JPRS L/9904

11 August 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

(FOUO 9/81)

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CONTENTS

JAPAN

DEVELOPMENT OF IRRADIATION CHAMBER FOR FUSION REACTOR

Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 59

[Text] In an effort to develop exotic materials needed for nuclear fusion reactors, the National Research Institute for Metals of the Science and Technology Agency plans to build an irradiation creep simulation test facility, and has decided to develop an irradiation chamber called a target test component starting in FY 1981. To produce fusion reactors, irradiation test data that will play a key role in core structure design and new materials development are urgently needed. Consequently, with construction planned for fiscal 1982-1984, the institute will build at its laboratory in Tsukuba Research Garden City (provisional name), a "light ion irradiation creep test facility," a new type of cyclotron that will irradiate protons and carry out creep or fatigue tests or materials.

The Japan Atomic Energy Research Institute is proposing to use SUS316 stainless steel for the experimental fusion reactor in its design. Since there are almost no data available for irradiation by neutrons of 14 mega electron volts (MeV), a lower reactor output must be specified to avoid higher irradiation damage. Stainless steel SUS316 could not survive the operating conditions of the next-stage prototype reactor, necessitating new material development. Above all, neutron energy in fusion reactors is 14MeV in contrast to about 1MeV in fast breeder reactors, in addition to far more helium being generated that can cause problems for fusion core materials.

To meet irradiation test requirements for the more severe conditions of fusion reactors than those in FBRs, the institute plans to introduce a simulation testing technique to collect irradiation test data for core structure designing and new material development.

According to the plan, a compact cyclotron capable of accelerating protons and alpha rays up to 16MeV is expected to be built in FY 1982-1984. First in fiscal 1981, costing ¥27 million, a demonstration irradiation chamber will be developed to conduct creep and fatigue tests, in order to acquire reliable information for the irradiation creep simulation test facility system that will be built for approx. ¥500 million. The new type cyclotron features material endurance tests that can be carried out under simulated conditions. Furthermore, the testing facility is capable of helium irradiation followed by proton bombardment to evaluate both irradiation embrittlement and creep simultaneously.

The device will provide a maximum energy of 16MeV for protons and alpha rays, which corresponds to the ability of the protons to penetrate, or helium ions to halt in, 0.1mm thick stainless steel (SUS316). The proposed test temperatures for the equipment are 300-1000°C, with a maximum test stress of 50kg per square mm.

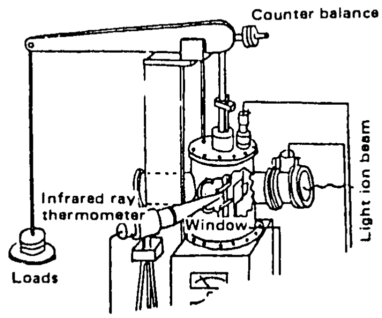

Fig. 1. Target Test Section of Irradiation Creep Test Facility

CSO: 5100/4540

JAPAN

SLAB CORE REFLOOD TEST FACILITY PRODUCED

Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 59

[Text] Ishikawajima-Harima Heavy Industries Co. has produced a slab core reflood test facility (SCTF). It completed a large-scale cylindrical core reflood test facility in 1979. These systems can simulate reflood phenomena in pressurized water reactors, the process that during a loss-of-coolant accident, an emergency core cooling system is activated to reflood exposed and overheated core fuels to prevent assembly failure.

SCTF will perform a two-dimensional study on core reflooding. It is roughly rectangular in shape, compared with the cylindrical shape of the cylindrical core test facility. This is the same as the operating reactors.

The test chamber in the facility is a flat, standing type pressure vessel with a body formed by plates. The vessel consists of three sections: lower, middle, and upper bodies. Each is connected with oval flanges, and the top and bottom are sealed with oval blank flanges. Inside, a partitioning board forms a downcomer section, and the external surface is ribbed to give added strength to the plates. Nozzles to attach measuring instruments are also located on the exterior surface.

The main specifications are as follows:

Design pressure:	6 kg f/cm^2
Design temperature:	350°C
Dimension:	
Major axis (interior width):	3541 mm
Manor axis (interior width):	460 mm
Thickness:	105mm
Height:	8911mm
Materials:	
Flat parts:	(SGV49) + (SUS304) clad
Round parts:	(SF50) + (SUS304) clad

Moreover, mock-up fuel assemblies lined up side by side in the test chamber consist of 8 bundles each providing dummy fuel rods in a 16 x 16 configuration to form a simulated reactor core. The core, to avoid flow interference by the core wall while reflooding, the interior is covered with a honeycomb slab that is supported and shielded by a barrel structure.

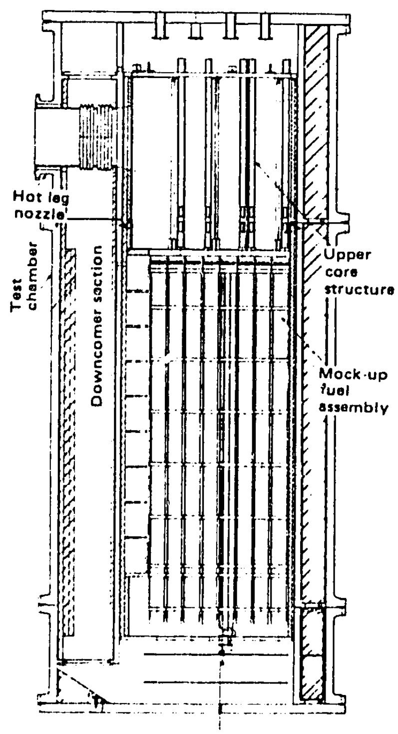

Fig. 1. General Arrangement of Pressure Vessel Fuel Assembly (SCTF)

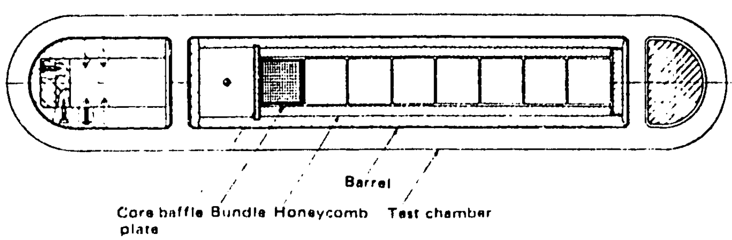

Fig. 2. Arrangement of Fuel Rods (SCTF)

CSO: 5100/4540

JAPAN

BRIEFS

HIGH PURITY PLASMA--A research team of the Japan Atomic Energy Research Institute (JAERI), working under a Japan-U.S. joint study on nuclear fusion, has achieved the world's highest purity plasma needed for efficient fusion power generation. The experiment was conducted using the "Doublet III," nuclear fusion test facility of the General Atomic Co. (GA) in San Diego, California. When metallic impurities, such as iron and stainless steel, from the internal wall of a fusion reactor enter the core plasma, the temperature drops suddenly thereby preventing the fusion process. This problem caused researchers in many nations to seek ways to eliminate impurities. JAERI succeeded in reducing the contamination of plasma by 4/5 by using the force of a magnetic field. Doublet III is the world's largest TOKAMAK type experimental device. It was built in 1978 based on a design by Doctor Chihiro Okawa of GA. The Japanese and U.S. governments began the joint research using Doublet III in September 1979 under the "Energy Research Development Cooperation Agreement" signed in May 1979. This tie-up study will continue through fiscal year 1983, followed by more experiments to attain the "critical plasma conditions," required for sustained thermonuclear reactions at the JAERI's test facility, "JT-60." [Text] [Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 58] [COPYRIGHT: 1981 Fuji Marketing Research Co., Ltd.]

HYDROGEN PLASMA LASER OSCILLATION--The Institute of Physical and Chemical Research has succeeded in oscillating a "plasma dynamic laser" that could be used to measure temperatures in nuclear fusion reactors and in space. In the tests, a hydrogen plasma jet was used to cause an infrared laser to oscillate for about two-thousandths of a second. Existing lasers are usually oscillated in solid, liquid, and gaseous states; the feat in plasma, called "the fourth stage of substance," will add another feature to lasers. The infrared laser has a wavelength of 1.88μ and is expected to be applicable to instrumentation. One probable use is the measurement of hydrogen fuel for fusion reactors. [Text] [Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 58] [COPYRIGHT: 1981 Fuji Marketing Research Co., Ltd.]

REACTOR VESSEL COVER IMPROVEMENT--Three electric power firms and Mitsubishi Heavy Industries have jointly developed an improvement technique for covers of reactor vessels, and the three power companies have decided to use it hereafter in commercial reactors. Nuclear power plants must undergo annual inspections; this technical development was intended to shorten the inspection period and to reduce the radiation exposure of plant workers. The four firms have cooperated in developing the integrated structure of the vessel cover and the cooling duct of the control rod drive mechanism near the cover. In a full-scale model plant used for operationability tests, the uncovering procedure required only 6-7 days, compared with the current 10 days. [Text] .[Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 58] [COPYRIGHT: 1981 Fuji Marketing Research Co., Ltd.]

GIANT ELECTRON LINEAC--The National Laboratory for High Energy Physics of the Ministry of Education is building one of the world's largest "light factories," a radiation light experimental facility capable of producing a variety of light waves ranging from visible light to X-rays. Operation is scheduled to begin next spring, and the building to house the huge 400m long electron lineac has already been built, allowing the installation of some equipment. Performance tests for the facility will start in late November. This "light factory" will permit molecules and atoms to be observed in ways that to date have been hard to do. This will also allow further interpretation of materials structure and application in industrial technologies, such as VLSI production. The construction of the much awaited radiation light experimental facility began in 1978 at a cost of about ¥18 billion. The facility includes the 400m-long electron lineac, the world's second largest, coupled with an elliptical electron storage ring (major axis: 68m; minor axis: 50m) and a variety of measuring instruments. [Text] [Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 58] [COPYRIGHT: 1981 Fuji Marketing Research Co., Ltd.]

RADIATION-RESISTANT XMA--The Japan Atomic Energy Research Institute in collaboration with JEOL, Ltd., has developed and recently begun full-scale operation of a shielded X-ray microanalyzer (XMA) that can analyze elements or observe highly radioactive core materials. The apparatus can handle nuclear fuels of up to 10 curies irradiated in reactors whereby containing much fission products. It is the first attempt in the world to build an XMA with unique shielding that can fully protect the operator and the detector of the device from radioactive specimens. To remove possible contamination from the specimens, components such as the shield, electro-optical system, X-ray spectroscope, sample chamber, and sample stage are completely independent to facilitate dismantling and assembling of blocks required for decontamination. Moreover, samples are treated with ultrasonic cleaning and are coated to minimize contamination. The device is expected to provide excellent data previously unavailable in the field of reactor core research. [Text] [Tokyo TECHNOCRAT in English Vol 14, No 5, May 81 p 58] [COPYRIGHT: 1981 Fuji Marketing Research Co., Ltd.]

CSO: 5100/4540

INTER-ARAB AFFAIRS

NUCLEAR OPTION DISCUSSED IN FACE OF ISRAELI RAID

Paris AL-WATAN AL-'ARABI in Arabic No 228, 2 Jul 81 pp 18-19

[Article by the Political Editor: "The Nuclear Raid"]

[Excerpts] On Thursday Dayan was crying. He went to his prime minister, Golda Meier, to tell her that Israel had lost all her weapons and war materials, and no longer had the means to confront the Arab forces, coming from Golan to Galilee, and advancing in the Sinai, after having crossed the Suez Canal.

After nasty meetings and consultations, the prime minister gave the order for 13 nuclear bombs to be taken out of their hiding place deep in the Negev, and to be loaded onto bombers.

Then Israel decided not to use its nuclear weapon, since Nixon ordered the Pentagon to send "everything that flies" to Israel's aid. Its defeat was turned into victory.

Disregarding the temporary deficiency in the strategic balance between the Arabs and Israel, there is a great disparity between the Arab Nation and the Zionist state. Israel is able to decide to resort to the nuclear option, since it is recognized that it is a small, fanatical and violent entity that stole its international legality by force, and that it wants to maintain it by force, whether by conventional or nuclear arms.

As for the Arab Nation, it cannot secretly adopt a nuclear decision. Its historical legacy, humanitarian responsibility, its standing in the developing world, and its position with regard to the international struggle does not allow it to adopt such a grave and urgent decision as this.

Experience over the past few years has proved that the Arab Nation cannot make its nuclear decision gradually, as if it were saying, for example, that it was trying to acquire nuclear technology for peaceful purposes, and then suddenly changed over to the production of nuclear weapons. That might appear easy in the face of a desire for adventure. However, nuclear technology and fuel are not as easily available as the average person imagines. There are restrictions on sale and shipping. There is strict surveillance, even without resorting to inspection of the nuclear reactor or facilities. Israel, which depends on maximum secrecy regarding its nuclear activities, has ultimately been unable to conceal them from the world.

Moreover, experience has also proved that the Arab Nation cannot make its decision on a narrow national or local level, as if a ruler or a country were to make the decision alone, even if it were to have the necessary money for that.

Therefore, what is the required action in light of what occurred on the evening of 7 June, near Baghdad?

What is needed is simply an Arab collective decision to face up to the Israeli nuclear theft.

The Arab kings and presidents can jointly decide to confront the entire world with two options: either deter Israel and neutralize its nuclear teeth, or the Arab Nation, with absolute openness, will resort to the nuclear option.

However, a decision like this is not easy to make, because of the diversity of positions and circles which make up a political decision. But, the very hopeful thing, regarding unity of opinion in this case, was the total conviction, after the Israeli raid on the Iraqi facilities, that no Arab country is out of reach of the Israeli arm, which has been lengthened with American support.

It is not too much of an exaggeration to say that the political goal of the Israeli operation was to eliminate the fear which was gathering over Iraq as the most powerful Arab country, liberated and independent in its political and military will. It is not too provocative or frightening to say that any future Israeli strike will be aimed at the Arab Gulf, and specifically at Saudi Arabia, by virtue of the fact that it is the developing Arab and international quarter for the area floating on a lake of oil.

Accordingly, there is no Arab country that can shirk its responsibility in making the fateful decision. There is no Arab regime that can claim that its wealth of distance from Tel Aviv will protect it from evening blows of the Israeli arm, clutching American cudgels.

Once again, we hasten to say that we are not calling for recourse to the nuclear option, before the enemy chooses between abandoning its nuclear option or continuing with it. The matter requires an initiative to raise the issue of Israeli nuclear armament, and to bring it to the full attention of world public opinion, as Israel has imposed its initiative on the world. If the Arabs are incapable, because of understandable Zionist reasons, to make their voices heard on the Western and world media, then they are capable of imposing, on those who arm Israel, one of two options: neutralize Israel's nuclear teeth, or else.

The Arabs together are capable, if they wish, of smashing the nuclear technology monopoly, as they smashed the conventional arms monopoly. Unless Israel is forced to abandon its nuclear option, they will be capable also, if they wish, to confront all the challenges of American terrorism and Israeli "criminality", beginning with the attempt to deprive them of fuel and technology, and ending with the attempt to attack nuclear installations and infrastructure.

Finally, the question that torments the mind: Would the Arabs use a nuclear bomb?

The answer is not as easy as President Qadhafi imagines, who enthusiastically spoke before he thought; he has ceased calling for the bombing of Israeli nuclear facilities.

There are one-half million Arabs surrounded by the Israeli wall, erected in 1948. There are a million Arabs on the West Bank and in the Gaza Strip, surrounded by the Israeli wall erected in 1967. All of them would face death due to exploding an Arab bomb over the occupied territory, or because of blowing up Israeli nuclear weapons or facilities. There are millions of Arabs in Jordan, Syria, Lebanon and Egypt who would be exposed, in one form or another, to fatal nuclear radiation. There are also 3 million Jews; for obvious humanitarian reasons, the Arabs could not accept their dying in a nuclear attack.

However, the question that torments the mind still remains: Would the Arabs use a nuclear bomb?

Let us acquire the bomb first. Let it be a deterrent, a preventive and warning factor. One bomb would be enough to remove Israel from existence, whereas that could not be done to the Arabs with 20 or 30 Israeli nuclear bombs.

Let us acquire the bomb first, so that we do not give scope to the madmen in Israel to think about our using that dreadful thing, which one does not like to think about.

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FEDERAL REPUBLIC OF GERMANY

FRG SCIENTISTS AID PAKISTAN NUCLEAR DEVELOPMENT

Hamburg STERN in German 2 Jul 81 pp 96-99

/Article by Karl Guenther Barth: "The Germans Saw to It That There Was an Interest in the Bomb"/

/Text/ Only a few days ago, Pakistani dictator General Zia-ul-Haq still claimed that his country had no intention of developing atomic weapons, but in secret high-pressure work is going on to make a bomb. Pakistan's helpers: FRG scientists and Libyan head of state Qadhdhafi with his oil millions.

Wednesday afternoon, 9 March 1977. A sultry day in Islamabad. The guards in front of the government guest house have sought the shade of the trees. The colonial-style bungalow is outside the Pakistani capital, in a park--a place that looks tailormade for secret meetings.

In the conference room of the villa three Germans and four Pakistanis are sitting opposite one another. The men from the Federal Republic are Albrecht Migule, sole owner of the Freiburg engineering firms CES Kalthof GmbH /Ltd/ and chemists Heinz Mebus from Erlangen and Erwin Veldung from Munich. The hosts are Mssrs Farouq, Dr Javeed and Yousi from the firm M/S Arshad, Amjad & Abid Ltd of Karachi and a high government official.

It takes an hour for the drafted agreements to be signed. Migule and Farouq sign every single page of the document containing a great many articles. Then Mr Farouq says: "Gentlemen, this is an important hour--for us and our country."

And a whale of a deal for both sides. It is a question of "supplying plans, equipment and technical assistance for converting" uranium ores and of "producing" up to 99 percent enriched uranium--the material from which atom bombs are made.

Production has been going on since April 1980. By 1982 at the latest, Pakistan will have enough fissionable material to be able to build its first atom bomb, something the U.S., Soviet and Israeli intelligence services have been afraid would happen ever since the mid-seventies. Details are not known by them, however--particularly not the way Germans have seen to it that Pakistan is rising to the level of an atomic power.

In 1972 the then Pakistani head of state, Zulfikar Ali Bhutto, had assembled the atomic scientists of his country in a desert camp. Khalid Hassan, Bhutto's press spokesman,told intimates later: "The president said, 'We will have the bomb.' He said it the same way as one says, 'Let's have a party.'"

It would take some years, however, the atomic experts explained to the president--provided the necessary funds were available. In 1973 Bhutto went to the fraternal Islamic states to collect these. He flew to Damascus, Rabat, Cairo, Algiers and Tunis. Not before he got to Tripoli, to Libyan head of state Qadhdhafi, did he get what was needed. Actually the revolutionary colonel had wanted to build the bomb himself. And though he had the necessary billions from the oil business, he lacked the scientists. Besides Qadhdhafi was afraid that the Israelis would never allow their avowed enemies to construct an atom bomb. The fact that this estimate was correct was shown by the bombing of the Iraqi nuclear reactor Tamuz I in early June of this year.

Qadhdhafi and Bhutto agreed in a secret accord that Islamabad would build the bomb, and that Tripoli would fund it, receiving finished nuclear weapons in return. When Pakistan's archenemy, India, detonated its first atomic explosion in 1974, Bhutto swore publicly, "We will have the bomb even if we have to eat grass." Pakistan is one of the poorest countries in the world. The national budget of the 80 million people is in such bad shape that the International Monetary Fund (IMF) is releasing financial aid only to rev up industry, and now only under special provisos. To prevent Qadhdhafi's oil millions for building the "Islamic bomb" from going through state accounts checked by the IMF, the deal between the two states was executed like among smugglers. In regular planes of the state airline Pakistan International Airlines (PIA), Qadhdhafi's couriers transported suitcases full of wads of dollars via Rome to Karachi. "On some flights, 100 million dollars at one time," reports Mohammad Begg, who was PIA representative in the Italian capital in the mid-seventies. He had to grease the palms of Rome custom officers to let the money go through. More than 500 million dollars reached the country that way.

In 1975 Pakistan, which (like neighboring India) had not signed the 1968 treaty against the proliferation of atomic weapons, quite officially ordered a reprocessing plant in France. In such a plant, Pakistan could divert plutonium for building atom bombs from burned nuclear fuel rods of its reactor in Karachi.

The order triggered international protests. U.S. President Ford dispatched his secretary of state, Kissinger, to talk Pakistan out of its project. Ford's successor, Carter, negotiated first with France and Pakistan about international safety controls such as have been accepted in the meantime by 119 states which have signed the nonproliferation treaty. Then he threatened he would withhold from Bhutto urgently needed economic and military aid.

While this dispute was being carried out for everyone to see, Bhutto, with German assistance, took steps to build the bomb another way: in an enrichment plant, uranium 235, which is contained in uranium ore only to an extent of 0.7 percent, is concentrated up to 90 percent and more. Once the high-percent uranium 235 is obtained, the decisive step for building the bomb has been taken.

The two most important people for this project were the head of the Freiburg CES, Albrecht Migule, and Pakistani atomic scientist Dr Abdul Qader Khan. The latter had worked for years in the Netherlands, spying out important nuclear secrets in the process--particularly the uranium enrichment plant at Almelo. In this joint project of the Federal Republic, Great Britain and the Netherlands, uranium is enriched in gas centrifuges, and from it fuel rods are manufactured for reactors throughout the world.

As an investigating committee of the Dutch parliament found out later, the Pakistani at Almelo got hold not only of the top-secret construction plans for the gas centrifuge but of the list of supplying contractors. Shortly before the Dutch security authorities found him out, Khan made off for his home country in 1975. There he became director of the test installation in Kahuta for enriching uranium, near the capital Islamabad.

With Khan's list and Qadhdhafi's oil dollars in their pockets, Pakistani buyers now fanned out. From an office at Bonn-Wachtberg, Hauptstrasse 8c, Embassy Counselor Ikram-ul-Haq Khan, under the protection of diplomatic immunity, directed the atom shopping in Germany, Britain, Italy and Switzerland. At the firm of Leybold Heraeus in Hanau he ordered vacuum pumps. The Singen aluminum rolling mills supplied aluminum pipe. Further accessories were ordered from Team Industries at Leonberg and at Emerson Electric Industrial Controls at Swindon in Great Britain.

These deals went off smoothly, but the three directors of the Canadian firm Serabit Electronics Ltd had bad luck. The Egyptian Salam Elmenyawi, the Lebanese Muhammad Ahmad and the Pakistani Abdul Aziz Khan are on trial in Montreal for illegal shipment to Pakistan of computer and electronic components.

The Serabit people had received their orders from Pakistani atomic scientists who had come to Canada for that purpose. Art Lebel, Canadian federal police inspector, told STERN why, immediately after they had started, the proceedings against the three men were declared to be secret: "The electronic elements were components for building an atom bomb."

Just as important for the Islamic bomb as Dr Abdul Quader Khan is the graduate engineer Albrecht Migule, 59, from Freiburg. In 1967 he had built a margarine factory for the son of the then Pakistani president, and soon thereafter, thanks to these connections, he was permitted to search in Pakistan for fluorite, the basic material for fluorine. He is an expert in that. Migule told STERN: "I will fluoridate anything--from toothpaste to uranium." The Pakistanis, however, were not interested in toothpaste; they were interested in enriching uranium. Fluorine is needed in a complicated chemical process for producing the gaseous uranium hexafluoride (UF_6). This gas is channeled into a centrifuge. At an extremely high speed, the UF_6 particles can be isolated, and from them the atomic explosive uranium 235 is gained later. The plans for the centrifuge had been stolen by Dr Khan at Almelo.

For the fluorine project, Migule engaged two people. First the Munich chemist Erwin Veldung. In World War II he had experimented with fluorine as a rocket fuel at the Kummersdorf army research institute near Berlin. After the war he had built a fluorine production plant for the FRG armament concern Messerschmitt-Boelkow-Blohm (MBB) in Munich.

The second man on Migule's team was the engineer Heinz Mebus from Erlangen. This 50-year-old man describes himself as an "expert in the removal of radioactive waste," saying that he had designed and built relevant installations for lage hospitals with nuclear medicine departments such as the gynecological clinic in Hamburg-Eppendorf and, moreover, directed contract work at the Karlsruhe nuclear research center.

On 13 November 1967 Migule signed in Pakistan the first contract concerning the design and construction supervision of a fluorine factory--a contract to the value of DM 4,235,468.75--with the Karachi firm M/S Arshad, Amjad & Abid Ltd as the partner in the deal. That large concern primarily operates textile plants--a harmless address.

On 3 January 1977 Migule signed another contract--for a plant to produce UF_6 and UF_4. A total of "198 tons a year" of uranium hexafluoride is to be produced, and "approximately 177 tons a year" of uranium tetrafluoride. The value of the contract: DM 1.7 million. Migule receives 10 percent "15 days after signing" and a further 20 percent on "receipt of blueprints of premises and process outlines." According to the wording of the contract, the "installations are to be in line with the most up-to-date state of German nuclear technology."

In mid-February 1977 Migule flew to Germany to fetch the blueprints prepared by Mebus and Veldung in the meantime. On 6 March Migule and his two experts arrived in a Lufthansa plane in Karachi.

From then on the three were guests of the state. On 9 March they continued on their trip, flying first class to the capital, Islamabad. The government had rooms reserved for them at the Intercontinental Hotel. From there the Germans were driven to the government guest house, and there Migule signed several contracts, guaranteeing the Pakistanis production of 99-percent-pure uranium 235 in ingot form. Such greatly enriched uranium is unsuitable for commercial atomic reactors. It is used primarily for one purpose--the bomb.

Back in Germany, Migule and company threw themselves into their work. There was need for detailed designs to be drafted, for equipment to be tested and ordered. In part, the Pakistanis tested the machinery themselves in Germany. Thus, on 2 May 1977, Irshad Akhtar, engineer with the Pakistani form of M/S Arshad, landed at Frankfurt Airport with seven uranium samples from Niger in his luggage. That central African state has one of the biggest uranium deposits in the world. As the supply invoices showed, the samples had been flown with the Polish airline LOT as diplomatic baggage from Niger to the Islamic Republic of Pakistan. The Pakistani ambassador in Niger had received them from the National Authority for Mineral Resources.

At Frankfurt Airport, Akhtar almost got into trouble with German customs. When he has to open the suitcases with the explosive samples, the customs men ask, "What is that you have there?" Migule, who has come to meet the Pakistani at the airport saves the situation saying, "That is harmless fluorite." The Pakistani goes with Migule to Freiburg and on to Munich. He moves into the Hotel Atlantic in Ottobrun and has his uranium samples tested by the firm of Kontron. STERN has the results of the analysis.

Later this firm--for about DM 150,000--supplied Pakistan, via Migule in Freiburg, with a plasma spectrometer. Also via Migule, the firm of Siemens in Erlangen supplied some generators. And with Draeger in Luebeck, Migule people negotiated about protective suits for the uranium plants in Pakistan. The work of the Germans continued there also after President Bhutto had been overthrown in a coup and replaced by General Zia-ul-Huq.

As Migule chemist Peter Hirschfeld told STERN, a large industrial complex, about 400 by 600 meters, was erected in a desert region near Multan. The uranium plant is surrounded by a 2-meter-high wall. The only access road is guarded by military patrols protecting the secret project. "Strangers do not have a chance to get in," Hirschfeld says.

Hirschfeld, now 38, had been sent to Pakistan as construction chief in place of Erwin Veldung, who no longer wanted to be part of the atomic project. Everything was gratis for him there--car, hotel, full board. Plus pocket money of 300 rupies, about DM 68, a day. In the desert town of Multan, Hirschfeld met colleagues from the nuclear research center in Karlsruhe engaged in what Hirschfeld calls "busy exchange of experience" with Pakistan.

His job ended in April 1980, when after a test run he turned over the finished uranium plant to the Pakistanis. Since then Hirschfeld has been unemployed since Migule received no followup orders. The Pakistanis have failed to pay the last installments of the huge deal.

The head of the firm guards against questions about his Pakistan deal, saying that the only thing he supplied was margarine plants. When confronted by STERN with designs signed by him, he concedes having "supplied things for uranium fluoridation as well."

He never applied for export licenses, prescribed for such plant by the foreign trade law, saying: "I knew nothing about that." Even unauthorized export of blueprints for them is punishable.

Migule, Mebus and Hirschfeld are in agreement on the Pakistan project, saying that "everything serves peaceful purposes." But they also say, "We are pledged to secrecy."

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