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nuclear 55*

PRELIMINARY

REPORT OF THE VISIT TO ATOMIC ENERGY

SITES IN ISRAEL

APRIL 20 TO APRIL 24, 1967

SUMMARY AND CONCLUSIONS

(ONLY)

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Report of the Visit to Atomic Energy Sites in Israel

April 20 to April 24, 1967

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1.0 Conclusions and Recommendations.

- 1.1 The members of the 1967 team visiting the Dimona site (now called the Nuclear Research Center Negev, NRCN) are in unanimous agreement that there is no discernible evidence from which to conclude or to suspect that Israel is, or intends to, operate or modify these facilities with the objective of producing separated material for use in nuclear weapons.
- 1.2 The two repeating members of the team believe that the stated intentions (as indicated in the 1965 and 1966 team reports) of the Israelis to utilize the Dimona reactor and associated laboratories as a research center have been implemented to a significant extent since the 1966 team visit. The following observations, on which all members of the team agree, support these beliefs.
  - (a) The time operating efficiency since the 1966 team visit was 29.2% ( $\frac{\text{actual megawatt days}}{\text{possible megawatt days}}$ ) with the reactor operation being controlled mainly by the needs of the experimental programs. The number of days that the reactor was operating at any power divided by the total available day was 32.4%.

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- (b) There is no irradiated fuel reprocessing plant in existence or under construction at NRCN. The Israelis again said that no reprocessing plant will be built at NRCN.
- (c) There is no hot analytical chemistry capability consistent with the requirements for a fuel reprocessing plant at or planned for the NRCN.
- (d) It is the opinion of the team that there are no high level wastes in storage at Dimona. At least one of the waste tanks (probably) is being used to store concentrates from the low-level water evaporator.
- (e) The uranium conversion plant (ore conversion to metal ingot) has not been operated according to all of the Israeli personnel. The team's observations confirm this statement.
- (f) The metal (fuel) production plant has been operated at low efficiency to convert ingots of uranium metal (produced in 1965 to 1966) to about 300 canned fuel slugs; to remelt some few slugs already made because of low molybdenum content and improper heat treatment; a few experimental alloy slugs.
- (g) The NRCN is being utilized increasingly for nuclear research in support of industrial and medical applications. Through a coordinating committee, NRCN is more fully integrated, by objectives, exchange of personnel and specific programs with the work at Nahal Sorek and the Weizmann Institute. For example, the Israel Atomic Energy Commission (IAEO)

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radioisotopes catalog, published January 1967, is available from the IAEC, Nahal Sorek or NRCN.

- (h) Fifteen (15) of the NRCN scientific staff lecture at the recently established, fully accredited Beersheba University. The Director, NRCN, (Joseph Tulipman) is on the Beersheba University Committee. Consideration is also being given to making the NRCN facilities available to the Beersheba University for research. This would involve teaching the sciences of the NRCN, while the humanities would be taught at Beersheba.
- (i) The NRCN has established a training program for students from the Technical Vocational School at Beersheba. There are presently 26 students enrolled, and 30 more will be received next year. The parents of some of these students are NRCN employees.
- (j) Consideration is being given to the installation of a 15-mev TU accelerator at the NRCN for use of all scientists in Israel.
- (k) If the 40 (25) US physicists (reference, New York Times article dated \_\_\_\_\_, 1967) move to Arad, these scientists will use the NRCN facilities, according to both Tulipman and De-Shalit.

1.3 No additional ore concentrates were received at Dimona, according to the Israelis. There is no way for the team to check on

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No chemical plant at Dimona.  
No preparation at Dimona.

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Center is being used as advertised -  
for basic research. Going beyond that  
now into industrial uses - e.g.

this without opening all of the containers in the plant, for <sup>kilns to</sup> waste phosphate  
which there is insufficient time. The team believes the state- <sup>rock,</sup>  
ment, however. <sup>series of</sup>  
<sup>educational</sup>  
<sup>enterprises.</sup>

1.4 The railroad has not been extended from the town of Dimona to either the reactor site, Arad, site of proposed new phosphate mill, or Oron, site of the major existing phosphate facility where non-acid leach phosphate upgrading facility exists. However, ore and Dead Sea Works trucks of up to maybe 30 tonnes capacity use the Dimona road.

1.5 The team asked again about the 100 tonnes of Argentine concentrate. Tulipman and De-Shalit claimed no knowledge of this material.

1.6 Recommendations.

While the preceding conclusions are comforting, it must be remembered that: 9.58 tonnes of irradiated fuel containing about 5.1 kgs of plutonium are in the storage pool; 7.81 tonnes are in the reactor containing about 6 kgs of plutonium; and additional plutonium will be produced by continued reactor operation. A fuel reprocessing plant of modest capacity (50-100 tonnes/year) could probably be built in 12-18 months. Hence, so long as the irradiated fuel remains in Israel, the risk of diversion is present. Consequently, the 1967 team recommends that every effort be exerted to witness, or otherwise establish, when the irradiated fuel is shipped, and to make future visits to NRCN when possible, and at least at yearly intervals. Visits every

For shipment to France.

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All of fuel that has been through reactor is still on site in storage canal. Israelis anxious to get it out to avoid risk of serious accident.

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six months are still desirable, at least until the Embassy staff can establish, hopefully, a more open relationship with the Dimona staff, and can discuss more freely the overall nuclear energy program in Israel with knowledgeable scientists involved in the program direction. This subject is discussed further in the next section.

2.0 Summary of Policy Discussions and General Topics Relevant to the IAEC Program.

- 2.1 The budget of the Dimona Center is IL. 31,000,000 per year (\$10,300,000). Half goes to salaries. About 1200 people are employed. Tulipman stated that he had tried to reduce the non-scientific staff, but had difficulty doing so because of unions. Technical staff is about 160.
- 2.2 The Israelis have now taken some responsibility for making changes and repairs, no longer depending extensively on the French. French technical people still come and go as needed, according to Tulipman.
- 2.3 A new phosphate deposit has been found, but we do not know exactly where. It is the team's impression that it is south and east of Oron, in the direction of Eilat.
- 2.4 The Arad phosphate deposits have a concentration of about 0.015%, about 50% higher than those at Oron. This should be used to up the estimated uranium reserve in the Arad phosphates to about 11,000 tonnes  $^{43}\text{O}_8$  proven, 30,000 to 105,000 tonnes  $^{43}\text{O}_8$  possible.
- 2.5 Tulipman stated that he was not sure whether a uranium recovery circuit would be put on the next phosphate mill that may be soon built at Arad. If the processes now being developed by Lavie at Dimona are economical for phosphate (it uses HCl rather than  $\text{H}_2\text{SO}_4$  and solvent extraction a la LMI process), then almost surely a uranium circuit will be installed, since only

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one more stage of solvent extraction using a different organic solvent (which is being patented), is required over the phosphate plant requirements. Tulipman and Lavie, along with the Fertilizer Company, have not yet estimated costs. It is the team's opinion that with the IMI-HCI process for phosphate that uranium might be recovered more cheaply than with the more standard sulphuric acid leach, assuming that the phosphate economics are competitive.

- 2.6 The Israelis are very concerned about the quantity of fuel which they have stored at Dimona. They have built extra heavy protection for it and for the reactor. The team saw the measures taken. They are pressing as vigorously as possible (Tulipman) to clear the legal (safety regulation based) restrictions on fuel shipment, both in Israel and in France.
- 2.7 We asked again about the possibility of witnessing the shipment of fuel. De-Shalit said that they had not asked the French if such a procedure would be acceptable to them, but he again gave the impression that Israel might be willing to have a US observer. In the team's opinion, it would not be too distasteful to the Israelis if our Attache or Ambassador asked again about witnessing, or, as a minimum, of being informed of the shipment and shipment quantity after the shipment has safely arrived in France.
- 2.8 No comments were made about John Finney's story after last

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year's visit.

2.9 The desalination program is regarded as promising, but scheduled for about 1975 rather than 1972, when a larger reactor can be accommodated by the Israel power grid.

2.10 De-Shalit and Tulipman were just as convinced as last year that Israel would not agree to accept IAEA safeguards under the circumstances now existing for the reasons stated in last year's report. We asked whether a revised approach to safeguards, embodying retention of all plans and detailed data in the country being inspected, might be more acceptable. De-Shalit seemed to be interested by the thought; he will surely discuss it with the government. But we did not get an answer to the question; all that we did was plant the thought.

*will not buy  
in any form*

De-Shalit did raise some quite valid general points about safeguards that also would be pertinent specifically to the above proposal, i.e.,

- (a) From discussions at the Pugwash Conferences, which De-Shalit attends, he is reasonably certain that other countries (Germany in particular) would not be comfortable with safeguards as now proposed because of the necessity of disclosing all technical details, which is themselves || may provide commercial advantages to the whole competitive nuclear community. A modified disclosure may be more generally acceptable.

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- (b) The inspecting team should surely be composed of members agreeable to the inspected country, as is now part of the safeguards provisions.
- (c) The question of the resolution of disputes arising from differences of opinion between the inspectors and the inspected should be specifically implemented in such a way as to hold private vital commercial and security information.
- (d) As is very frequently the case when discussing non-proliferation with those countries who are not now members of the weapons club, the general idea of a "nuclear umbrella" provided by the US or some consortium, was discussed.

2.11 The team's request (at our first meeting on April 20) to make smears was turned down by De-Shalit (A.M. meeting at Dimona on April 22), after he had checked it with someone else, on the basis that the original agreement covering these visits disallowed instruments, photographs and sampling.

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- 2.12 Tulipman and De-Shalit said that no French firm was designing a fuel reprocessing plant for Israel. We asked specifically about St. Gobain and were told that they were not doing anything along these lines.
- 2.13 We suggested that further support of the Israeli position that the use of the Dimona site will continue to be for research purposes only might be obtained by having visiting non-Jewish (and non-Arab) scientists invited, or to pursue work there. Both De-Shalit and Tulipman saw no reason in principle why this could not be done, providing interested scientists could be obtained and the security considerations were satisfied.
- 2.14 The team's impression is that the US Embassy staff, and, in particular, the Scientific Attache, might now be able to more freely discuss the Israeli atomic energy program than has been possible thus far. At dinner with Tulipman, De-Shalit and Bal-Sella on the last evening, we asked if it would not be wise to make more public the activities and current industrial and research involvement of the Dimona site. After observing that most of what was happening at Dimona involving education, general research opportunities, the overall research program planning and isotopes production has been in the local papers, De-Shalit suggested to Tulipman that a more comprehensive "public relations" effort at Dimona might be advantageous.

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He further said that he saw no reason why the Science Attache should not talk periodically with Tulipman, with himself and presumably others, about the activities and plans at Dimona. This seems to be a significant opportunity to have a bit more continuity between visits of the teams from the United States, and an opportunity to discuss the meaning and directions of the program.

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- "we see all of Israel's atomic energy establishment."
- Dimona now more integrated into Israeli Atomic energy effort. Could this be completely divorced from military program?
- These people would like to relieve tension that would preclude preventive strikes.
- Openness only within certain limits. Be markers - Argentine purchase concentrate....

1. What are chances of cheating on you?

2. To what extent does inspection of Dimona provide the whole picture? What questions about Israel's overall nuclear capability are left unanswered?

3. Do your findings mean there can be no other plutonium in Israel?

Uranium from phosphates - years off.

If fuel not shipped to France in a year, ~~the~~ should worry.