situation requires that action be taken to prevent the penetration of pollutants and to improve the water sources themselves. Activity in these areas has been insufficient.

(A) Clear information on the concentration of chemical pollutants is likely to lead to detecting sources of pollution and to cessation of processes that harm the water sources.

The Environmental Health Department only began in 1993 to computerize the chemical-tests data at all the water sources. At the time the audit was concluded, the Department had a summary report on the chemical tests of all the water sources only for 1993-1996. The report indicates that 109 of the water sources contain concentrations of chemical materials that exceed the standard, and that 47 of them were prohibited for drinking water use.

Ministry figures reveal that, from January 1998 to the end of October 1999, an additional eight drillings were closed due to pollution from metals, such as chromium and cadmium, and other micro-pollutants, and nine drillings were closed because of high concentration of nitrates. It was also found that, in November 1999, the supply of water in nine drillings continued to have a nitrates level higher than the maximum permissible standard of 90 mg/l.

(B) As noted, the Ministry of Finance and the Ministry of Interior demanded, that, prior to amending the Regulations, complete chemical tests in accordance with the Regulations and tests of organic micro-pollutants, which are new ingredients included in the proposed amendment, be performed. Therefore, in 1998, a nationwide effort to perform the tests commenced. The effort was made only at water sources controlled by the Local Authorities.

In the second half of 1998, the testing of 275 drillings controlled by municipalities and local councils began. According to Ministry figures of August 1999, in only 93 instances were drillings examined and results obtained. Forty-five drillings are in the process of being tested.

The test results indicate that there were excessive amounts of various materials in 22 drillings, most of them in the Tel-Aviv District.

Monitoring of Facilities Supplying Drinking Water

Suppliers of drinking water are responsible for the proper sanitary maintenance of their drillings and equipment and of the reservoirs of drinking water. The Ministry directly supervises the suppliers of drinking water. This activity includes examinations to ensure that the facilities for supplying drinking water are sanitary, and includes inspection of maintenance of the structure and surrounding areas, as well as maintenance of the facilities - pumps, disinfecting facilities, and the water pipes. The Ministry also inspects pollutants in the area of the facility and the storing of materials - pesticides and other chemical materials - that are not directly related to the supply of water.

1. *Drillings for drinking water:* In September 1994, the Department issued directives to the Environmental Health engineers in the Health Offices concerning sanitary inspection of drinking water drillings. The directives provide that the engineers are to verify that the physical conditions of the drilling and its environs do not pollute the water in the drilling, and to verify that the equipment at the drilling is in proper condition and operates as required. The frequency of inspections depends on the physical condition of the drilling and in maintaining a system of professional and reliable sanitary control by the water supplier.

The sanitation reviews conducted in the districts from 1997 to mid-1999 reveal defective maintenance of the drilling facilities, the structures, and their surroundings. In close proximity to several drillings were health nuisances, such as sewers, industrial waste, petrol stations, poultry coops, cattle pens, and agricultural areas using pesticides and fertilizers. Defects were also found in protecting the site - several drillings had no fence at all, and in others the fences were defective.

2. *Pools and reservoirs of drinking water:* The Public Health Regulations (Pool Systems for Drinking Water), 5743-1983, state the conditions for maintaining the pools, such as its structure, flooring, and roof of the pool, protecting the pool, the area of the lot, fencing around the pool, and storage of materials.

(A) The sanitation reviews conducted by the districts from 1998 to mid-1999 revealed defective maintenance of the pools and reservoirs of drinking water and that health nuisances lie in close proximity. There were serious defects in protecting several pools, which did not have fencing, lighting, or warning devices. In such a situation, there is a real danger of harm being intentionally inflicted on the pools and the water. The situation is especially grave in communities in the Jerusalem District. It was found that, despite the Ministry's repeated criticism and warnings, the situation did not change over the years at most of the drinking water pools and reservoirs in the district.

(B) The regulations concerning pool systems for drinking water require every new pool to be constructed in a closed structure. It is also possible to prohibit use of an open pool that was built before the regulations took effect if its use endangers or is liable to endanger public health. At the time that the audit was concluded, August 1999, six open reservoirs used as a source of drinking water - four in the Southern District - were exposed to pollutants and harmful sources. Financing by the Ministry of Finance is necessary to cover the reservoirs, and, in July 1999, a budget for this purpose was approved. According to Mekorot, all the reservoirs will be covered within two years.

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The quality of drinking water is extremely important for public health. The sources of drinking water – groundwater and surface water sources (Lake Kinneret, springs, and river beds) – become polluted from numerous chemical and biological pollutants. Water quality is affected by increase in the concentration of chlorides and salts dissolved in the water. Some of the pollutants found in the water sources, primarily the micro-biological pollutants, can be treated by purification when the water leaves the water source and at the transport facilities; the treatment of chemical pollutants is difficult and more complicated, requiring investment of many resources to improve the water, requiring that efforts be especially directed at

actions intended to prevent the penetration of pollutants into the water sources themselves.

Pollution of the groundwater is a combination of utilization of the reserves, on the one hand, and the increase in pollutants, on the other hand. Groundwater is polluted by untreated household, industrial, and agricultural sewage, leakage of petroleum and hazardous materials, pesticides and fertilizers, irrigation with sewage water, and waste disposal sites. As a result of all these, the quality of the groundwater, primarily in the coastal area, is deteriorating.

The increase in pollution of the water sources leads to the failure of some of the sources to meet the water quality level set in the Public Health Regulations. As a result, in recent years, several drillings that supplied drinking water were closed. The necessity to establish stricter water quality standards, following discovery of additional harmful materials, is liable to lead to more drillings not meeting the Regulations and to their being prohibited from supplying water.

The State Comptroller believes that insufficient steps have been taken to preserve the quality of drinking water. Special effort is necessary to preserve water quality. The bodies responsible for ensuring water quality – the Ministry of Health, the Ministry of Environment, and the Water Commissioner's Office – must act to enforce the directives to prevent pollution of the water sources and to take meaningful measures by detecting and treating pollutants, and by ensuring that polluting factors are distant from the water sources. Purification and disinfecting – which are extremely important, especially because of the condition of the existing water – cannot be employed as a replacement for preserving the water sources themselves, but to complement the actions to prevent pollution.