Israel, Palestinians must build high-tech 'Second Jordan River'

by Marcia Merry

The Jordan River is one of civilization's most famous natural resources, and if the economic protocols of the new Mideast peace accords are quickly and rightly carried out with advanced-technology mutual benefit projects, then the world can soon have a "new" Jordan River to celebrate for generations to come. Construction of a series of nuclear-powered desalting plants in this region can, by soon after the turn of the century, provide the same amount of fresh water to the Jordan River Basin population as they are receiving now from natural run-off and groundwater sources. That will be the only way to carry out the spirit and "letter of the law" of the historic new peace accords.

On Oct. 6 in Cairo, Israeli Prime Minister Yitzhak Rabin and Palestine Liberation Organization Chairman Yasser Arafat met to reaffirm the spirit of the accords, and to set up committees to carry out various tasks. An economics committee was mandated, which subsequently has begun to meet on what to do. It is within the purview of this committee, and well within the expertise of Israeli, Palestinian, Jordanian, Egyptian, and other engineers and scientists the world over, to carry out the necessary tasks.

Make new supplies

Annex III of the accords, the economics protocol titled "Protocol on Israeli-Palestinian Cooperation in Economic and Development Programs," lists nine points, beginning with water:

"Cooperation in the field of water, including a Water Development Program prepared by experts from both sides, which will also specify the mode of cooperation in the management of water resources in the West Bank and Gaza Strip, and will include proposals for studies and plans on water rights of each party, as well as in the equitable utilization of joint water resources for implementation in and beyond the interim period."

The second point concerns electricity: "Cooperation in the field of electricity, including an Electricity Development Program, which will also specify the mode of cooperation for the production, maintenance, purchase and sale of electricity resources."

It should be clearly understood by everyone concerned with peace in the Middle East and worldwide, that the only way to carry out these historic protocols requiring "cooperation" in managing water resouces and "equitable utilization" of joint water supplies, as well as electricity, is to *make new supplies*.

To be sure, there are gross inequities in the current pattern of rates of water and power in use per capita in Israel, Jordan, and the Gaza Strip and West Bank. The crisis state has been reached where residents in the Gaza camps have only about 44 liters of water a day for personal use (for all purposes of hygiene, drinking, and cooking, etc.), which is less than the minimum emergency ration specified by even the World Health Organization. Hospitals in Gaza are without continuous electricity, besides lacking other supplies.

However, even these inequities are overshadowed by the obvious point that wholly new sources of water and power must be provided if all peoples are to have the right to rates of supplies and usage of water and power, per capita and per hectare, that will guarantee healthy lives, a growing economy, and enhancement of the environment.

Old Jordan River running dry

As of at least two decades ago, rates of water usage in the entire Jordan River Basin had exceeded all available supplies—no matter how fairly or unfairly these supplies were divided up among the downriver peoples. There has been overpumping from the West Bank aquifers, to the point that this resource base itself is being destroyed. Underground water is turning saline. The Jordan River water flow has fallen to practically a trickle at the point where it enters the Dead Sea. Its feeder waters are being drawn off farther upstream, and nothing is left by this point. The Dea Sea itself is shrinking drastically.

As hydrologists measure it, the nation of Israel is now making use of 88% of what is called "available renewable supplies" of water, a world-record high rate. Most nations of the world are using perhaps 15-30% of their technically available supplies.

Table 1 and **Figure 1** together show the location and small volumes of existing water supplies, and the location and volume of potential new supplies.

First, look at the source waters of the Upper Jordan. Section I of the table lists the principal sources by name, and the map shows their location. The Jordan River proper is formed inside the boundaries of Israel in the north, at the

TABLE 1

Nuclear desalting plants can double the water supply in the Jordan River Basin

I. Surface water, principal flows

Surface water, principal flows		Discharge (mcm*/year)
Hasbani		138
Banias		121
Dan		245
Yarmuk		450
Upper Jordan		650
Lower Jordan	in 1950s:	1,200
	in 1990s:	100

II. All sources of fresh water are fully used (surface and underground combined)

	Volume per year			
	Total (mcm)	/ha (cm)	/cap 1990 (cm)	/cap 2020 (cm)
Jordan River Basin†	3,500	318	365	165
Israel, current use (includes 520 mcm from West Bank acquifers)	1,970	1,297	428	294
West Bank	175	313	160	76
Jordan	900	101	281	92

III. Nuclear desalted fresh water additions to Jordan River Basin

Year	Number of MHTGR plants	Increment new water (mcm)	New total (mcm)	New total (m³/ha)	New total (m³/cap‡)
199?	1	146	3,646	331	331
1999	5	730	4,230	384	352
2000	10	1,460	4,960	450	354
2020	20	2,920	6,420	584	309
2035	35	5,110	8,610	782	287

* Million cubic meters.

† The Jordan River Basin covers 18,300,000 hectares in its overall watershed. Of that, 11,000,000 hectares are inside the boundaries of Israel and Jordan—which is the area used for consideration here. Israel, Jordan and the Israeli Occupied Territories together use about 80% of the Jordan Basin renewable waters (surface and underground).

‡ Population growth projected: 1997—11 million; 1999—13 million; 2000—14 million; 2020—21.2 million; 2035—30 million.

Source: U.N. Food and Agriculture Organization; U.S. Department of Agriculture; "International Security," Vol. 18, No. 1 (Summer 1993), pp. 113-138.

point where the Dan, the Hasbani, and Banias rivers come together. Thence flows what is known as the Upper Jordan, into Lake Tiberius (Sea of Galilee).

As of 1964, Israel completed construction of the National Water Carrier and its offshoots, to draw water out of the Upper Jordan system and distribute it throughout Israel. Additionally, significant amounts of water are pumped into the system from aquifers arising in the West Bank. The delivery system reaches down into the Negev.

As of 1966, Jordan had completed construction of the East Ghor distribution system, running parallel to the Upper Jordan. Originally, this was just one part of a larger water improvement program, called the Greater Yarmuk Project, but this was not completed because of political strife and Israel's increased use of the basin waters.

However, Israel itself, despite making claim to larger amounts of water, and despite implementing water recycling and reclamation projects, nevertheless was severely short of water as of the 1980s. Jordan has even less water use per capita and per hectare. When the mid-1980s droughts set in, the water shortages were dramatic. Israel cut agricultural use of water for the first time in 1986, by about 10%. Then in 1990, water use was cut back by 37%.

Meanwhile, 1 million Arab residents of the West Bank have been restricted by Israel to merely 125 million cubic meters (mcm) of water a year, compared to a need for hundreds of million more. When Jordan took in some 300,000 refugees after the Persian Gulf war, there were no new water supplies to accommodate them. There are many other examples.

Nuclear power for fresh water

For over 15 years, *EIR* has specialized in publicizing the technologies that could, if applied, provide the new volumes of water and power for a new Jordan River and a new Mideast. What we present here is a summary picture of what is involved in equitable water development.

Figure 1 shows the location of three canals in the southern Jordan River Basin and vicinity: The Med-Dead Canal from the Mediterranean Sea to the Dead Sea; the Dead-Red Canal from the Dead Sea to the Gulf of Aqaba, an inlet of the Red Sea; and a new cut for the Suez Canal connection of the Mediterranean Sea to the Red Sea. These projects have been discussed for decades, in various forms.

However, the purpose is to provide inland channels of seawater, as both waterways for transport and along which "nuplexes" can be located—nuclear-powered desalting facilities, around which can be built high-tech food production systems, industrial activities, and cultural, medical, and other service centers, in order to serve whole new towns for millions of people. **Figure 2** shows an artist's sketch of the idea of such a man-made oasis town in the desert.

In addition, water and power from the nuplexes can be drawn off into pre-existing and new expanded power grids and water tunnels, to provide new supplies to the existing towns of the West Bank, Gaza, and Israel. The calculations shown in the reference table focus on what that would mean per capita and per hectare for the Jordan River Basin, apart from the Suez region in Egypt, because the new peace accords focus on the priorities of improving living standards in the Gaza Strip and Jericho, for self-government.

The "new Jordan River" thus consists of the totality of

FIGURE 1
Selected infrastructure projects for the "New Mideast"

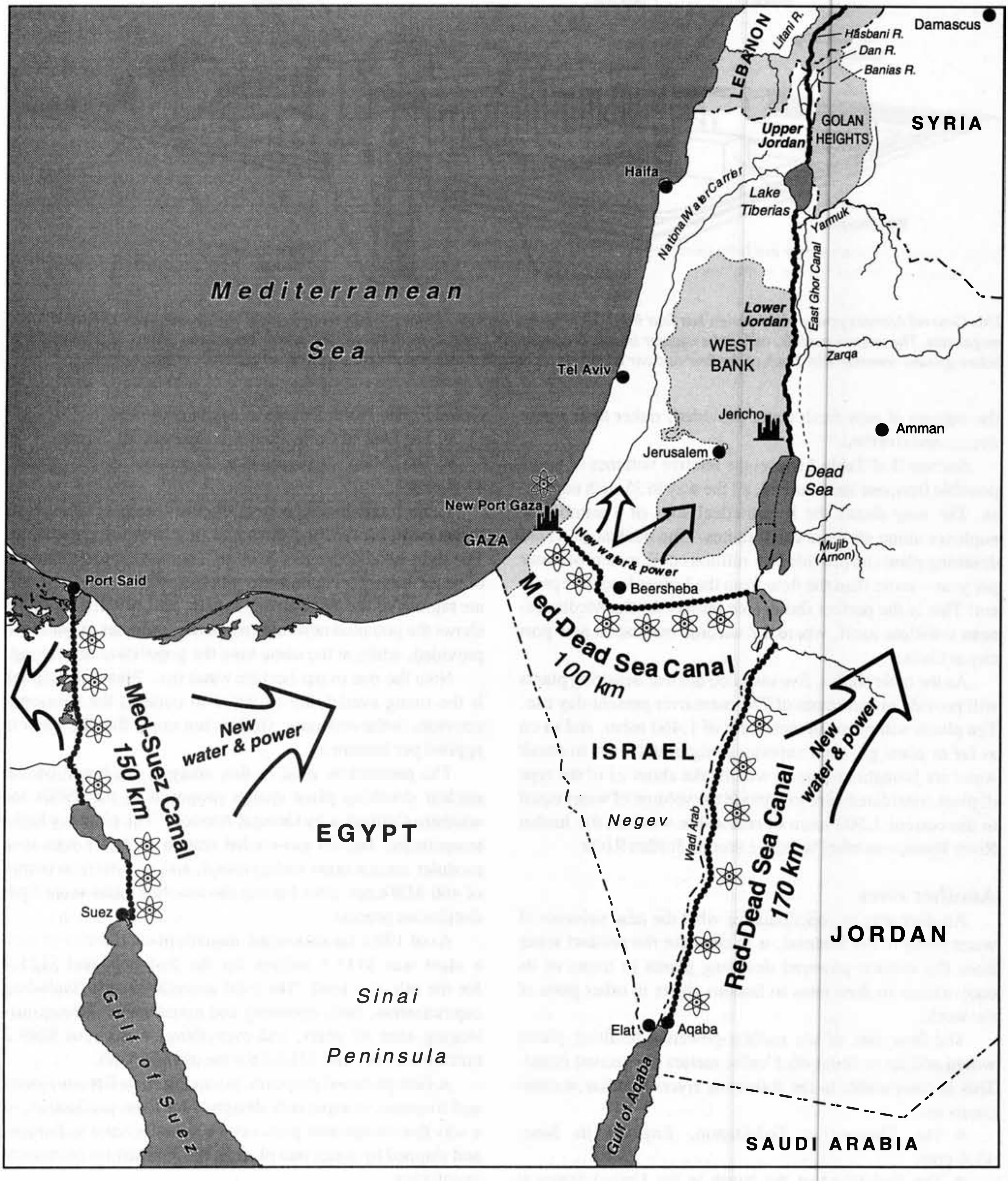
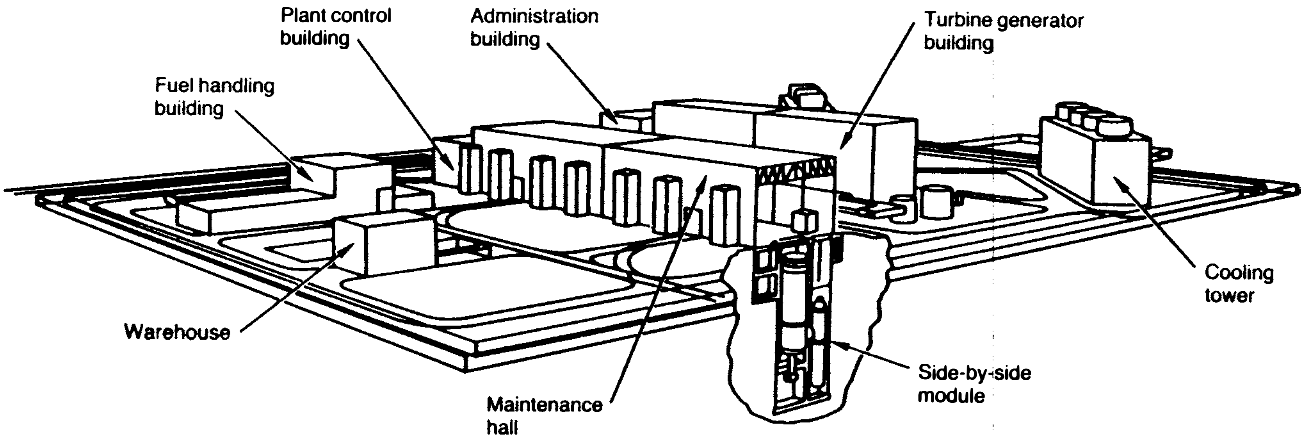


FIGURE 2

Proposed MHTGR power plant design



This General Atomics power plant design has four MHTGR modules, each at 135 megawatts-electric, for a total power output of about 540 megawatts. The reactor module, called the nuclear island, is completely separate from the electric power generating system. It is housed in a below-ground concrete silo. Each of the four nuclear islands is an independent confinement structure, with its own exhaust system.

the volume of new fresh water provided, rather than a new stream and riverbed.

Section II of Table 1 shows the relative volumes of water possible from one such nuplex, all the way to 35 such nuplexes. The map shows the hypothetical sites of a number of nuplexes along all three canal routes. One nuclear-powered desalting plant can provide 146 million cubic meters of water per year—more than the flow from the Lower Jordan at present! This is the perfect showpiece project for the Mediterranean coastline itself, where the accords mandate a new port city at Gaza.

As the table shows, five installed nuclear desalting plants will provide in increment of 730 mcm over present-day use. Ten plants will mean an increment of 1,460 mcm, and so on as far as plans go, until superior designs and ways to desalt water are brought on line. It would take about 22 of the type of plant considered here to provide the volume of water equal to the current 3,500 mcm of renewable water in the Jordan River Basin—in other words, a second Jordan River.

Another river

Another way to conceptualize what the new volumes of water mean to the Mideast, is to consider the product water from the nuclear-powered desalting plants in terms of its equivalency in flow rates to famous rivers in other parts of the world.

The flow rate of ten nuclear-powered desalting plants would add up to about 46.5 cubic meters per second (cms). This is comparable to the following rivers familiar in other countries:

- The Thames at Teddington, England in June, 43.6 cms.
- The Red River of the North in the United States at Grand Forks, North Dakota in August, 44 cms.
- The Oise at Creil, France in August, 39.7 cms.
- The Main at Kemmern, Germany in November, 41.3 cms.

Table 1 also indicates roughly what the new volumes of water mean for meeting the needs of a growing population. The right-hand column of Section II shows the existing rates of water use in per capita and per hectare terms in the immediate regions of the West Bank, Jordan, and Israel. Section III shows the potential new rates when new volumes of water are provided, while at the same time the population is growing.

Note the rise in per hectare water use. What this implies is the rising availability of water to conduct the necessary activities in the economy. (It does not imply that the water is applied per hectare.)

The parameters used in this analysis are based on the nuclear desalting plant design proposed in the 1980s for southern California by General Atomics. The plant is a high-temperature, helium gas-cooled reactor (HTGR) with four modular reactor units underground, and an electrical output of 466 MWe net, after fueling the attached multi-stage flash distillation process.

As of 1990, the estimated annualized capital cost of such a plant was \$143.3 million for the first one, and \$125.9 for the nth of a kind. The total annualized cost (including capitalization, fuel, operating and maintenance, decommissioning after 40 years, and everything) was put at \$249.2 million for one, and \$210.3 for the nth of a kind.

A Europe-based proposal, involving Asea Brown-Boveri and Siemens, is especially designed for mass production, in a way that component parts can be manufactured in Europe, and shipped by water into place in the Mideast for permanent installation.