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THE BUENOS AIRES OATH: A HIPPOCRATIC OATH FOR SCIENTISTS

A group of Argentine Scientists, mainly astrophysicists, were instrumental in the convening of an April 11-15 conference on Scientists, Disarmament and Peace which produced a workable "Hippocratic Oath" for scientists.

Led by a young astrophysicist Guillermo LeMarchand, and with activist-biologist Alberto Pedace handling public relations and logistics, the students got the backing of the Administration of the University of Buenos Aires and of the Argentine government to hold the conference.

Invitees included two Soviet scientists, a Chilean social scientist, the French President of the World Federation of Scientific Workers (WFSW), a Venezuelan, an Italian, a Pole, several Brazilian scientists as well as representatives from the Argentine scientific community.

Papers were presented for a week, for about ten hours a day. About 100 students attended. The topics included nuclear winter, seismic monitoring of underground testing, Star Wars, Latin American nuclear questions, World Laboratory, INF, economic implications of the arms race, science and ethics, the need for scientists to organize, and so on.

But the single most significant "output" of the conference was certainly the "The Buenos Aires Oath."

LeMarchand, especially, and some of his associates, had wanted some kind of Hippocratic Oath for scientists from the beginning and his contribution to the conference was a paper detailing the (failed) efforts of the past to get one adopted at Pugwash, at the International Physicians Movement and in the U.S. He calculated that 1.7 billion hours per year were being spent by scientists on "the planet's

destruction" and that 30% of the totality of the scientists, engineers and technicians of the world were working on R&D for military purposes.

He urged the establishment of a "project to ethically bind people upon graduation" to use their knowledge "only for the benefit of mankind."

LeMarchand turned out to have a gentle, thoughtful, and attractive personality. He leaned toward quoting Ghandi and was much admired by his fellow students for his attitudes toward science and society and for his ability at astrophysics.

The "Project" the students put forward originally envisaged 5 points of which the "Act of Swearing" or "Commitment on Graduation" was just the first. The students wanted also:

2) Eliminating any university courses that proposed destructive or harmful scientific techniques. [This was dropped when it was pointed out the difficulties the word "proposed" raised.]

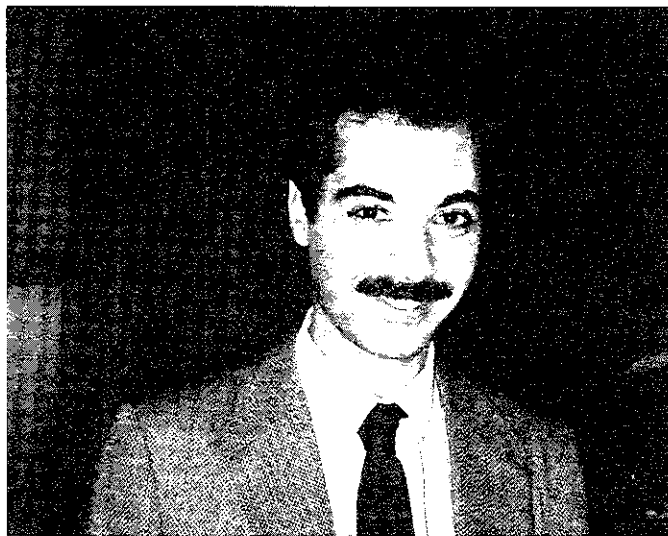
3) Studying a Peace Education Program with the help of UNESCO.

4) Working out ways to make scientists aware of their responsibilities.

5) Limiting access to the educational media by "persons presently involved in bellicose activities." [This was dropped, as LeMarchand expected, because of the problems it raised for free speech and, also, definitional questions.]

Even without points 2 and 5, there were problems. The subsequent discussion showed why Hippocratic oaths normally failed. In the past, they were usually directed at non-participation in military activities, which was, indeed, what LeMarchand and his astrophysicist associates originally had in mind. But in that form the oath could capture the

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Guillermo A. LeMarchand, father of The Buenos Aires Oath

THE BUENOS AIRES OATH

"Aware that, in the absence of ethical control, science and its products can damage society and its future, I pledge that my own scientific capabilities will never be employed merely for remuneration or prestige or on instruction of employers or political leaders only, but solely on my personal belief and social responsibility — based on my own knowledge and on consideration of the circumstances and the possible consequences of my work — that the scientific or technical research I undertake is truly in the best interests of society and peace."

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support only of the scientist "pacifists" and not the main core of the scientific body. Even then the "oaths" would have problems explaining why such peaceful notables as Albert Einstein had recommended to higher authorities the building of an atomic bomb. Obviously circumstances mattered.

Oaths are of special interest in Latin America because the Latin American tradition encourages them. At graduation, students may swear a professional oath and, also, in Argentina, an oath to support the "fatherland." It was natural for the students to feel that scientists needed their own oath in a way that would not occur to students in the U.S. (For example, in Brazil, one participant explained to a visitor, it was envisaged that the Universities would adopt the Buenos Aires Oath for use at graduation. Then a single student in each class would, at graduation, take the oath on the stage as a surrogate for the others. Students could opt out, but it would take a deliberate decision.)

Even the social scientists, in the person of Patricia Morales, who runs a journal called *Ethics and Science* wanted to be involved. Ms. Morales said, "Today, social scientists swear on the Bible and for the Fatherland, but these pledges are obsolete now and we need something like the Hippocratic Oath."

In the discussions of a drafting committee, some suggested an oath that scientist members of the military could sign that would only prohibit work on weapons of mass destruction. An Argentine scientist, F. Cernusci, spoke movingly of how he saw scientists at Harvard and MIT cooperating with the military in World War II. (Given military rank, they were assigned to "think" and, even when they said they were bored and could think of nothing, were told to persevere. One such scientist finally ordered enormous numbers of aluminum tooth picks which were dutifully bought and shipped to England where they were dropped from planes to confuse German radar.)

It was interesting for a visitor to see the diverse attitudes that this problem raised. At a subsequent drafting session, President J.M. LeGay of the World Federation of Scientific Workers said that scientists ought not adopt any oath

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Three Argentine astrophysicists and a biologist — student staffers of the conference.

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at all since it would simply "wash the hands of the political authorities" and take all the responsibility onto the scientists! He felt scientists were "powerless" and asked how a violation of such an oath could be proved. (This seemed to show how unactivist the World Federation of Scientific Workers has become and perhaps reflected also the fact that LeGay is a lawyer not a natural scientist.)

The working group finally decided to avoid oaths that would be "scientific pacifist" but to adopt one that was "ethical." The draft finally approved by the Conference was:

"Aware that, in the absence of ethical control, science and its products can damage society and its future, I pledge that my own scientific capabilities will never be employed merely for remuneration or prestige or on instruction of employers or political leaders only, but solely on my personal belief and social responsibility—based on my own knowledge and on consideration of the circumstances and the possible consequences of my work—that the scientific or technical research I undertake is truly in the best interests of society and peace."

As LeMarchand later explained to the Conference, they had "opted for a formulation that would raise consciousness rather than for a more committed pledge."

Most of the discussion in the drafting sessions revolved around the question of simplifying the oath. But it was felt that simplification could always come later if other institutions or countries wanted to do so for their own purposes, while enriching it could not. Accordingly, a substitute that simply asserted that scientists would consider the consequences of their acts was shelved.

Argentinean/Brazilian Nuclear Cooperation

On arrival in Argentina, the newspapers were full of reports of a meeting between President Alfonsín and Brazilian President Sarney. In a joint communique, they had confirmed the "inalienable" right of each state to pursue its programs for peaceful purposes. [This reminded a visitor of two alcoholics issuing a declaration confirming their right to drink.]

They went on to announce that they would enhance bilateral cooperation because of its importance to economic and social development. The meeting meant, according to Alfonsín, the end of any type of arms race in Latin America. The Argentine enrichment plant for uranium would be useful for providing fuel for submarines.

This matter came up at the conference where representatives met from the Brazilian and Argentinean physics societies to discuss the matter. Fernando de Souza-Barros, a past President of the Brazilian Physics Society, also presented a paper on the subject.

The two physics societies had earlier made a joint statement urging civilian control of the various nuclear programs in the two countries. They were both in favor of mutual inspection by the two sides of the other's installations but they felt that these high level visits by Presidents were not inspection and, instead, were just giving legitimacy to the programs.

The communique of distinguished physicists at the meeting said that they would urge both physics societies to undertake "concrete actions" and, in particular, to create a commission inside each physics society looking for formulas in which their national societies could control nuclear research through inspection and through keeping their parliaments advised.

Souza-Barros explained that the Brazilian public had been persuaded that atomic energy issues should be decided in a tightly controlled part of the Executive Branch without congressional or public involvement. It was criti-

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OATH OF HIPPOCRATES

Sixth Century B.C.—First Century A.D.?

I swear by Apollo Physician and Asclepius and Hygieia and Panacea and all the gods and goddesses, making them my witnesses that I will fulfil according to my ability and judgment this oath and this covenant:

To hold him who has taught me this art as equal to my parents and to live my life in partnership with him, and if he is in need of money to give him a share of mine, and to regard his offspring as equal to my brothers in male lineage and to teach them this art — if they desire to learn it — without fee and covenant; to give a share of precepts and oral instruction and all other learning to my sons and to the sons of him who has instructed me and to pupils who have signed the covenant and have taken an oath according to the medical law, but to no one else.

I will apply dietetic measures for the benefit of the sick according to my ability and judgment; I will keep them from harm and injustice.

I will neither give a deadly drug to anybody if asked for it, nor will I make a suggestion to this effect. Similarly, I will not give to a woman an abortive remedy. In purity and holiness I will guard my life and my art.

I will not use the knife, not even on sufferers from stone, but will withdraw in favor of such men engaged in this work.

Whatever houses I may visit, I will come for the benefit of the sick, remaining free of all intentional injustice, of all mischief, and in particular of sexual relations with both female and male persons, be they free or slaves.

What I may see or hear in the course of the treatment or even outside of the treatment in regard to the life of men, which on no account one must spread abroad, I will keep to myself holding such things shameful to be spoken about.

If I fulfil this oath and do not violate it, may it be granted to me to enjoy life and art, being honored with fame among all men for all time to come; if I transgress it and swear falsely, may the opposite of all this be my lot.

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cal, he felt, to strengthen and consolidate Brazilian democratic institutions. And, for this, they would need to have the disarmament and the detente continue in the North.

Souza-Barros said that, in Brazil, nuclear energy was stalled from 1964-1972 by the military takeover. The Brazilian-West German agreement was in slow motion because Brazil was bankrupt, and no fuel reprocessing or uranium enrichment has thus far been carried out. The Brazilian-West German deal for eight nuclear reactors evidently had a special clause requiring the West Germans to provide Brazil with a "complete fuel-cycle package," i.e., as free a shortcut to fissionable material as international safeguards would permit.

But in 1986, Brazilians decided to build a nuclear-powered submarine which is now run through a secret bank account controlled by the President. Using Ultra centrifuges for U-235, they have isotopic enrichment to 1.2%.

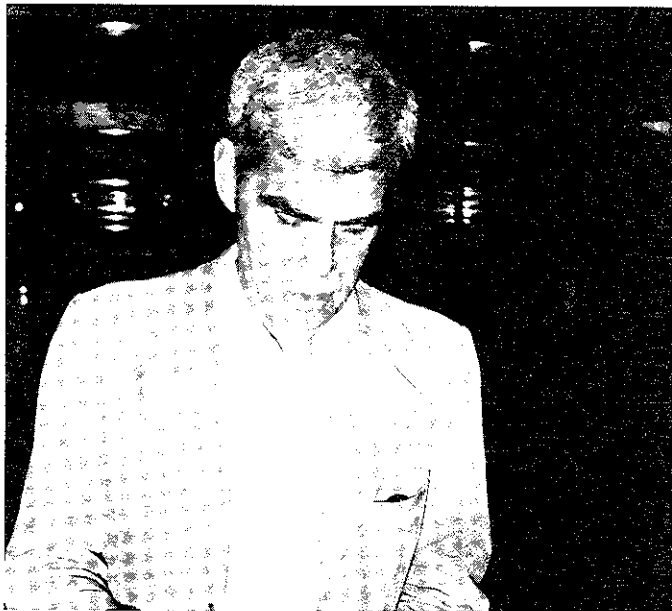
In 1987, the Brazilian Physics Society got 60,000 signatures on a statement, which it wants put in the Constitution, saying:

"The construction, storage and transport of nuclear weapons is forbidden in Brazil."

Nevertheless, he said:

"... step by step, these two countries approach that moment when the actual construction of nuclear weapons will rest upon a political decision. When that moment arrives, prevailing reasons of state will be the only basis for not going ahead with a bomb unless the authorities have been pre-empted by a definitive mandate of the society as a whole. This mandate will require the strengthening of our democratic institutions. But it will also rest on the awareness of our people. It is the duty of Latin American scientists to contribute toward this goal."

—Jeremy J. Stone



Fernando de Souza-Barros

ISRAEL'S NUCLEAR ARSENAL

by David Albright

On March 24, Mordechai Vanunu, the former technician at the Dimona nuclear facility who disclosed Israeli nuclear weapons secrets to the London *Sunday Times*, was convicted by a Jerusalem court of espionage and treason. His conviction adds additional credibility to his revelations that Israel has a larger and more sophisticated nuclear weapons program than commonly believed, including possibly the ability to build thermonuclear weapons.

The U.S. government has said little about Vanunu's revelations, his kidnapping to Israel from Europe, or his subsequent conviction. This silence partially reflects a long standing U.S. policy to treat Israel's nuclear program differently than programs in other "threshold" countries. For several decades, Israel has been a close U.S. ally, and since Israel has not tested its weapons openly or declared itself a nuclear weapons state, the United States has been willing to craft laws aimed at stopping the spread of nuclear weapons to other nations in such a way as to avoid cutting off military and economic assistance to Israel.

Israel's Warheads

Vanunu's statements to the *Sunday Times* were the most recent of a long list of credible reports that Israel possesses nuclear weapons. The CIA is reported to have first concluded that Israel had nuclear weapons in the late 1960s. By the mid-1970s, it estimated that Israel had 10 to 20 nuclear weapons available for use. Its conclusions were based on the output of Israel's unsafeguarded heavy water reactor near Dimona, its secret acquisition of large quantities of uranium, and Israel's large investment in a costly missile system designed to accommodate nuclear warheads.

Vanunu's detailed description of a large underground reprocessing plant at Dimona provided dramatic confirmation that Israel had greatly expanded its nuclear arsenal during the last decade. He stated that the reprocessing plant could separate annually 30 to 40 kilograms of plutonium, enough for up to 10 warheads a year. These values imply that the power of the Dimona reactor is between 110 and 150 megawatts thermal (MWt), over four times larger than the 25 MWt reactor commonly believed to have been supplied by France in the 1950s.

According to a U.S. government source, however, the consensus of people in the government who have studied Vanunu's information is that the reactor power has not reached the higher levels stated in the *Sunday Times* article. Another government source stated that the power has probably never exceeded 70 MWt. However, these sources cautioned that estimates of the power of the reactor are very uncertain.

If the Dimona reactor has always operated at less than 70 MWt, then it could have produced enough plutonium for less than 100 weapons, assuming that each warhead requires at least 4 kilograms of plutonium. A calculation based on more realistic assumptions about the power histo-

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ry of the reactor would imply that Israel has between 40 and 70 warheads.

If Israel has obtained weapon-grade uranium, it could have even more nuclear weapons. For years, Israel has been developing laser enrichment technology, and Vanunu stated that Dimona has a facility that enriches uranium. In addition, Israel is widely suspected of having diverted weapon-grade uranium from the United States during the 1960s, but reports about this diversion state that Israel could have obtained enough material for only a few nuclear weapons.

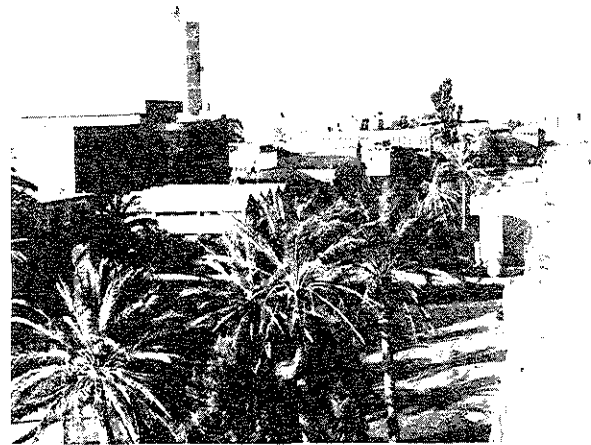
The above estimate of the size of Israel's arsenal, however, is considerably lower than estimates reported in *Aerospace Daily* which said in 1985 that Israel might have up to 200 warheads. Reconciling the various estimates is beyond the scope of this article, but their wide variation underlines the uncertainty in public and governmental estimates of the size of Israel's nuclear arsenal.

Another uncertainty about Israel's arsenal is whether Israel has fully assembled nuclear weapons, or is "just a screwdriver's turn" away from them. The distinction, however, is unimportant; since in any case Israel could undoubtedly deploy its weapons quickly enough to use them in a crisis. In addition, keeping the plutonium or weapon-grade cores of the warheads isolated from the rest of the warhead would be required if Israel has not designed its weapons against accidental nuclear detonation or unauthorized use. Such a practice, which was also followed during the first decade of the U.S. nuclear weapons program, would preclude the possibility of an accidental detonation of the high explosives in the weapon causing an unintended nuclear explosion or the dispersal of plutonium. It would also lessen the risk that its warheads could be seized and used by an enemy.

Thermonuclear Weapons

Vanunu released information to the *Sunday Times* that suggested that Israel is knowledgeable about very sophisticated nuclear weapons designs, including thermonuclear weapons. Vanunu stated that the Dimona complex is producing materials, such as tritium, lithium, and deuterium, which are necessary in thermonuclear and boosted fission weapons. Vanunu also provided pictures that, according to nuclear weapons designers, suggest that Israel might be developing thermonuclear weapons.

Because Israel has never had an extensive full-scale nuclear weapons testing program, many questions remain about how it could have developed highly sophisticated weapons. Israel might have designed its weapons to be simple, conservative, and reliable using computer simulation and component testing, although according to the former nuclear weapons designer Theodore Taylor, "full confidence in the performance of boosted fission weapons or thermonuclear weapons of any kind requires testing at yields at least in the vicinity of a few kilotons." Israel might have also managed to obtain key weapons design information by penetrating another country's nuclear weapons program or obtaining unofficial cooperation from foreign weapon designers.



A photo taken by Mordechai Vanunu, a former Israeli nuclear technician, who said this is a view of Israel's Dimona nuclear complex from the roof of the reprocessing facility where he worked. Copyright The Sunday Times, London reprinted by permission of the editor.

Israel's reasons for wanting thermonuclear weapons are probably related to its desire for larger yield weapons and weapons that could produce less fallout. Larger yield weapons would enable Israel to use fewer weapons on a city or military target. By lowering the amount of fallout that could blow back onto Israel, thermonuclear weapons could be more usable against troops massed near Israeli borders.

Delivery Vehicles

Whatever the number and sophistication of Israel's nuclear warheads, the country has advanced aircraft and missiles capable of delivering its warheads to its foes. With its existing nuclear warhead arsenal, Israel could destroy most major Arab or Islamic cities and military targets, threaten the Soviet Union, and still have several weapons left for use against enemy troops near its borders.

Israel's nuclear-capable F-15 aircraft have a combat radius of over 1000 miles, sufficient to reach the Soviet Union and distant Arab capitals. Although its F-16 attack aircraft have a slightly shorter range, Israel has an aerial refueling capability which would enable these planes to reach many of the same targets.

An April 1988 *Washington Post* article citing U.S. military sources reports that Israel is well along in development or deployment of two versions of Jericho II missiles, with ranges of 400 and 900 miles. Both are highly accurate and capable of carrying nuclear warheads. Last year, the newer one was flight-tested over a 500 mile range in the Mediterranean. Once operational, the longer-range missile will be able to reach the border of the Soviet Union.

U.S. Nuclear Export Laws

Despite these new developments, the United States maintains an official silence about Israeli nuclear weapons. This veil around the Israeli nuclear program has been important in enabling the U.S. government to sculpt U.S. proliferation laws around Israel, particularly those laws

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that use the threat of a cutoff of U.S. military and economic assistance to prevent the spread of nuclear weapons or the capability to make them.

This process can be seen in the development of a set of amendments to the Foreign Assistance Act, often called the Glenn-Symington Amendment. This act includes provisions that require a cutoff in economic and military aid to any non-nuclear weapons state that imports unsafeguarded reprocessing and enrichment technology or equipment, or detonates a nuclear explosive device after the date of enactment of this law which was 1977. The amendment also contains a provision that allows the President to obtain a waiver for national security reasons.

Since Israel obtained its reprocessing technology from France before 1977, it was "grandfathered" by this amendment. Because of concerns that Israel not lose its aid during the middle of a war in which it detonated a nuclear explosive, the Glenn-Symington Amendment also allows the United States to continue aid for an additional 30 legislative days after a nuclear detonation.

Israel's nuclear weapons program has prevented Glenn-Symington from being able to include general provisions that require sanctions if a non-weapons state possesses nuclear weapons. For example, during the early 1980s, members of Congress attempted to add a provision to the *this amendment that would require an aid cutoff if a non-weapons state took steps that indicate it is in the process of manufacturing a nuclear explosive*. Discussions between members of Congress and the Administration made it apparent that this provision could affect Israel. This guaranteed that the provision was dropped in committee.

In 1985, Congress, frustrated with the waiver of the Glenn-Symington Amendment for Pakistan despite abundant proof that it was developing nuclear weapons, passed legislation that required the President to certify to Congress each year that "Pakistan does not possess a nuclear explosive device" and that the proposed aid "will reduce significantly the risk that Pakistan will possess a nuclear explosive device." This double standard did not go unnoticed, and led to protests that Pakistan was being treated unfairly.

Not all non-proliferation laws governing nuclear exports have excluded Israel. For example, the Nuclear Non-Proliferation Act of 1978 cut off nuclear cooperation with Israel, because it refused to apply international safeguards to all of its nuclear facilities. This cutoff has hindered Israel's attempts to obtain foreign assistance in building commercial nuclear power reactors, although Israel might have dropped its plans to build them in any case.

U.S. Policy Failures

Some in the administration view Israel's lack of a large scale nuclear weapons testing program as a success for U.S. non-proliferation policy. Israel's program, however, has caused U.S. proliferation policy to focus itself unduly on preventing threshold countries from overt testing of nuclear weapons rather than covert possession of them. This imbalance has contributed to the current failure to stop several threshold countries, such as Pakistan, India,

and South Africa, from proliferating.

The United States' failure to prevent the development and growth of Israel's nuclear arsenal is undoubtedly seen in the Mideast as tacit support for that arsenal. Since the United States is also actively working to stop Arab countries, particularly Iraq and Libya, from obtaining nuclear weapons capability, lack of U.S. condemnation of Israel's arsenal is hypocritical, and can be expected to make Arab and Islamic countries even more determined to get nuclear weapons.

Conclusion

We might have already had a foretaste of the risks posed by Israeli nuclear weapons during the 1973 Yom Kippur War. Israel is reported to have assembled and deployed nuclear weapons early in the war when it was faced with possible defeat. According to these reports, this triggered the Soviets to dispatch nuclear warheads to Egypt, which in turn caused a global U.S. military alert.

With the development of its longer-range Jericho II missile, Israel seems to be obtaining the capability to deter the Soviet Union from supporting Arab or Islamic states in the event of war. These missiles, armed with nuclear warheads, could be used to pressure the Soviet Union into stopping Arab states that might be overrunning Israel.

Now, Pakistan either already possesses nuclear weapons or could do so in a short period of time. It could share these weapons with its Islamic allies during the next Mideast war, making the situation that much more unstable. As a result, the next major Mideast war might include a nuclear ultimatum by whichever side is losing.

A frightening new dimension in the Mideast is the growing use of chemical weapons and intermediate range missiles by Iraq and Iran. Syria is also believed to possess chemical weapons and Soviet-supplied short range missiles. Israel, in response to a chemical attack on its cities or military airfields, might respond with a nuclear attack.

All this is extremely dangerous. Since the United States has failed so completely in preventing the spread of nuclear weapons to the Mideast, it has an obligation to itself and the world to prevent these weapons from being used. The United States should be prepared to use its economic and military aid and its political influence to obtain a just settlement.



Taken by Vanunu, who said this photo shows the control room of Israel's secret underground reprocessing plant at the Dimona complex. Copyright The Sunday Times, London, reprinted by permission of the editor.

DO WE NEED AN INTERNATIONAL POLICY ON HAZARDOUS WASTE EXPORTS?

by Bonnie Ram

Late in 1985, more than 100,000 gallons of hazardous waste from Southern California found its way to an open field in Tecate, Mexico — a few miles from the border. Bribes to Mexican Custom agents had helped pave the way. The Mexican government ultimately disposed of the waste securely in a landfill.

In another illegal case, waste entrepreneurs falsely labeled 275 drums of dangerous wastes as cleaning fluids. These drums were purchased by a company in Zimbabwe with federal funds from the U.S. Agency for International Development. An agency audit discovered the scam. Meanwhile about 1500 gallons of hazardous waste remain in a phosphate mine pit in Zimbabwe.

These are just two examples of what appears to be a growing international trend — uncontrolled dumping of hazardous wastes across national borders. The few cases that the press has uncovered thus far include the involvement of dummy companies set up specifically for the waste trade.

Stricter policies within countries may have created incentives for entrepreneurs to dispose of hazardous waste outside their countries. In particular, tighter domestic regulations, in many industrialized countries, have made the costs of "proper" land disposal rise astronomically. As siting of new landfills and incinerators have become politically unpopular, "capacity crunches" also have been felt in various regions in the U.S.

When asked about the scope of the problem a State Department spokesperson noted that, "This is a newly perceived problem and we have no way of knowing its scale. But this issue can only heat up."

Besides the illegal movements of hazardous wastes, there is an increasing volume of legal exports. The trade is as diverse as the hazardous waste problem itself. Some of the legitimate trade is between industrialized countries for treatment and/or recycling. A significant portion of the exports from the U.S. to Western Europe, for example, is to reclaim precious metals from byproducts. Other legal exports might be destined for nations that have more favorable terms for disposal. For example, Canada imports

about 100,000 tons of hazardous waste annually from U.S. companies located in the northeast corridor.

To date, a very small number of legal hazardous waste shipments from the U.S. are destined for cash-short nations that accept the waste in exchange for hard currency, technology or services. These countries, generally, do not have the same standards and/or domestic legislation concerning proper waste disposal as we do.

Under U.S. law, many wastes can be traded but only hazardous waste is regulated. Hence, the recent "garbage barge" that shipped incinerator ash to Guinea is not regulated because it is categorized as a "non-hazardous waste." This incident, however, has piqued an interest on Capitol Hill about the U.S. role in exporting garbage to developing countries.

Despite the small volumes of waste involved, transboundary shipments of hazardous wastes present foreign policy and moral concerns for the U.S. Exporting these wastes to a nation that lacks the ability to manage them could lead to the U.S. being blamed for resultant environmental disaster. Already, there have been minor diplomatic incidents where the U.S. State Department has intervened. Press reports in Central and South America about rumored exports have fueled negative images of "big brother" to the north dumping garbage on them. One official of the United Nations Environment Program (UNEP) in New York even went so far as to say that "Governments could fall because of this."

U.S. Law Requires Notification

To deal with this problem, U.S. law requires the exporter to notify the importing country of the composition and quantity of the intended hazardous waste shipment. The country, thereafter, has the right to refuse the shipment. The principle of "prior informed consent" assumes that the importing nation will set its own criteria for deciding whether it can or cannot handle the waste properly. Clearly, the effectiveness of prior informed consent depends on full disclosure of information by the exporter and on the ability of the importing nation to assess it scientifically and to act upon it.

A key issue that is, of course, not addressed by U.S. law is the international monitoring of the hazardous waste to its final disposal. As one EPA official noted, "It's not our business what the importing country does with the waste once it exits our border. We can't tell other countries what to do."

Disposing of toxic chemicals in another country could boomerang. With about \$20 billion of food imports to the U.S., the "circle of poison" could end up on American dinner tables. We have seen this phenomenon with banned pesticides exported to Mexico that find their way into agricultural products that are imported back into the U.S.

In a case directly related to waste shipments, West German chemical wastes exported for final land disposal in East Germany allegedly have caused groundwater contamination back across the western border.

(Continued on page 8)



Illegally dumped hazardous waste drums from Southern California were found in Tecate, Mexico. *Proceso*, (490): 16-17, 1986.

(Continued from page 7)

Determining how much hazardous waste crosses U.S. borders is difficult because of unreliable and inaccurate data. In 1983, OECD estimated about 5000 international shipments took place in North America. According to EPA's export notification records, the number of planned shipments rose from 30 in 1980 to over 500 in 1986. Assuming the OECD figure of 5000 transfrontier shipments per year is an upper bound estimate, then legal notifications account for just over 10 percent of the estimated number of hazardous waste cargos that could have crossed U.S. borders last year.

About 90 percent of U.S. hazardous waste shipments travelled to Canada in 1986. Exports to Canada are sent to an incinerator complex in Ontario and a chemical treatment center and landfill in Quebec. The number of legal notifications to the Third World has risen from 3 in 1984 to 22 in 1987 including to Mexico, Brazil, Guinea, South Korea, the Philippines and South Africa. Relatively cheap bulk transport by sea keeps long distance exports feasible.

Significantly, hazardous waste traffic to OECD nations, other than Canada, was over 7 percent of total exports in 1987. Some of the OECD countries accepting U.S. hazardous waste for re-use and/or recycling include; West Germany, England, Spain and Finland.

Flourishing Trade in Europe

There are indications of a flourishing trade in Europe — where population densities and geography have created a favorable business climate for disposing and/or treating wastes across borders. At least 10 percent of the total hazardous waste generated in Western Europe crosses one border before final disposal.

Following the Seveso, Italy incident in 1983 — where 41 drums of dioxin-contaminated wastes slipped across the border to an abandoned slaughterhouse in France and ultimately ended up in Switzerland — the European Community called for regional controls on this commerce. The majority of European nations have yet to implement these regulations to control the movements of hazardous waste shipments. Meanwhile, hazardous wastes were discovered

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aboard the Herald of the Free Enterprise, the European ferry that sank off the Belgian coast last year. According to the *Guardian*, the chemical wastes were not properly declared by the shippers before the ferry sailed, and the Belgian authorities are still investigating the circumstances with a view to a criminal prosecution.

The precise dimensions of this trade are almost impossible to estimate. "We hear a lot of stories. We hear a lot of rumors, said Jan Huisman, an official with the International Registry of Potentially Toxic Chemicals (IRPTC) in Geneva. It is going on, but nobody knows exactly how big the trade is." In response to these uncertainties, the U.N. General Assembly adopted a resolution last year calling for the Secretary General's office to investigate this trade.

At this point, what is known has prompted several agencies to call for international controls on shipments of hazardous wastes. The 24 countries of OECD and the 150 nations of UNEP are negotiating separate international agreements to control transfrontier movements of hazardous wastes. Clearly, there is a need for an international trade policy on hazardous wastes. Sustained progress has been made on framing the multinational principles that would govern these movements. The uncertainty rests, however, in finding the human and financial resources to implement it.



"No stupid . . . killing innocent people with toxic chemicals is only immoral during wartime." ISIS International Women's Health Network, Chile.

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