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RAMAT HOVAV INDUSTRIAL PARK IN THE NEGEV DESERT– ISRAEL

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Résumé. La principale direction dans le développement industriel de l`Israël est représente par la mise en scène des parcs industriels, ayant plusieurs entreprises dotées avec des technologies modernes et en respectant les normes de la pollution. Une partie des anciens facteurs polluants a été localisé dans le Désert de Negev, ou des autres unités de même type étaient aussi mises en construction. Une bonne partie de ces facteurs ne se sont pas soumis aux normes environnementales. La pression issue de la réaction humaine locale et de la part des organisations non gouvernementales, a eu comme conséquence la création des parcs industriels dans cette région en conformité avec la législation environnementale . Le cas mis en analyse dans cet article c`est celui de parc industriel Ramat Hovay.

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1. Introduction

With a small territory, of 22 700 km^2, but with a continuously growing population (over 7.5 mil inhabitants at present), Israel had to develop a strong industry that supports its fast growing economy. As a consequence, more work places are needed and, on the other hand, the protection of the environment is required within a sustainable development programme.

Therefore, industrial parks have appeared in Israel. In these parks high technology that protects the environment coexists with old chemical enterprises that used to function in these territories, with a negative effect on the environment (pollution of soil, water, air etc). The owners of these enterprises, the great magnates who own the financial capital, representing groups of economic pressure, have got on their side the support of the politicians and of the government, under the excuse of offering jobs to thousands of families and supporting the economy of the country. In this way, they managed to move these enterprises that were situated in the northern part of the country, to Negev, where the population is very rare. They even got authorization to work, even if they contribute severely to the pollution of the environment and to the altering of human health. Furthermore, having as an excuse their “wish” to avoid environmental pollution in the centre and

north of Israel, they justified the development of these pollution sources and even the building up of new chemical enterprises in the Negev Desert.

After the setting up of "Ben Gurion" University in Beer Sheva of Negev and of the research centre of the desert - "Jakob Blaunstein" Institute, the studies that were undergone by the teaching staff and researches pointed out to this subject. A radical change of the environmental policy has been caused by the pressure of the local population and of the environmental non-governmental organizations (such as "Negev Bar –Kaima") on the politicians in Knesset (the parliament of Israel) and on the owners of the chemical plants.

A first step was represented by the creation of an industrial park with petro-chemical profile in Ramat Hovav, in the north of Negev, 12 km away from Beer Sheva, with an area of 2200 hectares, on the hills that represent the watershed of the valleys of the Beer Sheva, Ha Besor and Hovav rivers (Figure 1)

2. Short presentation

The Nahal Beer Sheva valley is part of the Nahal Ha Besor basin, that includes all the major and secondary aquifer supplied by sources and rivers situated upstream the industrial park. The Nahal Beer Sheva originates on the slopes of Kina mountains, 1 km north of Arad, next to the important archaeological site, Tel Arad. Next to Arad, the valley has a western course, after a narrow bend, bordering the Dimona Mountains, until the confluence with the Nahal Ha Besor. This collector is the most important one in the north of the Negev Desert, it is 80 km long and the river basin covers an area of 3400 km^2.

The region was situated in a mountain space made up of monocline Mesozoic structures, moulded by erosion for a long time. The erosion products are found at the foot of the steep slopes of the *nahals* (valleys) or on the surfaces of the flat interfluves, with desert gravels of hamada type. As a result, the water of the superficial aquifer presents a hydric regime influenced by water supply coming from the rare rainfalls (annual rainfall amount is under 100mm), while the major aquifer are deep and richer in water. Both aquifer strata should be protected against the depositing of the harmful products within the area of the industrial park, and this requires high but compulsory capital investments.

3. The beginning of the industrial park

In the 70's, due to the pollution with cyanic liquid residues mixed with oils and industrial pollution, attention was drawn to realizing the danger represented by uncontrolled or even deliberate discharges of the chemical industries. The accidents repeated or even multiplied in the 80's, and this caused a destruction of the fauna and flora along the river beds of several rivers crossing the metropolitan area of Tel Aviv, on their way to the Mediterranean Sea.

As a consequence, since 1985, the state has significantly modified the environmental policy. Many polluting chemical enterprises in Beer Sheva (Mahteshim and Tirkovot Brom) and in other cities in Israel were therefore forced to move in the Ramat Hovav region, situated 12 km south-east of Beer Sheva. The state offered the location field for free, as well as bonuses and other facilities in order to stimulate this re-location.

How was this place chosen?

Ten years after the proclamation of the state of Israel, the Negev Desert still had a rare population. Economy was not developed in this area which was considered peripheral as compared to the urban spaces in the north to which the new waves of immigrants were attracted. The city of Beer Sheva covered a reduced area and had less than 20 000 inhabitants, much less than the large cities in the centre or in the industrial north. Due to the need of labour force, industry was located especially in the north, including the chemical industry, and this contributed to the economic development and the attraction of the new comers. At the same time, the road network was scarce and rudimentary, with only one railway, dating back from the British period in Palestine.

Considering all these data, the government decided that the chemical residues and the dangerous substances all over the country should be deposited in Negev, who became the "garbage bin of Israel". This installation was then called "Society of services for the protection of the environment" and dealt with the storage of these residues. At that time, this operation was not completed too carefully, the content of the residues was not strictly checked, and this allowed the depositing of dangerous materials in this area, with no control and without ensuring the costly conditions for their storage.

Gradually, the new coming people were directed to Negev, and as a result, the demographic development of the settlements here was higher than in the rest of the country. Under such circumstances, the government and the city administration did not consider the rapid development and population growth and the new impact the new industry implemented here could have on the environment. In order to attract the population to the desert, new jobs were needed, and therefore, bonuses were offered to the new enterprises and to the specialists with their families in order to come to this region.

Since 1995, when the pressure of the population suffering from poisonous gas emanations intensified, a decision was taken in order to update the enterprises, to re-burying of the chemical substances in the old "Societies of services for the protection of the environment". As the space was not enough, and technology was old, the Ramat Hovav Industrial Park was built, on an area of 23 hectares (including the previously mentioned building).

4. Present state of the industrial park

Today, the number of the chemical enterprises within the park reached 17. Among thee enterprises, the "pioneers" are also included: *Mahteshim* – 400 workers, with an annual production of 500 million $ (chemical fertilizers, insecticides and pesticides); *Tircovot Brom* – 600 workers and annual production of 600 million $ (produces fire proof materials, fertilizers and chemical filters); *Teva – Tek* with 550 workers, annual production of 500 million $ (produces raw material for pharmaceutical industry), a.s.o. Among the smaller enterprises we can mention *Negev proxide* producing oxygenated water, *Cupoloc Darom* producing fodders for animals, raw material for medicine industry and vitamin additions for food industry; *Chimaghis* producing raw material for medicine industry; *Maxima* – separation of gases from air for aviation and hospitals; *Matil – Tek* recycling metals (tungsten) and the batteries with lithium and nickel-cadmium, *Aviv* recycling the plastic bottles of PET type, and finally *Ecosol*, the first installation for burning the harmful materials in Israel.

The number of the workers varies between 500 and 600 in the large enterprises and between 30 and 200 in the small enterprises, with a production between 10-36 million $.

The purpose of setting up the industrial park is related to the environmental policy of Israel which can be synthesised as it follows:

1. The removing of the hard harmful industry, especially the chemical industry, from the populated centres from all over the country;

2. A better and adequate management of the chemical polluting substances and, therefore, a better protection of the environment: preservation or re-habilitation of the quality of air, soil, underground water.

We have to mention the fact that the value of the production and exportation of the enterprises within the park is about 2 billion $, and the number of the employees directly involved in the production is of 2100 while 600 employees are involved indirectly in the activities here.

It is clear that this industrial park has a great importance as an influence group, therefore, the government decided that the large enterprises should try a re-structuration of their organization. In 1989 a law was given, stipulating that the Ramat Hovav Park should become a *Municipality* with the main task of coordinating all the activities within the park, the population being represented by the existent enterprises. These enterprises pay large amounts of money to the local town hall (according to their size, production and category of the pollutant materials they produce).

The municipality council includes:

Nine members appointed by the Ministry of Domestic Affairs: 3 government representatives (one of them is the mayor), 3 representatives of the neighbouring

two halls and 3 representatives of the large enterprises (Machtesim, Brom and Teva-Tek)

The representative of the Ministry of Environment attends the meetings but has no electing rights.

Attributes of the town hall:

- All the attributes any other town hall has (salubrity, cleaning, water supply, organizing and maintenance of green spaces etc).
- The majority of the town hall investments are made with of purpose of preventing the environment impacts (smell, gases and dangerous substances). The continuous development of the environmental department is a priority. This department is endowed with the most performant equipment for detecting and monitoring the environmental impact both within the enterprises, within the park as well as outside the park. Due to its performant equipment, the park can interrupt the production of the enterprise, in real time, if any fault was detected in the elimination of the toxic gases in a certain enterprise.
- The environment department is directly responsible for everything that happens within the park and has the power to sanction/give penalties to the enterprises that do not obey the environmental rules and laws or disobeying the functioning authorization given by the town hall.

5.The activities within Ramat Hovav industrial park

Until the building up of the industrial park, these enterprises represented an economic force by offering jobs to hundreds of families, but due to the neighbouring position to the populated areas, they influenced the life of the inhabitants. They also cause a free pollution to the air and soil by eliminating liquid residues in the rivers: Nahal Beer Sheva, Nahal Ha Besor. These residues were made up of chemical substances as well as of heavy metals. The researchers in the above mentioned institutes, through specific studies, have demonstrated the threatening on population health and on polluting underground waters (the main water source in Beer Sheva). As a result of the pressure of the non-governmental organizations, the enterprises and the government have changed their attitude. This is when the municipality of Ramat Hovav was set up.

The municipality of Ramat Hovav, hosting the industrial park, has undertook/undergone different experiments in order to establish the impact of different situations in which harmful substances are discharged (explosions, burnings, gas emanation, infection with liquid residues).

The municipality, with the taxes got from the enterprises, has bought a modern, high-tech equipment, in order to prevent and cope with impacts. A data centre is activated permanently by the environment department within the Ramat Hovav municipality, with the mission of giving a notice, in real time, to the enterprises when an impact occurs, and transmitting directions and measures that

should be taken when the impact occurs (detecting and identifying the discharged gases, as well as treating the impact). To respond to such requirements, the environment was set up, including specialized staff who guides the representatives of the enterprises.

Water monitoring

In July 2005, at the request of the municipality of Ramat Hovav Industrial Park a scientific research was done by a group of researchers from Ben Gurion University of Negev, coordinated by Professor Jonathan Laron, brilliant hydrologist and geomorphologist. The study was called "The surface affected by infection of the flood water and alluvia, coming from the liquid residues of the enterprises in Ramat Hovav, along the Hovav and Seher" and it was elaborated as a result of a thorough filed research work. The infection of deep underground waters and south aquifer was checked, after the pollutants leak generated by floods and alluvia, as well as the coarse materials coming from the liquid substances eliminated by the enterprises in Ramat Hovav, in the river beds of these rivers.

On the basis of this research, isolation works have been done, as well as filtration, cleaning up of the river beds by the Ramat Hovat municipality, and this lead to a significant decrease of the infecting agents and a lower danger of pollutant infiltration in the depth waters. These works lead also to the significant decrease of the underground water level as well as to the worsening of water quality. After these works were done, still important quantities of pollutants reach the river beds of the Nahal Ha Besor, Beer Sheva and Seher rivers.

Air monitoring

Air monitoring is done either at the chimneys of the enterprises as well as inside the enterprises and the park, at the surface of the evaporation basins and especially in the neighbouring populated centres. Ramat Hovav municipality give population access to the data on the environment, to the monitoring reports and to the events detected in order to be communicated, in real time, on internet.

Internet is also the place where data from all the functioning monitoring stations can be found, depending in the chemical substances – orange = bad air quality, to green = good air quality. Complaints concerning the odour or other phenomena are analysed immediately and, if necessary, the cease of production is required. Ramat Hovav municipality installed detectors that can automatically cease production in the place where the accident took place.

Another study "Report on the state of the environment in Ramat Hovav 1998- 2005" was prepared by another group of specialists in management of the environment in Ramat Hovav (with dr.Tzur Gallon as the manager of the Department of the Environment in Ramat Hovav Municipality). This study was presented to the Ministry of Health and Development of Negev on the 9th of February 2005. This report has as its main objective air quality, deep water quality, river water quality as well as the prevention and solving of the incidents with

dangerous substances. Besides the data obtained from air monitoring, the reports of the researchers, starting with the flood water infection source and going along the river beds to the Mediterranean Sea. These data are transparent, and they are accessible both to the non governmental environmental organizations as well as for the administrative bodies, in change with taking immediate measures, based on scientific bases, and that gives them an increase responsibility.

Monitoring and detecting harmful gases

(Sulphured hydrogen -H_2S, bisulphate carbon, bimethyl, sulphide, methylene) but also chloride coming from the cleaning basins, as well as GC-MS analyses that are done in the laboratories of Ramat Hovav Municipality are identified and then data from the weather station are collected (wind direction and intensity). The report presented after the measurement of the organic matter in the neighbouring settlements between 1998-2005 shows the following (fig 2):

The organic residues discharged together with other gases by the enterprises here did not exceed the most strict international standard values.

Only four substances with high concentrations have been found.

- sulphurate hydrogen – coming from the evaporation basins. This problem was solved partially by means of excessive salinization.
- bisulphate carbon and chloride methylene – the emanating source being the chimney of an enterprise. The measures that were taken – cease of the production and later on, the building up of a thermal oxygenation installation.
- bimethyl sulphide - was detected in the biological treating and recycling of the liquid residues.

The liquid residues from the enterprises are drained to the treating and cleaning basins. The conclusion was that the majority of the odour sources come from the treating basins, and there fore, a decision was taken for each enterprise to treat the liquid residues itself. Starting with 2008 this pollutant will disappear as each enterprise will have its own treating basin.

Complaints from the population of the neighbouring settlements:

- The report shows that the complaints regarding the odour diminished in the period 2002-2006
- Air pollution dropped from 60 % to 30% between 2004 and 2006.
- The chemical agents in the air also diminished.

Impacts in the enterprises

Since 1999 a significant decrease of the impacts in the enterprises has been registered, from 51 to 12 in 2003, followed by a new increase in 2004, when 31 impact situations occurred. Through intense burning of the chemical substances in the enterprises, the number of impact situations increases. Such a case is represented by *Ecosol,* enterprise that was forced to build a cooling installation of the residues coming from burning. As a result, the impact number diminished to 11 in 2005 and reached zero in 2006.

Impacts with liquid residues

In 2002 Ramat Hovav Municipality decided to classify the incidents with liquid residues as dangerous material impacts, as the liquid residues threaten human health in the neighbourhood on a long term. Therefore, due to the actions taken, the number of impacts decreased from 16 in 2002 to 10 in 2003, and in 2004 a new increase is recorded (to 15 impacts), caused by the leaking from the channels that transport the residues from the enterprises to the treating basins. After maintenance works were done (pumping and detection of the substances and their transport to the treating installations for the specific substances, drainage and the removal of the infected soil) by the Ramat Hovav Municipality, the impacts decreased to 8 in 2005 and 6 in 2006.

Distribution of impacts on the enterprises:

Since 1999 a continuous diminution of the impacts in the enterprises has been recorded.

In 1998 the number of impacts in all the enterprises was 54, in 1999 they increased to 73 (because Ecosol enterprise did not have a system of cooling down the residues after burning). Starting with 1999, a diminution is noticed, from 70 in 2000, 59 in 2001, 44 in 2002, 41 in 2003 , and in 2004 it increased to 57 because of Ecosol enterprise (22 cases), and in 2005, 33 cases were recorded (due to the fines given to many enterprises).

6. Conclusions

The existence of Ramat Hovav Industrial Park has the following advantages:

- In 2005 a diminution of 42% of the impacts with dangerous materials was noticed, as compared to 2004, a diminution of 64% of the impacts in the enterprises, an increase of 27% of the local impacts and a decrease of 47% in the liquid residues runoff.
- 1/4 of the impacts were with dangerous substances and 1/3 with liquid residues.
- Ecosol enterprise – impacts diminished with 59% as compared to 2005.
- The company dealing with environmental services realized a decrease of the impacts with 60%

Nature protection depends on the investment made in this respect. There is a continuous fight between those who produce and want to earn more and more, with as little investments as possible, and those representing the population and the environmental organizations, who, through their vigilance they are continuously fighting, and they obtained a thorough legislation. Ramat Hovav is an example of continuous activity in which population and nature win. Even the employers realized that without protecting the environment they do not have any right of “existence”.

Fig 1. Ramat Hovav Industrial Park is situated 12 km south of Beer Sheva

Fig 2. The Nahal Ha besor river valley

Fig 3. Decrease of complaints concerning the odour (%)

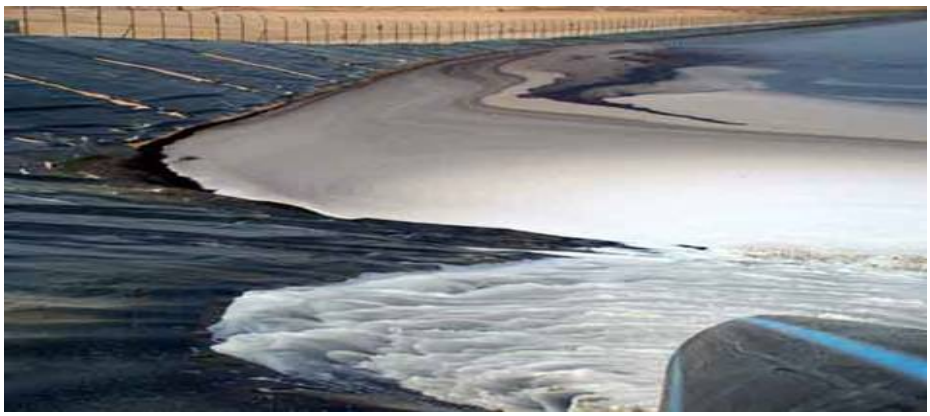

Fig 4. Evaporation basins in Ramat Hovav

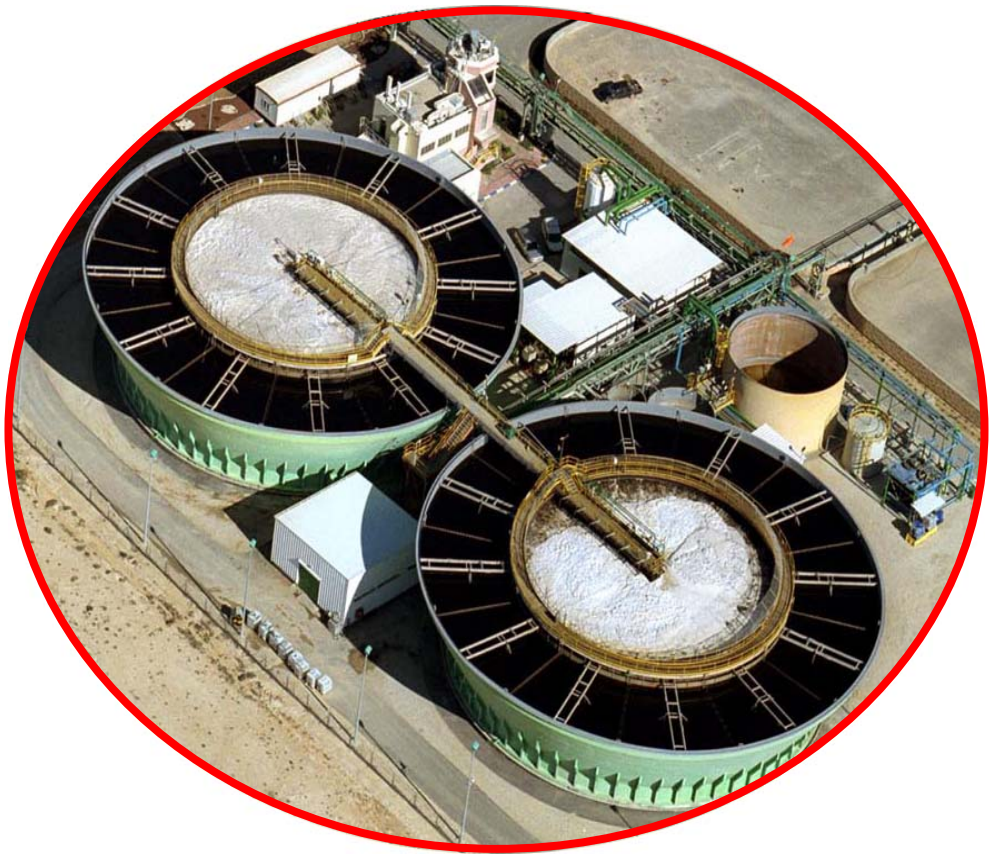

Fig 5. Last generation equipment for the biological treatment of the liquid residues

Bibliography

Adar, A. (2006), *Calitaea apelor de adâncime în perimetrul industrial Ramat Hovav. Referatul monitorizării pe anul 2005,* Univ. "Ben Gurion", Negev, Institutele "I. Blaustein" şi "Zucherberg" pentru cercetări asupra apelor, Departamentul hidrologic şi microbiologic al mediului, p. 5-80.

Adar, E., Nativ, R. (2000), *Utilizing hzdrochemistry and isotopesin a mixing-cell model to quantify the relative contribution of multiple-source of contaminants to seepage from fractred chalk aquitard, in Contaminant, Tansport, Monitoring and Remediation Strategies,* Report submitted to the Ramat Hovav Research Council, p. 133-138.

Laron, I., Nativ, R. (2005), *Perimetrul distribuţiei poluanţilor în apele de inundaţie şi aluviuni. Panta de curgerea râurilor din Parcul industrial Ramat Hovav. Studiu hidrologic,* Univ. "Ben Gurion", Negev, Uiversitatea Ebraică, Ierusalim, p. 2-38.

Cohen, A., Adar, A., Caplan, A. (2006), *Propagarea poluanţilor industriali pe râurile Najal Beer Sheva şi Ha Besor. Date asupra monitorizării albiilor efectuată de "Regia Parcurilor Naturale Departamentul monitorizării mediului,* referat, 7, Ierusalim, p. 3-11.

Cohen, N. (1990), *Răspândirea poluaţilor în albiile râurilor Nahal Ha Besor, Beer Sheva şi Nahal Seher (Negev - Israel). Rezultatele monitorizării,* Buletinul Biosfera - Israel, (1988-1989), seria 7, p. 11-37.

Zur, G., Ran, P. (2006), *Referat privind impactele cu substanţe periculoase în incinta Parcului industrial Ramat Hovav, în perioada 1998-2005,* Ierusalim, p1-9.

H.P.C-T.H.L. (2002), *Hazardous Waste Treatment Site at Ramat Hovav, Master Plan for the Remediation of the Hazardous Waste Treatment Site at Ramat Hova,* A draft submitted to the Ministry of the Environment.