ORIGIN/ACTION
5/5-56

REP	AF
EUR	FE
CU	INR
P	IO
FBO	AID
COM	FRB
LAB	TAR
XMB	AIR
CIA	NAVY
USIA	NSA

[9] STATE

AIRGRAM

AE 11-2 ISR

FOR RM USE ONLY

SECRET
(LIMITED DISTRIBUTION)

A-742 NO.

AIR POUCH
HANDLING INDICATOR

TO : DEPARTMENT OF STATE 1965 APR 11 AM 8 32

NEA 20-23

COPY NO. SERIES A
ANALYSIS & DISTRIBUTION BRANCH

FROM : Amembassy, TEL AVIV DATE: April 9, 1965

SUBJECT : Current Status of the Dimona Reactor

REF : Deptel 930 INR

RM/R file 6-25 NE

"We are in the process of erecting a research reactor which will serve the needs of industry, agriculture, health and science....This reactor is dedicated entirely to peaceful purposes." (David Ben-Gurion in December 1960)

"In certain circumstances a virtuous woman may not want to appear virtuous." (Chaim Yahil in May 1963, referring to a US request to reassure President Nasser about the peaceful nature of activities at Dimona.)

"I desire to confirm Mr. Ben-Gurion's clear assurance on the character and purpose of the Dimona reactor." (Prime Minister Eshkol, August, 1963)

The quotations above are typical of at least a dozen unequivocal statements of reassurance coming from the top level of the Government of Israel. In the history of US-Israel relations there have been occasional misunderstandings, but there has never been a case of violation of such a clear, frequently repeated pledge. As reinforcements for these good intentions, the intensity of USG opposition to nuclear proliferation has been forcefully brought home to Israel frequently and recently, together with the realization that the development of an Israel nuclear weapon would lead to sharp displeasure accompanied by severe curtailment of the American support in other fields which Israel needs so badly.

1965 APR 11 PM 12 58
COPYFLO-PBR

GROUP 3
Downgraded at 12-year intervals,
not automatically declassified.

SECRET

FORM DS-323 4-62

SECRET
(LIMITED DISTRIBUTION)

FOR DEPT. USE ONLY
[X] In [ ] Out

Drafted by: SA:RTWebber:nwi:4-7-65

Contents and Classification Approved by: DCM - William N. Dale

Clearances: The Ambassador (in draft) POL - SEPalmer, Jr (in draft)

Quite aside from these assurances, there is ample independent evidence that Israel has not assembled nuclear weapons and is not now in the process of doing so. High officials of the GOI have frequently admitted, however, that they are quite glad to "keep Nasser worried" on this subject. This element of psychological warfare is stated by Israeli officials to be the reason for the extraordinary security precautions which have surrounded Dimona from its inception. The extent to which this bluff is actually useful to Israel is debatable; it may even be counterproductive through creating a distrust stimulating the Arabs to greater efforts (nuclear and otherwise) against Israel. In any case, it seems unlikely that any large fraction of the $60 million already spent at Dimona can be justified in terms of the bluff value of the installation. It therefore seems desirable first to approach a study of Dimona from the point of view of its value as a research establishment devoted to the scientific needs of the nation.

Available information on the Dimona establishment - its history, facilities and staff - indicates clearly that, if military considerations are entirely omitted from the equation of motivation, it is not a sensible research project fitting into the total picture of the accomplishments, activities and needs of Israel's science. On the contrary, judging purely from this angle, it would seem to be a colossal blunder which has dissipated more than half of the total funds devoted to construction of facilities for research and development in the whole nation during the past six years.

If we regard Dimona as 10 percent bluff and 90 percent blunder, some baffling questions are answered. For example, why did all the members of the Israel Atomic Energy Commission (except Professor Bergmann) resign in 1959? The departing members included such distinguished scientists as Professor Giulo Racah and Amos de Shalit who were fully aware of the nation's great need for more adequate research facilities. It could be that these men refused to lend their names and reputations to such an expensive boondogle.

Similarly, the earlier public descriptions of Dimona (textile plant, science department of a new "University of the South," etc.) and the present security precautions (electric fence, trip wires, signs forbidding photography, exclusion even of most Israeli scientists) may be designed not so much as to fool the Arabs as to keep the highly articulate Israeli scientific community from realizing what a fatuous waste of money there has been.

If the men who originally authorized the Dimona project really had in mind the construction of a research establishment serving only the needs of industry, agriculture, health and science, it is not difficult to show that these intentions miscarried. We will attempt to outline two types of argument:

(1) We can study Dimona from the point of view of the ratio of capital investment per professional scientist, and compare this ratio with bond-fide research institutions elsewhere in Israel. To bring Dimona into line with the

best equipped of these other laboratories would require a staff of professional nuclear scientists about three times as large as the total number of such men now resident in Israel.

(2) A chronological outline of the establishment of facilities at Dimona leads to the conclusion that relatively few of these seem primarily designed to meet Israel's real research needs. In the process of pursuing this development, Israel has overcome most of the hurdles lying in the path of achieving a production capacity of plutonium, the basic material of nuclear weapons.

Capital Investment in Research Institutions

A well-known and frequently deplored feature of the emergence of science in the past thirty years is the large capital investment required. The modern scientist needs and expects elaborate and costly equipment, extensive services, a well-stocked library, fast computing machines and ample working space in a modern, specially designed building. Following the American pattern, Israel has made great efforts to furnish its scientists with satisfactory facilities. At the Weizmann Institute, the total cost of buildings, equipment and services installed since 1950 runs to about $25 million. The Institute's 280 professional scientists are thereby furnished with facilities as good as any in the world at an average cost of slightly under $100,000 per scientist. The investment in buildings and services for research scientists at the Hebrew University during the same period comes to about $16 million, at an average cost per scientist of about $80,000. The capital investment per research scientist at the Technion is about $69,000; at the Standards Institution of Israel, it is about $58,000; and at the Israel AEC's Soreq Research Establishment it is about $75,000.

The total capital investment in the Dimona Establishment is believed to be about $60 million. Even if we allow a generous ratio of capital investment per research scientist of $100,000 per man, the operation of Dimona as a research establishment would require a staff of 600 professional scientists and engineers. But the total number of Israeli scientists and engineers doing research in all fields is now only about 2100. Of these, the estimated number of specialists in nuclear science and engineering is almost exactly 200, distributed as follows: 93 at the Soreq Research Establishment, 55 at the Weizmann Institute, 40 at Dimona (a very rough guess), 10 at the Technion and 5 at the Hebrew University. If Israel were to staff Dimona with enough talent to permit a reasonably economical use of the capital investment, it would have to find ways of recruiting three times as many nuclear scientists as now reside in the whole nation.

In studying the impact of Dimona, it must constantly be kept in mind that Israel is a small and not very populous nation. The commendable scientific reputation of the Weizmann Institute, the Hebrew University and the Technion sometimes obscures the fact that these three institutions taken together employ

only about 1000 professional scientists and engineers and that the total capital they have expended on laboratories and research facilities since the establishment of the State amounts to only about $58 million. The $60 million spent on plant and facilities at Dimona looms large in this perspective. It is hardly surprising that the academic scientists sometimes become irritable when they hear Dimona referred to as a research Facility.

Research Facilities at Dimona:

Visitors at Dimona in 1964 reported that the reactor had been furnished with the usual provisions for providing neutron beams and for the irradiation of materials. These included channels in the graphite and in the core itself for irradiations, 14 radial channels (beam ports) into the reactor core, a thermal column, and a biological irradiation facility. The intention to use the Dimona reactor to supplement the service provided at Nahal Soreq in furnishing radioisotopes was indicated by the existence in the hot laboratory of equipment for "tagging" compounds with radioactive atoms and for performing experiments in conventional radiochemistry. There is also a small theoretical research group working on the theory of reactors.

The neutron beams emerging from the radial beam ports would also provide a useful facility for experimental research. The fact that all of the beam ports on the Nahal Soreq reactor are now in full use for research indicates that there should be some demand for the Dimona neutrons, particularly as the higher power at Dimona would yield a more intense beam - a very valuable feature in certain experiments such as neutron spectroscopy. It is therefore particularly surprising to receive a recent indication that there is no apparent effort to install experimental equipment at the Dimona beam ports. The construction and testing of such equipment usually takes considerable time - a year or more.

Aside from the very modest research activities described in the preceding two paragraphs, nearly all of the considerable facilities at Dimona seems to be devoted to the various stages of fueling and operating the reactor and handling the Plutonium which is to be produced. The great expense and considerable talent being devoted to developing this technology are alleged to be justified on the grounds that Israel must prepare itself for the electric power reactors and desalination reactors which will certainly be installed within the next twenty years. Why Israel feels it must be prepared to build its own reactors and produce its own fuel for these commercial enterprises is unclear, particularly since the United States, Canada, Britain and France are all eager to sell reactors and provide fuel on quite favorable terms. In other areas of advanced technology - e.g. jet airplanes, steam turbines, locomotives, oceanliners - Israel seems quite content to let other nations sweat out the development costs and provide the finished product. Autarkic arguments appear to have prevailed with regard to the development of reactor technology.

It seems unlikely, however, that a country which must husband its resources would have made such a wasteful investment as Dimona would be if we judge it entirely on scientific and commercial grounds, and as a training facility for nuclear engineers. In addition to its possible uses in these fields, it seems likely that the Israelis have been deliberately developing their nuclear potential with national security in mind. This is not to say that the GOI is building or necessarily definitely plans to construct nuclear weapons but it is entirely conceivable that they are constructing a high plateau of scientific techniques and facilities so that they can move to the making of weapons in a relatively short time if the international situation should appear to require it. If we introduce this element into our thinking Dimona no longer appears as a wasteful boondoggle. The apparent blunder becomes in large measure a security safeguard, intended to match developments among the Arab countries should they move in the nuclear direction. For instance, in the process of developing the technology for building and fueling reactors, it is quite remarkable how much progress Israel has made along the path to a nuclear weapon. Starting from scratch, there are nine facilities which must be completed before a nuclear weapon can be assembled and tested. A description of these, and an indication of their present status are tabulated below:

Step	Description	Status
1	Provision of adequate supply of Uranium ore from uncontrolled source	Accomplished in 1964 (Argentine ore)
2	Facilities for converting ore into pure Uranium metal	Completed in 1963
3	Facilities for alloying, casting, machining and cladding Uranium metal to yield fuel rods	Completed in 1962 or '63
4	Facility for irradiating fuel rods	Reactor reached full power in 1964
5	Facility for "cooling off" irradiated fuel rods in water bath	Nearly completed 1965
6	Hot cell facility for remote-control de-cladding and breaking up irradiated fuel rods	Nearly completed 1965
7	Chemical plant for separating Plutonium from irradiated fuel	Pilot plant being constructed in 1961; no subsequent evidence of activity
8.	Facilities for casting and machining Plutonium in an inert atmosphere	Completed in 1965
9	Preparation of site for weapon test, presumably underground	No clear evidence of activity

Even though it is clear (see introduction) that Israel is firmly committed to using the Dimona facilities for peaceful purposes, it is interesting to speculate on the time schedule which might be followed in developing a nuclear weapon should the Government make an early decision to move in this direction. It seems probable that the following suggested schedule would be within the technical capacity of the Dimona Establishment and could be carried out without any noticeable stepping up of the level of activity:

Year	Activities
1965	Replace French fuel in reactor with Israeli (uncontrolled) fuel. Start construction of chemical separation plant. Complete preliminary survey of testing site.
1966	Start mining operations at testing site.
1967	Put chemical separation plant into operation. Complete mining operations at testing site.
1968	Assemble and test explosive device.

These tables lead to the conclusion that in addition to the minor motive of bluff and the somewhat more important one of gaining expertese in nuclear technique, the Israeli have now created a flexible basis of choice regarding the possibility of producing nuclear weapons. Although the technical facilities are in an advanced state of preparation, we believe that weapons are not now being made, and there is no evidence that the Israeli have made a decision to move the rest of the way towards producing them.

There were indications early this year that a delay may have been introduced in the development schedule of the Dimona Establishment. In January, 1965, both the plant for producing Uranium metal and the plant for converting this metal into fuel rods were in the process of being closed down, at least temporarily. It is not yet clear what significance should be attached to this delay, but we feel quite sure that it does not represent any softening in the fundamental determination of the GOI to "maintain an option" with regard to nuclear weapons. Any effort on the part of the USG to foreclose this option is certain to be met with opposition bordering on the frantic.

The Embassy will continue to be alert to developments at Dimona and will report any items that seem significant.

FOR THE AMBASSADOR:

William N. Dale

William N. Dale
Charge d'Affaires, a.i.

Read related article:

Duplicity, Deception, and Self-Deception: Israel, the United States, and the Dimona Inspections, 1964-65

2020-11-03