Fallout from the Raid on Iraq

By leveling a "peaceful" reactor, Israel flattened the credibility of international atomic safeguards

When Israel dropped a barrage of "iron bombs" on a French-built reactor in Iraq on 7 June, the damage extended beyond Baghdad, for Israel shattered a convention that has sustained a decade of trade in nuclear technology. In addition to life and property, the idea that went up in smoke was the notion that the industrialized countries can give the less developed world an expertise in nuclear power and at the same time withhold expertise in nuclear weaponry.

As Senator John Glenn (D–Ohio) said during an inquiry on the raid, Israel has cast a vote of no confidence on the Non-Proliferation Treaty (NPT), the 1968 agreement designed to contain the spread of nuclear weapons. Under the provisions of this treaty, Iraq received the shipments of nuclear fuel and laboratory equipment that provoked the Israeli action.

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Israel was not convinced by the reassurances of the International Atomic Energy Agency (IAEA), which said that Iraq had obeyed all the rules of peaceful nuclear research. As overseer of the system of safeguards meant to guarantee that atomic fuel is not diverted to warlike purposes, the IAEA had said as recently as January 1981 that nothing was amiss in Iraq. After the bombing, Sigvard Eklund, director general of the IAEA, said that he thought his agency had been attacked along with the reactor. The incident, he said, would have profound and far-reaching effects and "could do great harm to the development of nuclear energy for peaceful purposes." Indeed, the IAEA's first impulse after the raid was to ask other members to offer emergency assistance to help Iraq rebuild its reactor. The NPT requires members to promote peaceful uses of nuclear power.

While Eklund was trying to restore the status quo at headquarters in Vienna, a lower level employee of the IAEA, inspector Roger Richter, was doing his utmost in Washington to expose the agency's inspection process as a charade. He appeared as a surprise witness at the Senate Foreign Relations Committee inquiry on 19 June, summoned there by Senator Alan Cranston (D–Calif.). Cranston, an advocate of strengthening controls on fuel shipments, had spoken with the 33-year-old inspector earlier in the week and persuaded him to speak publicly about problems inside the agency. Richter agreed, and 3 days before the hearing, he quit his well-paid position as the only American inspector in the IAEA division that watches the Middle East.

Richter has never been to Iraq, but he claimed to have good information about the situation there and about the limitations of IAEA inspection procedures. The latter, he said, amounted to a flawed system of accounting in which the inspector checks a list of shipments against a list of receipts made available by a country and then makes a perfunctory tour of "declared" facilities. Richter said that it is impossible to conduct a surprise inspection since one must obtain a visa beforehand. He also said that the type of reactor acquired by Iraq (a 70-megawatt materials testing device) could be used secretly to manufacture weapons material.

To support Richter's argument, Senator Cranston released several internal IAEA documents dated February and March 1981. These revealed that staffers at the IAEA had been concerned for more than a year that Iraq might have found a loophole in the inspection system. These staffers had recommended, unsuccessfully, that the IAEA adopt a more aggressive inspection policy for this type of reactor.

Richter said that he, too, had asked his superiors many times to address the Iraq problem, to no avail. When Richter began to read from a letter he had sent the State Department a year ago, he was told he was in danger of violating secrecy regulations. He had to paraphrase his letter. Here, in part, is the text he was not allowed to read in the hearing room:

> The available information points to an aggressive, coordinated program by Iraq to develop a nuclear weapons capability during the next 5 years. . . . The IAEA safeguards are totally incapable of detecting the production of plutonium in large-size materials test reactors under the presently constituted safeguards arrangements. Perhaps the most disturbing implication of the Iraqi nuclear program is that the NPT agreement has had the effect of assisting Iraq . . . by absolving the cooperating nations of their moral responsibility by shifting it to the IAEA.

The Foreign Relations Committee also heard Cranston's charge that the January inspection of Iraq's reactor was conducted with the lights out: "It was limited to a visual inspection of the fuel. And the whole operation was conducted by flashlight." Several fuel elements could not be checked, Cranston added, "because they were locked in a vault and the key could not be located at that time."

As of this writing, the State Department's only comment has been that a response will be forthcoming.

The Richter testimony calls into question the present scheme of IAEA inspections and raises a general question about the law that governs them. Does the NPT really encourage only peaceful uses of atomic power, or does it indiscriminately stimulate all kinds of nuclear trade?

Despite Israel's many pleas not to do so, France shipped 13 kilograms of highly enriched uranium (93 percent pure) to Iraq in July 1980. This was done in accord with a 1975 Franco-Iraqi agreement in which France promised to build and fuel a pair of small reactors to be used for research. The agreement took shape under the duress of the post-embargo scramble for oil suppliers. France assured its continued access to desperately needed Iraqi oil and at the same time sealed a $1.5-billion arms deal. In return, Iraq got some reactors.

Italy, also resisting Israeli protests, agreed in 1980 to supply Iraq with equipment to handle nuclear fuel. Richter claims that the Iraqis are getting shielded

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laboratories for handling radioactive samples and possibly plutonium separation, a radiochemistry laboratory, a pilot reprocessing facility, and a fuel fabrication laboratory. For this, the Italian company providing the equipment has reportedly been paid a little over $50 million, and Italy has won a contract to build military ships for Iraq.

In addition, several countries—Portugal, Italy, Niger, and possibly Brazil—have sent or are planning to send large quantities of semi-processed uranium known as yellowcake (U_3O_8) to Iraq. Estimates of the volume range from 100 to 300 tons. Iraq apparently has no plans to build facilities to convert the ore to fuel, but the ore could be irradiated in the French reactor to produce plutonium.

Even before the Italian deal, Israel announced that the situation was becoming intolerable. Israeli officials made threats in public and private, suggesting that if the big powers did not intervene, Israel would act to crush the growing nuclear program in Iraq. Some examples are worth citing. The chief aide to Menachem Begin was quoted last July as saying, "Israel cannot allow itself to sit back and wait for an Iraqi bomb to fall on our heads." Former chief defense scientist and Begin adviser Yuval Ne'eman warned at the same time that Iraq would be able to build a bomb within 2 years. Deputy defense minister Mordecai Zipori was quoted as saying of the campaign against Iraq, "We will explore all legal and humane avenues. If pressure doesn't work, we'll have to consider other means." At that time Israel had already been accused of directing murder and sabotage plots against Iraqis (*Science*, 29 August 1980, p. 1001 and 31 October 1980, p. 507).

Although Israel did apply diplomatic pressure in the United States and Europe, it never made public its full case against Iraq. Perhaps Israel found it awkward, having never signed the NPT, to demand that restrictions be imposed on Iraq, a seemingly obedient follower of NPT rules. Perhaps Israel's military did not wish to draw attention to the bombing plan.

In any case, the failure to make a formal case against the Iraqis before the attack is now seen as a breach of international law. Undersecretary of State Walter Stoessel, Jr., told the Senate Foreign Relations Committee on 18 June: "The United States was not consulted in any way about any phase of the Israeli action, nor were we informed of it in ad-

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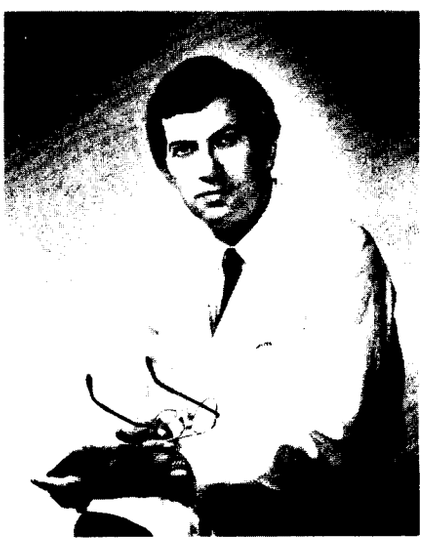
Cancer Researchers Defend NCI Against Congressional Attacks

Unusually aggressive though largely unspecific criticism by members of Congress of the National Cancer Institute and its director, Vincent T. DeVita, Jr., have brought forth a strong reaction from the cancer research community. At recent Senate hearings, Senators Paula Hawkins (R–Florida), Orrin Hatch (R–Utah), and Howard Metzenbaum (D–Ohio) were particularly vehement in attacking NCI's failure to produce a cure for cancer and in challenging DeVita's ability to manage the vast cancer enterprise (*Science*, 13 February, p. 684, and 19 June, p. 1366).

Metzenbaum, who in the past has been supportive of NCI, publicly accused DeVita of being "blasé" about his leadership of NCI. Hatch, for reasons that are not clear, has indicated in private that he wants DeVita ousted from the NCI directorship which is a presidentially appointed post.

The National Cancer Panel, which reports directly to the President, the National Cancer Advisory Board, and an overwhelming majority of NCI's senior scientific staff are among those who have rushed to DeVita's de-



Vincent T. DeVita, Jr.

Flattered by researchers' support

fense. The panel, headed by Rockefeller University president Joshua Lederberg, sent a wire to the President on DeVita's behalf; the advisory board sent a letter saying that if DeVita is not reappointed, the national cancer program will suffer "irreparable damage."

In a letter to Richard H. Schweiker, Secretary of Health and Human Services, more than 90 directors and heads of NCI's laboratories and clinics said they were "dismayed by the impressions reflected in the press following the recent hearings of the Senate Committee on Labor and Human Resources." They called DeVita an "excellent manager of scientists and scientific resources and . . . a dynamic leader." Copies of their letter, which is reprinted in full on page 9, went to more than 20 members of Congress and to White House science adviser George A. Keyworth, among others. Keyworth is known to be an admirer of DeVita's.

The effect of public and private politicking apparently is working in DeVita's favor. Several of Hatch's Senate colleagues have urged him to back off and Metzenbaum actually phoned DeVita to apologize for the tone of his criticism. DeVita, who has been trying to keep a low profile throughout, says that he is "very flattered" by the support he is getting and that he believes that he and Hatch can get along.

—BARBARA J. CULLITON

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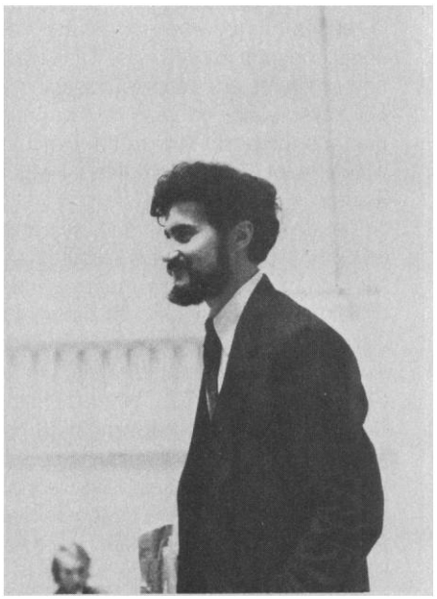
vance. Although we had concerns about the potential of Iraq's nuclear program, we do believe that the Israelis had not exhausted all the diplomatic options available. . . . For these reasons we condemned the attack."

In the hours just after the attack, Israel



Roger Richter

Having quit the IAEA on 16 June, he testified that Iraq was planning to make atomic bombs.

issued some information to justify its action that has since proved false. For example, Begin mentioned that there was a secret bomb factory which he said at first was 130 meters and later 13 meters beneath the reactor. There was no such factory. A State Department technical expert, John Boright, acting deputy assistant secretary for nuclear energy and energy technology, said in the Senate hearings that the only thing that might fit Begin's description was a fuel transfer tunnel running between the large reactor (Osirak) and the small backup reactor.

Israeli officials also said it was necessary to move quickly because the bomb program would soon be under way and the reactor would be charged with hot fuel. Attacking a hot reactor, it was said, would cause radiation deaths in the city of Baghdad, 12 kilometers away. Thus, the bombing was presented as a humane act.

Physicist William Higinbotham of the Brookhaven National Laboratory says it is very unlikely that bombing such a small reactor would produce any radiation deaths. Yet, as several congressmen pointed out, an attack on a hot reactor would have produced horrible political fallout, even if it produced no deaths.

No one has claimed that Iraq was actually building a bomb or even producing weapons material at the time of the attack. Although several scenarios have been proposed to illustrate how Iraq might have produced bomb material in the future, none suggests that Iraq could have made a bomb sooner than a year from now.

In the most likely scenario, Iraq could have used its French reactor to irradiate natural uranium, thereby producing plutonium, which could have been extracted and used in weapons. All the technical witnesses who appeared before the Senate Foreign Relations Committee in June said this was the most credible scenario. Yet even Richter, who believes Iraq is already headed down this path, agrees that many obstacles blocked the way.

A large-scale irradiation program would cause the reactor to burn fuel more rapidly, for instance, perhaps requiring twice the scheduled number of fuel shipments each year, Higinbotham says. The French would have to cooperate in the deception, which seems unlikely. It might also be necessary to rearrange the reactor's plumbing to remove excess heat. Large casks of irradiated material would have to be trundled from place to place, out of sight of the IAEA inspectors. Tons of material would have to be processed through the laboratories. Would the 75 to 150 foreign technicians running the reactor fail to notice? Would they keep quiet if they did notice? And how would the extra fuel shipments and the irradiation program be explained to the IAEA?

If all this activity could have been hidden successfully, and if a miracle of industrial productivity had occurred in a country not noted for technical feats, Iraq might have collected enough plutonium for two or three bombs at the end of a year, according to Richter. Higinbotham disputes this estimate, based on his own recent calculations of the uranium-to-plutonium conversion rates possible in Osirak. He says that even under the most favorable conditions, Iraq could have produced enough material for only one bomb a year.

France has not been entirely straightforward in describing the Iraqi program, and this may have led to confusion. For example, French officials have told the IAEA and the press that the reactor is producing 40 megawatts of power, while a small-reactor specialist at the Department of Energy tells *Science* that he has learned from French engineers that Osirak is capable right now of running at 70 megawatts, without major mechanical changes. The higher the power, the greater Osirak's weapons-producing ability. In addition, many observers have questioned France's wisdom in waiting until 2 weeks after the bombing to reveal an agreement that reputedly guarantees French control of Osirak until 1989.

There is little reason to fear that Iraq was on the verge of producing a nuclear weapon. Yet there is evidence of a hidden agenda in Iraq's nuclear program, which may come to the surface 5 to 8 years from now. As Boright noted during the Senate hearings, the United States has been worried by the breadth and the pace of Iraq's investment in nuclear technology. It seems unusual at so early a stage of development.

If Iraq is truly interested in research and training, why does it need any fuel processing equipment? And its choice of the Osirak reactor as a first purchase seems unusual. According to a Department of Energy physicist familiar with research reactors, this type of reactor was really meant to be used in conjunction with a thriving nuclear industry. A materials test reactor is designed to generate a large neutron flux, and it is shaped with extra space in the core to hold test samples. It is a builder's tool, used to test fuel rod alloys and other materials used by reactor manufacturers. The materials test reactor may also be used to manufacture large quantities of radioactive isotopes for basic research and radiomedicine. Iraq has no nuclear industry and no pressing need for radioisotopes. Thus, the reactor may have been destined to serve as an expensive training device and perhaps as a plutonium factory.

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The most striking anomaly, of course, is the notion that Iraq, with potential oil reserves that rival the Saudis', finds it necessary to resort to atomic power for electricity. Last of all is the fact that Iraq's president has said he would like to bomb Tel Aviv off the map. Taking this into consideration, it is not difficult to understand why Israel was unwilling to trust its fate to the deliberations of the IAEA.—ELIOT MARSHALL