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# Worldwide Report

## NUCLEAR DEVELOPMENT AND PROLIFERATION



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# WORLDWIDE REPORT

## NUCLEAR DEVELOPMENT AND PROLIFERATION

## CONTENTS

ZHAO ZIYANG ON NUCLEAR DISARMAMENT

OW150813 Beijing XINHUA in English 0759 GMT 15 May 84

[Text] Beijing, May 15 (XINHUA)--Premier Zhao Ziyang stated in his report on the work of the government today that China is for disarmament and against the arms race, especially the nuclear arms race. It stands for a total ban on and complete destruction of all nuclear, chemical, biological and space weapons and for substantial reductions of conventional weapons, he noted. Together with the people of all countries, he said, the Chinese people will continue to make unremitting efforts to help bring about disarmament and relax tensions.

Zhao reiterated China's commitment that at no time and under no circumstances will it be the first to use nuclear weapons and that it undertakes not to use nuclear weapons against non-nuclear states.

China is critical of the discriminatory "nuclear non-proliferation treaty" and has declined to accede to the treaty, he noted. But China by no means favors nuclear proliferation by helping other countries to develop nuclear weapons, he declared. China holds, he said, that all nuclear states should unconditionally undertake not to use, or threaten to use, nuclear weapons against non-nuclear states and nuclear-free zones and should reach an agreement on the commitment not to use nuclear weapons against each other.

Zhao Ziyang said China maintains that the United States and the Soviet Union whose nuclear arsenals account for 95 percent of the world's total should take the lead in drastically cutting back their nuclear weaponry. Only thus is it meaningful for the other nuclear states to participate in nuclear disarmament. This is China's principled stand on the question of nuclear disarmament. China thinks that a broadly representive international conference involving all nuclear states should be convened to discuss mutual reductions of nuclear weapons after the two nuclear superpowers have taken the lead in stopping the testing, improvement and manufacture of nuclear weapons and agreed on substantial reductions of their nuclear arsenals, the premier said. China is ready to fulfill its due commitment on nuclear disarmament.

Zhao called on the United States and the Soviet Union which possess huge nuclear and conventional arsenals to assume the main responsibility for arms reduction. China will support any practical proposal for disarmament which is in keeping with the fundamental principle that the two superpowers take the

lead in reducing their nuclear and conventional weapons. At present, he said, the two superpowers are competing in the deployment of new intermediate-range missiles in Europe, each trying to gain nuclear supremacy over the other. This dangerous race must be halted, he said. China demands that the United States and the Soviet Union refrain from deploying new missiles in both Europe and Asia and considerably reduce those already deployed and destroy them.

CSO: 5100/4127

PREMIER ZHAO ON NUCLEAR ARMS

OW231348 Beijing XINHUA in English 1333 GMT 23 May 84

["Chinese Premier on Disarmament and Europe's Anti-Nuclear Movement"--XINHUA headline]

[Text] Beijing, May 23 (XINHUA) -- Only when the two superpowers agree to reduce their nuclear and conventional weaponry drastically will it be meaningful to talk about universal disarmament, Premier Zhao Ziyang stated here today. Speaking at interview with Beijing-based West European correspondents in the Great Hall of the People this afternoon, the premier said that China stands for disarmament and particularly thorough destruction of all nuclear weapons. However, he pointed out, the present situation is that the two superpowers possess 95 percent of the world's nuclear weapons. Therefore, he said, the two superpowers should take the lead in reducing their nuclear and conventional weapons drastically.

The premier reminded the reporters that China had stated in the United Nations that once the two superpowers stop testing, manufacturing and improving nuclear weapons and agree on a drastic reduction of their nuclear weapons, China will approve the convocation of an international conference on disarmament involving all nuclear powers and participate in it. Asked about China's position on the deployment of U.S. cruise and Pershing-II missiles in Western Europe, Zhao said China's position on the Euromissile issue is clear and he believes that it is conducive to easing tensions in Europe, as well as tensions between the East and West and in the whole world. He said he is ready to exchange views on this issue with West European leaders during his visit there and he hopes that China's position will receive their understanding and support.

Answering a question about the peace movement emerging in Western Europe, the premier described this movement as an expression of the West European people's desire for peace and refusal to be plunged into another catastrophic war. China sympathizes and supports this desire, he said. It is another question whether certain other countries may take advantage of this movement to serve own interest, the premier said. The West European countries' effort to strengthen their defenses for the sake of their own security is not contradictory to their effort to safeguard peace, Premier Zhao said.

CSO: 5100/4128

ARKHIPOV TO DISCUSS NUCLEAR COOPERATION IN TALKS

OW051237 Tokyo KYODO in English 1229 GMT 5 May 84

[Text] Beijing, May 5 KYODO--Cooperatin in nuclear power will be one of major topics in the forthcoming talks in Beijing between Soviet First Vice Premier Ivan V. Arkhipov and Chinese leaders, a reliable East bloc source here said Saturday. Arkhipov will arrive here next Thursday.

The Soviet leader is expected to conduct talks in detail on Moscow's offer of nuclear power generation equipment to China, the source said. Cooperation between the Soviet Union and China in uranium development and the peaceful use of isotope is also likely to come up in Arkhipov's Beijing talks, the source speculated.

During a visit to Tokyo in April, Fang Yi, Chinese minister of the State Science and Technology Commission, disclosed that Moscow was ready to sell nuclear power reactors to China without any conditions. China has already concluded a nuclear power accord with France and a similar agreement was initialed between China and the United States during the recent China visit by President Ronald Reagan. In addition, China plans to sign a nuclear energy agreement with West Germany later this month.

China is trying to seek cooperation in nuclear power from various countries and judge them by comparison, the East bloc source said. In this connection, China has a strong interest in Soviet nuclear power technology, the source said. China also has a hope to seek the Soviet technology for coal development and this problem will be also taken up in the discussions between Arkhipov and Chinese leaders, the source said.

CSO: 5100/4125

## BRIEFS

NUCLEAR EQUIPMENT PLANTS FROM SWEDEN--The ESAB firm is receiving three orders for nuclear welding facilities from China. They are worth 11 million kronor and are intended for two plants which will apparently be platforms for China's future nuclear power industry. These are the first orders that China has placed with a Western firm in connection with its nuclear power program. [Text] [Stockholm DAGENS NYHETER in Swedish 30 Apr 84 p 8] 11798

CSO: 5100/2562

REACTION TO BUDGETARY CONSTRAINTS ON NUCLEAR PLAN

Madero Upholds Continuity

Buenos Aires CLARIN in Spanish 15 Apr 84 p 14

[Commentary by retired Vice Adm Carlos Castro Madero: "The Nuclear Plan Is Not a Waste of Money"]

[Text] The budget appropriation for the CNEA [National Commission for Atomic Energy] in 1984 is without doubt the main conditioning factor in our nuclear development. I therefore feel that a few remarks on the importance of the Nuclear Plan for our national development would be timely.

Argentina has made steady gains in the nuclear field mainly because CNEA activities have been based from the outset on two fundamental principles: continuity and coherence.

The Plan

These two principles have been set forth in the Nuclear Plan that was approved in Decree 302/79. This decree calls for the installation of four natural-uranium-fueled, heavy-water reactors to go on stream in 1987, 1991, 1994/95 and 1997 respectively and of the facilities needed to master the fuel cycle and to produce heavy water locally.

The plan was the result of a study that ascertained the proper sequence of nuclear power plant installation so that the plan would become the primary vehicle for achieving the nation's goals in the nuclear field. The plan was later brought in line with the national electric power program drafted by the Energy Secretariat on the basis of the likely future demand for electricity.

One of its objectives is to promote the active involvement of domestic industry and engineering so that we can achieve autonomy in this field and thus not adversely affect our trade balance. The plan provides a solid base on which these two essential sectors can assess the profitability of investments, extend amortization periods and phase in the appropriate technical and human infrastructure.

Today more than 60 government and private firms, including some of the largest in the country, are engaged in carrying out this plan. Their investments in equipment, technology and personnel training are such that their suspension would severely damage, if not bankrupt many of them, with the resulting adverse impact on the nation's socio-economic situation.

It would be very costly and time-consuming if we had to achieve our present status all over again because we would have to overcome the understandable skepticism that would take hold of the nation's businessmen with respect to nuclear programs and any long-range plan worked out in Argentina.

Response to Electric Power Requirements

Because of its low fuel costs, nuclear power is especially well suited to generating so-called firm power, which is the minimum continuous power that a country needs to function. It is true that the 1979 predictions of firm power demand have not come true, and today we have an oversupply, inasmuch as the country did not grow as expected.

Nevertheless, if we take into account the traditional growth of the demand for firm power (7.4 percent) and if we assume, optimistically, that Yacyreta will go on stream in 1990, Corpus in 1994 and the Middle Parana in 1997, our new assessment is that Atucha II will have to start up by 1989, Nuclear Power Plant IV by 1992, Nuclear V by 1995 and Nuclear VI by 2000.

It is therefore indispensable to implement the Nuclear Plan, even if 2 years behind the 1979 schedule, so that our country can count on the electric power that it will need for its future development and thus avoid a repeat of the setbacks that occurred in 1977 when, owing to a lack of electricity, the economy was severely hurt by a series of brownouts.

Furthermore, as of next century, when its main sources of hydroelectric power are on line, the country will have to make intensive use of nuclear power to sustain its development. Achieving our energy independence means developing a great many capabilities, and the only way to do this is by maintaining the continuity of the Nuclear Plan.

The CNEA is the most important scientific and technological agency in the country. It has researched and developed all of our nuclear technologies and pursued a proper scientific and technological policy in this field. This has made possible the large-scale domestic production of complex technological items, thus establishing Argentina as the most advanced country on the continent in this field and, in many aspects, among the top nations of the world.

This is not the case with any other field of technology. The Nuclear Plan is the main engine of this technological development, which spills over into other, nonnuclear fields and for now is our only chance not to lag behind in the technological revolution that the world is undergoing.

By developing new technologies and methods, it is the driving force behind an independent domestic industry that can produce new items of optimum quality and high value added, two decisive elements in expanding our export market and in cutting outlays for licenses and royalties.

Inadequate funding would offset long years of effort and cause discouragement among and the resulting emigration of highly skilled human resources. Training and keeping them has cost us dearly.

Less Expensive Energy

The cost of electric power has a direct impact on industrial costs, which obviously affect the cost of living. Economic analyses conducted both here and abroad have shown that nuclear power is less expensive than energy generated by burning oil, gas or coal. In addition, it is more reliable, safer and less polluting.

These assessments have been fully confirmed by Atucha I, which produces power at the cost of 23 mills per kilowatt-hour, and by Embalse, where the cost is 39 mills per kwh. These costs are competitive with those at our main hydroelectric plants, which are comparably sized and were built around the same time. It bears emphasizing that the generating costs at Embalse rose because of a 4-year delay in its construction for reasons not involving nuclear technology and because of the understandably higher costs stemming from a fully 71 percent domestic share in the total project price tag. The absence of a nuclear plan at the time of the competitive bidding was another negative factor, because had there been one, we would have been able to amortize the investment in more than one plant.

Today the country has a sizable nuclear infrastructure and is able to develop and implement most of the necessary engineering, to produce fuel elements and a high percentage of the electromechanical equipment and instrument and control systems and is on the way to producing heavy water. It therefore stands to reason that the cost of nuclear power will become even more competitive, in addition to requiring much less foreign exchange and promoting more investment in domestic equipment and manpower. This very important point should not be ignored in evaluating the cost of the various energy sources.

It bears noting that if sound criteria are employed in setting rates, the plan is completely self-financing in the long run.

What it requires is temporary funding to promote domestic participation, inasmuch as long-term financing is possible only for imported goods and services. The returns on the plan will come when the various power plants go on line.

The electric power that Atucha I and Embalse generate at full capacity brings in earnings of some $250 million a year, which represents a high percentage of CNEA requirements; it also saves the equivalent of 1,850,000 tons of oil.

Moreover, cutting the budget at the expense of the projects under way would not save money at all; it would increase outlays in the form of higher costs, interest on arrears and loss of potential earnings, outlays that would rise considerably if the budgetary constraints were such that the corresponding contracts had to be rescinded.

Political Weight

Argentina unquestionably holds a prominent international position in the area of nuclear development. Our mastery of so-called sensitive technologies in particular affords us political weight that is to our advantage in the attainment of national objectives.

Achieving this degree of self-sufficiency required surmounting major barriers that were erected internationally in our path.

An open and generous policy is also being pursued in Latin America as a means of achieving long sought-after regional integration. In addition to cooperation programs with all of the countries in South America, Argentina is involved in the construction of a nuclear power plant along with Peru and has signed a letter of intent for the same purpose with Colombia.

Under the same policy, commercial contracts marked by a strong sense of complementarity have been signed with Brazil.

It would be unreasonable to weaken this policy, which I regard as one of the most effective that the country is pursuing with a view towards Latin American integration.

The current economic situation requires drastic cuts in the national budget, cuts to which the CNEA must also be subject. Nevertheless, the country has made major, ongoing efforts in the nuclear field, and their many positive effects must not be undone because of inadequate funding in the budget.

These opposing needs can be balanced if the budget provides the minimum funding to keep the Nuclear Plan going.

The Nuclear Plan is not a waste of money; it is an indispensable investment for national development and to extend the country's influence overseas. (Retired Vice Adm Carlos Castro Madero was chairman of the CNEA until 1983)

## Action Called Absurd

Buenos Aires CLARIN in Spanish 13 Apr 84 p 14

[Editorial: "Restraints on the Nuclear Plan?"]

[Text] The chairman of the National Commission for Atomic Energy, Alberto Costantini, has just acknowledged at a press conference that "some difficulties" exist in meeting the payments due on the Arroyito heavy water plant. He emphasized that there was no danger of the project being suspended, which is of course reassuring, but there is mounting concern over the way in which budget cuts could hurt Argentina's fledgling nuclear industry.

The CNEA is one of the few examples in our country of a modernization policy that has been unfailingly and successfully promoted over the years. Starting with modest research plants, the country now has control of the complete cycle and has thus mastered all of the production phases of atomic fission. Personnel skilled in both theory and practice carried this task forward under conditions that were not always conducive to technology transfer and often had to withstand the onslaught of the world nuclear "establishment." Such a feat deserves more than grudging acknowledgement.

The nuclear industry could be described as somewhat of an island in the production sector as a whole. It is not the only case in which Argentina has undertaken a new sphere of activity, altered its structure and in so doing saved foreign exchange. It is, however, one of the few instances in which it has had continuing success. Whereas other industrialization efforts were scuttled by economic policy, the CNEA has not only survived; it offers eloquent evidence that development is possible.

We have often said in this column that Argentina's nuclear development must be strictly peaceful. Such an opinion is all the more valid in these proliferation-dominated times, although more in a vertical than in a horizontal sense. No country that has unlocked the secrets of atomic power can renounce them, however, to accomodate interests that are not its own. Hence, the "island" of modernization that is our atomic industry must rejoin the rest of our production activities at the highest level rather than be leveled down by policies that punish investment and production, policies that we have seen telling examples of in recent years.

The CNEA's delays and difficulties in paying its contractors and suppliers can be understood in the context of the economic crisis that is besetting the entire country. They cannot be justified, however, by pointing to the need for cuts in military spending (the assumption being that the nuclear industry could eventually build the bomb) or in the range of government activity. The nuclear industry obviously could not have been turned over initially to private enterprise, although now some of its facets gradually can be.

It is ultimately a question of using good judgment and respecting the fruits of our generations' labor. In the case of the CNEA, it would be absurd to try and fell the tree as its fruits were being harvested.

With regard to the military overtones of our nuclear industry, Argentina should move forward in the sphere of international commitments to peace through the appropriate instruments. Some are discriminatory, and others are attuned to the region's interest in peace, though they have been restrictively interpreted by signatory nations from the developed world. Striking a balance is a task for diplomats Defending an industry that has reached maturity is, in contrast, a cause that the entire country must embrace.

## Shift in Priorities Needed

Buenos Aires CLARIN in Spanish 17 Apr 84 p 17

[Article by Luis Masperi, chemical engineer, doctor of physics, a researcher at the Bariloche Atomic Center and president of the Argentine Physics Association; the article reflects his personal opinion only]

[Text] The Nuclear Past and Future

In analyzing nuclear technology, we must bear in mind its special historic link with the most destructive weapons that mankind has known and the extreme precautions that must be taken to prevent ecological disturbances. The initial interest in the atom was military both in Argentina and elsewhere in the world, and in 1946 there were several attempts to set up a Physics Research Institute under the then War Ministry. Through its first president, Enrique Gaviola, the Argentine Association was instrumental in seeing to it that these attempts did not succeed and that instead the National Commission for Atomic Energy was created in 1950 for exclusively peaceful ends. Even so, the CNEA was always headed by military officers until December 1983, an indication of the strategic importance attached to it. It was probabaly in part thanks to this military protection that the CNEA was able to carry out its activities with continuity. It is only fair to acknowledge that under dictatorships the CNEA was less intolerant than universities and other research centers.

During the years of the Process in particular, the CNEA received sizable economic support, perhaps for reasons of national prestige, in contrast to the concurrent destruction of the country's production machine. The efforts of skilled professionals and technicians have led to high-level scientific accomplishments and a successful transfer of the CNEA's pure research to recent technological applications.

Nuclear and Social

The nuclear development that we have achieved now demands a high degree of economic and political responsibility. The country must clearly set its priorities during this difficult period. While Argentina's per capita GDP has fallen back to the levels of the 1960's, the consumption of energy has continued to rise, which is a symptom of inefficiency. It therefore seems logical to spur the enhancement of industrial technology and, since there is no real energy emergency, to cut down on the number of future nuclear power plants and to coordinate them with hydroelectric power, which is our biggest natural resource, and other alternative energy sources. At the same time, we should carefully analyze whether it is really necessary to build a radioactive waste deposit, and under no circumstances should we agree to store nuclear wastes from northern hemisphere countries.

In the face of inevitable CNEA budget cuts, it will be indispensable to maintain funding for technological research and development because this will enable the country to keep pace with worldwide progress in this field.

In light of our nuclear predominance in Latin America, we should eschew any initiatives that might lead our neighbors to suspect that our country has military aims, because this could result in a senseless arms race. It would thus be advantageous to completely eliminate Armed Forces influence in the CNEA and related agencies. We should also abandon all extravagant projects, such as the nuclear submarine, which would cost more than $2 billion, and hypocritical programs, such as nuclear explosions for peaceful purposes, a euphemism for an atom bomb.

The country is in a favorable position to cooperate with Latin America in the nuclear field by seeking to export its technology and share the benefits of its peaceful strides with its neighbors. Because the power of the atom is a sensitive issue, the various countries involved must establish reciprocal controls in which they have confidence. The country must obviously not sign the Nonproliferation Treaty, because it is discriminatory and because the major powers have not fulfilled their obligation to reduce their nuclear arsenals. We should, however, urgently seek agreements with other Latin American countries on an equal footing.

An example in this regard is the joint declaration of the Argentine Physics Association and the Brazilian Physics Society and the subsequent plan to set up a joint commission to oversee nuclear activities in the two countries.

Civilian society must become aware of the need to debate the future of the nuclear plan and to monitor its execution. A standing bicameral committee with scientific consultants could be the ideal body to monitor

all nuclear activities, with particular emphasis on technologies such as plutonium reprocessing and uranium enrichment, which in addition to their peaceful applications, could be diverted to military use. In any event, all secret research behind the backs of the people's representatives must be banned, although confidentiality regarding the technological details might be admissible.

## Key to Nation's Future

Buenos Aires CLARIN in Spanish 13 Apr 84 pp 14-15

[Article by Roberto E. Rodriguez Vagaria, adviser to the Radical Civic Union (UCR) on nuclear matters, director of the Parana IDEPES and consulting member of the Argentine Council for International Relations (CARI)]

[Text] Amid the silence we can hear murmuring, muffled complaints and dialogues that sound like uncomprehending monologues, confusing discretion with disinformation and the defense of the national interest with competitive, obstructionist ideological stances of sheer good faith. It is a moral duty to set forth some clarifying thoughts.

1. Is the nuclear issue an ideological problem? The pursuit of an Argentine nuclear plan was not and is not an ideological problem if we consider it within the frames of reference within which we customarily approach the problem of ideology. Perhaps we should ascertain whether it has to do with the philosophy of science and the way in which the growth of 21st century societies is being questioned.

Man in postindustrial society must deal with the shock and irritation of constant technological progress that does not improve him. Criticism of economic and industrial growth has thus surfaced in this society, and the idea of zero growth is being pushed. Latin America, plagued by underdevelopment, is far from thinking along those lines. What we Latin Americans want from growth is just to be better off, not to be better people, so that the road ahead of us is one of tolerance, so that we can overcome despair and its beneficiaries. It would, of course, be foolish of us to ignore the instructive crises that the North is undergoing and to shun a life in harmony with nature.

We need to publicize and pursue our nuclear plan. We must realize that there are major external and internal conditioning factors. Everyone can correctly imagine what the external ones are. The internal ones are our crushing foreign debt, the falloff in output, improvisation and one-way communication.

If we take a look at the world around us, we will see that the two major ideological blocs, East versus West, have pursued nuclear plans for economic and military purposes and that from within these blocs have emerged dissident forces: Mao's China and De Gaulle's France.

Both countries have rejected the nuclear umbrella of the USSR and the United States. So, if it is not an ideological problem, then people can hardly call the Argentine nuclear plan the "plan of the Process" or the "plan of the native fascists." What it is is the plan of all Argentina over the past 35 years. And we should discuss it as such, without assigning it a godfather.

2. It is a problem of national interest. This is a correct assertion. Let us take a look at a few examples. This was what Mr Clark M. Clifford told President Truman in "American Relations with the USSR," and this is how Marshal Zhukov posed the issue to Stalin so that he would urge on the nuclear scientist Kurchatov.

National interest requires sovereignty in economic decision-making and development within the unavoidable ethical framework of an active commitment to world peace.

Therefore, we ought to place ratification of the nuclear plan outside traditionally partisan congressional debate and make it part of a fruitful dialogue between the parties involved. It is a typical "clarification" issue. The Executive Branch is working on this, but lawmakers on the Energy, Defense, Budget, Science and Technology and Foreign Relations committees have yet to make their voices heard on the subject.

The nuclear industry needs to export; scientists need to apply their know-how, and the national sovereignty requires an independent nuclear plan geared to the country that we have been given.

3. It is a UCR policy problem. Its election platform called for the continuation and exclusively peaceful aim of the nuclear plan, in line with the philosophy of Zavala Ortiz and Arturo Illia. The Peronist Party is in agreement on preserving this heritage, which the two parties ought to be enhancing.

4. It is a government problem. We Argentines must realize that we are not in a position to begin all fundamental undertakings and that choosing one means abandoning others for the time being. In the case of the nuclear plan, we cannot afford further delays; it is the key to the future, and doors will not open without this key.

The president has before him the colossal task of tackling the foreign debt, cutting government outlays, firmly reducing the deficit, making the people realize that the country's economic and financial situation is desperate without causing panic, and pointing out to the foolish penny-pinchers that there is but a thin line between success and failure.

We have not ratified the Tlatelolco Treaty because it has been vitiated in practice. It offers the same guidelines as the Nonproliferation Treaty, which we also reject and which ignores the region's distinguishing features. Cuba is not going to sign it, and we cannot forget what

happened in the Malvinas. We do not feel protected under the Tlatelolco Treaty. We should point out, however, that we co-authored its text and that we fully share its spirit. We could even assert that it figuratively guides our steps. Tlatelolco must await the outcome of negotiations that take our interests into account.

Separately, the countries of Latin America do not ask for explanations from us, and it would be advantageous to reach an exclusive agreement with them that precludes senseless competition and provides for a sharing of know-how.

## Nuclear Physicist Debates Constraints

Buenos Aires SOMOS in Spanish 27 Apr 84 pp 50-52

[Article by Dr Amilcar Funes]

[Excerpt] The Commotion

There was a time when it was very popular to be a member of the National Commission for Atomic Energy; now, we hear angry voices questioning the CNEA's activities. The world's powers do not look on our development kindly either, and the peripheral nations obviously feel a mixture of fear and suspense. All of the commotion stems from the spurious use of nuclear power, which has dominated the scene since Hiroshima and Nagasaki were razed in 1945.

It would seem that there are three conceivable reasons for developing nuclear energy: military (euphemistically called the nuclear option, prestige, bargaining power), energy and overall development.

The history of our CNEA is similar to that of its counterparts in the rest of the world: it was set up and it grew under the control of the military. In the democratic countries, Congress or Parliament legitimized their actions, to an outer limit that was never completely renounced: the bomb. We have to call a spade a spade: what "the negotiations" on the nuclear issue are concerned with is the threat of nuclear weapons use by those countries that have developed them and the threat of eventually threatening to use them by the countries that do not yet have them but that possess the pertinent technology. There is, of course, the uproar over energy too, and it is valid in a world with finite resources. There should be wideranging discussion of whether it "makes good sense" to discourage the local use of nuclear power as a necessary, peaceful and viable alternative, especially after so much time, effort and money has been invested in it. It behooves us, however, to keep current on the extent of these activities. We need to ascertain our energy demand over time and for this we will require credible hypotheses of the country's growth, including geo-political considerations as to the location of the power plants.

We also need to take stock of our available resources (water, gas, coal, oil, geothermal and uranium), to study their use pattern and to assess their ecological impact.

A comparison of projected demand and the resources to meet it will surely indicate that nuclear power must fill some of our needs, without ruling out the concurrent, ongoing need for energy conservation.

With regard to the third reason, I find it difficult to prove the link between nuclear power and development. I have not come across Argentine studies dealing specifically with this issue, although general pronouncements abound.

As a user of various technologies, I have encountered three technological applications of nuclear energy: radiotherapy, goods sterilized by irradiation and radiopharmaceuticals.

I also include the number of kilowatt-hours of nuclear power that I have used since 1974. In order to independently develop these three unmistakable applications, relatively small and economical irradiation reactors are required with the appropriate infrastructure: nuclear engineering, materials technology, instrumentation and control, radiation safeguards, etc.

All of this is part of a nuclear complex, the investment cost of which I estimate at between $100 and $200 million.

Radioisotopes have uses outside medicine as well, and research on them would also have a place in a complex like this.

Another technology associated with radioactive material involves metal containers, casings and support structures. The name of Jorge Sabato comes spontaneously to mind here; his innovative mind bequeathed to us the Metallurgy Department, later the Technology Division of the CNEA. Markedly technological operations such as metal rolling became basic disciplines in the theory of dislocations and other branches of science. Although our country's metallurgy achieved international scientific renown, however, its influence on industry has come slowly and with difficulty.

Technology transfer continues to keep the world's finest minds awake at night. There are no simple prescriptions. I am becoming convinced over time that the best method is to transfer people. When those of us "CNEA-Sabato" men moved on to ALUAR [Argentine Aluminum Enterprise], ACINDAR [Argentine Steel Industry, Inc], the navy, SEGBA [Greater Buenos Aires Electrical Services], etc, some procedures or products changed.

In general, however, our industry does not employ advanced technology. With regard to large components, for example, our greatest need is for high-pressure boilers and some steam-generating reactors, aside

from the manufacture of the reactor core. Users still prefer to consult with the overseas manufacturers, who have so far supplied almost all of these components. Control technology provides other examples, which we have omitted for reasons of space.

In short, although Argentine nuclear technology has had the same sort of larger-than-life promoters as our metallurgy had, it is still behaving like the hare in the race with the tortoise.

The CNEA's metallurgy group reoutfitted itself almost completely less than 20 years ago with a $1 million loan from the UN Development Plan. We could have one of these up-to-date complexes for less than $100 million. For less than $250 million we could build 2 complexes that would be among the world's largest in these fields: radiation and materials. It has been said that the CNEA has invested some $5 billion over the past 5 years; not much of this money has had an impact on national development (resource-generation capacity).

In principle, the users of the technology, not its creators, should be the ones to acknowledge this influence. We would hope that these voices will be heard defending the technological, as well as economic contributions of our CNEA.

We have given three reasons for the development of nuclear power and the criteria for evaluating it. We will now attempt to summarize the importance of nuclear power in Argentina.

The Energy Problem

I do not think that nuclear power is needed to solve our energy problem at present. Given the hydroelectric projects to which we have committed ourselves and the Middle Parana project, we will be managing sufficient renewable energy sources, valued at more than $30 billion, by the year 2000. We will also have to pay off a $40 billion foreign debt by then. For reasons of capital and loan availability, the major nuclear projects under way will not be able to maintain their scheduled pace, which was determined for the purpose of building our own nuclear industry rather than for strictly energy-related reasons. The situation could change substantially as of the year 2000, however. Much of our thermal generation equipment will have to be withdrawn from service; gas and coal will have to be used to fire the rest of the plants, and oil will be reserved for more important uses (petrochemicals). Any further expansion must necessarily be in the area of nuclear power, except for minor contributions from other sources (geothermal, wind, solar power, etc), which are limited to low-power projects.

Energy aside, it is difficult to deny the military motives for our nuclear development. In this regard, we have to bear in mind the governments that made the major decisions, the superficial basic research coordinated with the Energy Secretariat and the unusually large funding in the budget.

In general, nuclear power is an undeniable vehicle for development The process, however, is slow, difficult and very closely tied to the distribution of highly skilled professionals and technicians within production structures that, for reasons that are well known, still lack solid foundations. Since technology is built on technology, we do not have the experience to grasp the foundations of the technology we have acquired, and it is therefore very difficult to move forward or to innovate through local adaptations.

Upgrading the CNEA

The remarks above are not very encouraging if we remain stuck in this debt-ridden, retrospective present.

The CNEA's critics must realize that our accomplishments in nuclear power cannot be magically transformed into something else. We have the only two operating nuclear power plants in Latin America, and their daily operations enhance our knowledge of their complex systems. We have acquired the capability of enriching uranium and we are on the way to processing fuel elements for the extraction of plutonium, which can in turn be used as a fuel. We are building a third nuclear plant and an industrial heavy-water plant and we are close to developing our own technology for producing heavy water.

Even if for dubious ethical reasons, Argentina is being mentioned as a candidate for membership in the "nuclear club." It would be adding insult to injury if we squandered this legacy because of decadence, indecision or historical contradiction.

Discussion of these issues even within the CNEA has been regarded as untimely, if not uncalled for. "Confidentiality of proceedings," the "highest interests of the State" and widespread ambiguity are also our national patrimony. We do not seem to be (and to a great extent we are not) responsible citizens. We do not seem to be (and to a great extent we have not been) in control of what is ours.

We often disavow the results (as is becoming the fashion with the CNEA) after we have conveniently let others make the decisions and even encouraged them to do so. All of the difficulties that we are encoutering along this road should engender in us a less ephemeral interest in this and other matters that affect our status. Moreover, we should begin a period of civilized discussion in which we have not only a right to be informed but also a duty to inform ourselves so that we can offer intelligent opinions.

Towards the Future

Let us consider the future on three levels. Outside the continent: The government has the sort of bargaining capacity in nuclear energy that YPF [Government Oil Deposits] could never acquire, for example.

Foreign powers want to control Argentina so that it does not continue its nuclear development (the power plants are the least important thing), take steps that could lead to the bomb or make decisions that could alter the role assigned to Latin America. The rationale for the argument could be the Garcia Marquez-like image of a general who used to rule south of the Rio Grande and into whose hands the diabolical toy could fall. But the ongoing negotiations are being conducted by politicians who will fully live up to the popular mandate of peaceful and honorable coexistence with our neighbors.

I will not mention any other possibility for harm because the existence of 50,000 nuclear warheads should suffice to rule out any extra-continental designs on our part.

Our nuclear position has been strengthened. We have a patrimony, and its management can be discussed in civilized terms along with a number of other world problems besetting us; to resolve them we need the understanding of precisely those overseas powers that are the most worried about our nuclear development. As far as Third World countries on other continents are concerned, an Argentine "relative" is an attractive partner, as Iran demonstrated under the Sha. For now it is hard to assess the economic significance of potential nuclear trade, which would be conducted along the formal channels allowed under bilateral agreements supervised by the International Atomic Energy Agency.

On the continent: The ideal of reuniting our peoples economically and culturally is like the horizon: always visible and always far off. All of our countries are part of the Third World, and the above considerations apply to each of them. If one of them, perhaps the one most endowed with resources, has managed to excel in a field that could help us all to survive, this presents us with perhaps the last chance this century to utilize such a success as the cornerstone for future unity. In France, meanwhile, the company Framatome, which sells large nuclear reactors, is preparing to enter the small reactor market (200-300 megawatts). Its probable clients are Third World countries, whose grids cannot handle larger plants. Our experts discourage the construction of reactors of less than 600 megawatts because they are not economical (cost per MW). But just as the least expensive energy is energy conserved, the most expensive is energy not generated. Under present conditions, Latin American countries ought to select smaller plants with higher megawatt costs rather than expand their electric power grids so that they can supply them from more powerful plants. Moreover, China has developed the first 300-megawatt reactor, in keeping with the size of its grid.

There is no time to lose. I do not think that for the time being Argentina can have a nuclear industry based on domestic consumption. It must export and adapt to its customers.

Its potential customers are to be found in the Third World, particularly in Latin America. We should be working with the countries in this region to define this reactor for export, the design and construction of which are, in my judgment, the only viable future for our nuclear technology as applied to major projects and, therefore, for our nuclear industry. We should bear in mind the sizable investments that have already been made. A great deal of money has been spent on factories, laboratories, power plants, chemical plants and, above all, skilled technical personnel. To this we would have to add the opportunity cost, which represents the difficulty of achieving all this at a given moment by just pouring in capital. The value of all of this is about $10 billion. So then, each client would cover the costs of installation, plus a certain percentage of our investment in research and development.

The traditional supplier follows a similar approach For Latin American clients, however, the items supplied by Argentina (nuclear power plant, etc) would be backed up by area development, which could include the participation of the customer. Moreover, the negotiations would not be subject to the conditions imposed by treaties drawn up to assure the "disarmament of the disarmed."

On the local level: Budgetary restraints will delay the two largest projects: the Arroyito heavy-water plant (which is currently 80 percent completed after investments of more than $500 million) and the Atucha II Plant (about 30 percent finished after comparable investment). Work will not be halted, however, because the losses of potential earnings, higher costs, penal interest, etc would be too much for any "receivership commission." As far as the pilot heavy-water plant is concerned, the halting of work on a genuine national breakthrough is unthinkable. The line cannot be drawn until the projects following Atucha II. Meanwhile, scientists and technicians who work for the CNEA must employ their intelligence and creativity to propose options within the government's political guidelines, while properly arraying their own forces and simplifying administrative procedures. Such proposals might not come from the president or from a congressional committee.

For its part, the government realizes that the CNEA's human resources are its most valuable asset and that their activities cannot be turned off and on like a switch. In the 1990's Argentina must think of nuclear power as a valid alternative as of the year 2000, and an infusion of funds will not be enough. Our personnel must find sufficient motivation in their work to persevere. Whatever present and future circumstances are like, we will need prototypes to demonstrate the feasibility of nuclear developments and they will have to be continuously updated until commercial applications are necessary and affordable. The Latin American option is at least as attractive as the present plan, and study on it should begin without delay, with the involvement of other countries from the outset in market studies, determining the power output and kind of reactor to be exported, as well as complementary

development (nuclear complexes, fuel elements, heavy water, etc). It would be highly advantageous to intensify the training of Latin American professionals and technicians because once they returned to their home countries, they could pave the way for our exports. The cost of such studies is nominal, and each prototype costs about one-tenth as much as a plant like Atucha II. Lastly, it bears repeating that research and development (the underpinning of all technology) must continue at the necessary level, aimed decisively at achieving whatever objectives are established.

8743
CSO: 5100/2096

COSTANTINI ON EFFECTS OF BUDGET CUTS IN NUCLEAR PROGRAM

Buenos Aires CLARIN in Spanish 24 Apr 84 p 11

[Text] Alberto Costantini, chairman of the National Atomic Energy Commission [CNEA], asserted yesterday that the scientific researches being carried out, particularly that of the production of enriched uranium at the Pilcaniyeu plant in Rio Negro Province, will not be affected despite the budget cuts that the organization will suffer this year.

Costantini admitted, on the other hand, that the construction of the Atucha II power plant and the heavy water powerplant of Arroyito, Neuquan Province, will suffer delays and losses in terms of interest payments and nondelivery of equipment from supplier countries, as well as increased unemployment as a result of the interruption and delay of the projected works.

Costantini reasserted that the researches performed by the organization will ensure the peaceful use of nuclear energy, and he maintained that the energy undertakings and other objectives outlined by the CNEA will be fulfilled, though with some delay.

In statements to Radio Excelsior, the official noted that the budget cutback made on the institution is not for last year, "but in relation to the budget that we drew up in the commission for the project timetable that we hoped to accomplish this year." He stated that the work plan conformed to the rate of the projected works in accordance with their status.

"For the current year, the last cutback, which has taken us to 185 percent of the gross domestic product [sic], represents a reduction of 900 million pesos in the 5.1 billion pesos available for the Atucha I works, and a similar reduction in the total of almost 4.6 billion pesos for the heavy water works in Neuquen Province," he explained.

Then he pointed out that those reductions represent an adjustment on the order of 20 percent in each case on the initial projections of the CNEA for the current year.

Costantini maintained that those cutbacks in funds for this year "are onerous for the commission and the country inasmuch as they imply unproductive expenses, incurred interests, demurrage and storage in equipment-supplying countries, and, naturally, the interruption in the rate of construction of the works with the consequent periods of idleness already occurring among the groups contracted for the two plants."

"Aside from that problem, which is an economic one," Costantini added, "if one wishes to refer to the problems of technological and scientific development--which naturally constitutes one of the great goals and achievements of the commission--they will not be affected in the least because the programs concerning those tasks" will not be interrupted.

The chairman of the CNEA remarked that the Tandar program, which is being carried out at the Constituyentes Atomic Center, as well as other development programs in the field of radioisotopes, the procurement of sources of cobalt, and everything concerning the application of radiation, is not going to be affected.

Finally, he said that an eventual decision to interrupt work within the purview of the CNEA "is a problem that concerns the economic management of the country."

8414
CSO: 5100/2098

CNEA CHIEF SAYS IMPORTANCE OF TLATELOLCO TREATY OVERRATED

Buenos Aires LA NACION in Spanish 30 Apr 84 p 15

[Text] Engineer Alberto Costantini, chairman of the National Atomic Energy Commission [CNEA], asserted that "a disproportionate importance is being attached" to whether or not Argentina will ratify the Tlatelolco Treaty, and he believed that "it is not that far-reaching" inasmuch as "it is not the central point of the country's nuclear activity."

He asserted also that he knew "safeguard formulas were being studied" to determine if Argentina will ratify that international agreement, but he explained that when he discussed the subject, he was doing so "more as a citizen than as the chairman of the CNEA" because it is a matter outside the direct purview of the organization.

Engineer Costantini announced also that he will talk with President Alfonsin "after 1 May" about "general topics of the commission."

The official denied that the government is going to sign the Nuclear Nonproliferation Treaty, and he thought that the cutback of the state enterprise's budget prescribed by the constitutional authorities "is not economically favorable."

In his statements, the official emphasized that "the activity of the CNEA is fundamentally peaceful" because its work is intended to develop the capability of Argentine technicians in the fields of medicine, biochemistry, biology, industry and agriculture as a contribution to economic and social development.

Later on, he expressed approval for the civilian comptroller of CNEA activities because "it is a distinctively civilian function." On that score, he pointed out that "since it has peaceful goals, it should have a totally civilian outlook and be already removed from the military sphere."

8414
CSO: 5100/2098

## BRIEFS

TLATELOLCO TALKS--Radical Sen Antonio Berhongaray, chairman of the Upper House Defense Commission, reported that Argentina's ratification of the Tlatelolco Treaty "depends on ongoing negotiations with the International Atomic Energy Agency (IAEA) in order to have our national interests, which translate into independence for the peaceful nuclear program of our country, evaluated and taken into account. In statements made to the DIARIOS Y NOTICIAS (DYN) agency, the legislator gave a detailed account of the discriminatory aspects of that treaty and the Nuclear Nonproliferation Treaty, and then pointed out that "perhaps we could allow IAEA inspections, but not subordinate our program to the decisions or advance supervisions of that organization controlled by the big powers. Tlatelolco permits explosions for peaceful and scientific purposes, and Argentina has committed itself through its president not to build the atom bomb for any bellicose purpose," he commented. "Anyway," the radical legislator remarked next, "it would be interesting to see what the IAEA would do in the event some Latin American state asks for permission. It will surely raise such objections that it will prevent the explosion by creating a severe international and institutional scandal," the senator answered him. [Text] [Buenos Aires LA NACION in Spanish 7 May 84 p 11] 8414

CSO: 5100/2098

FUNDS FOR YELLOW-CAKE PLANT SOUGHT FROM FRANCE, JAPAN

NUCLEBRAS Negotiations

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 28 Apr 84 p 27

[Text] Yesterday in Rio, the president of NUCLEBRAS [Brazilian Nuclear Corporations, Inc], Dario Gomes, confirmed the fact that negotiations will continue with French and Japanese agencies and business firms to procure funds to be used to build an industrial mining complex in Itataia, Ceara, which will produce uranium concentrate ("yellow-cake") and phosphoric acid. PETROBRAS [Brazilian Petroleum Corporation], through Petrobras Fertilizers, Inc (PETROFERTIL) and other Brazilian companies are also included in the undertaking.

Accompanied by the NUCLEBRAS director, John Forman, Dario Gomes met with the minister of mines and energy, Cesar Cals, and other authorities from the sector to detail the steps to be taken, and to discuss the interest of the French and Japanese firms in the enterprise. In exchange for financing to be obtained abroad, NUCLEBRAS may export the uranium concentrate at international market prices, abiding by the legislation in force on the subject. PETROFERTIL will be responsible for the sale of the phosphoric acid.

At the meetings, the various phases to be covered are being studied. The first step will be to complement the prospecting activity on the site with materials tests and the opening of headings. Next, the technical-economic-financial analyses and the feasibility studies on the undertaking will be completed, Later, the timetable will be set for the execution of the mine exploitation work, the processing of ores and the construction of the pilot plant. The following phase will be the construction of the industrial mining complex, if it proves feasible, with financial resources coming from abroad, in exchange for a commitment to sell the uranium concentrate that will be produced.

The Itataia deposit, with 142,500 tons, is the largest in Brazil and the second largest in the world. The large amount of uranium present in the area warrants the creation of the industrial mining complex, which will ensure economic and social benefits for a poor region (nearly 200 kilometers from Fortaleza) of Ceara's interior section.

Capital

Yesterday, the general stockholders' meeting of Brazilian Nuclear Corporations, Inc (NUCLEBRAS), in Brasilia, approved the correction made in the company's paid-up capital from 172.4 billion to 298.4 billion cruzeiros; in the authorized capital, from 182 billion to 365.5 billion cruzeiros; and in the capital stock, from 258.4 billion to 365.5 billion cruzeiros. These new amounts relate to the increase in the value of the company's common and preferred stock, from 5.20 to 9.00 cruzeiros.

The secretary of federal revenue, Francisco Neves Dornelles, and Luis Carlos Piva, also from the Ministry of Finance, were elected active member and alternate member, respectively, of NUCLEBRAS' controlling board. They replace Aluisio Fernandez Bonavides and Paulo Gustavo Migon, of the Ministry of Mines and Energy.

## Early Production Forecast

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 May 84 p 53

[Excerpt] Yesterday, upon visiting a copper mine in the municipality of Vicosa in Ceara, 350 kilometers from Fortaleza, the mines and energy minister, Cesar Cals, admitted the possibility of stepping up by 12 months the start of industrial mining and exploitation of uranium from Itataia, in the Ceara municipality of Santa Quiteria, and that of phosphoric acid , in Ibituba, Santa Catarina. Meanwhile, according to the minister, he has already authorized NUCLEBRAS and PROFERTIL to prepare a pilot plant plan and one for a laboratory in Santa Quiteria and Ibituba.

2909
CSO: 5100/2102

GOLDEMBERG PROPOSES RENEGOTIATION OF NUCLEAR ACCORD WITH FRG

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 May 84 p 24

[Text] Yesterday, in Rio, the president of Sao Paulo Electric Powerplants, Inc (CESP), Jose Goldemberg, said that, next week, he would be meeting with the president of PETROBRAS [Brazilian Petroleum Corporation], Shigeaki Ueki, to complete the details on the agreement for the creation of CESPGAS, a company that will be in charge of the distribution of natural gas in the state of Sao Paulo. Goldemberg denied that the National Council for Petroleum [CNP] has vetoed the creation of the company, giving assurance that CNP is only conducting the necessary studies for its materialization.

The CESP president, who made these statements after speaking at the energy seminar held by the Rio de Janeiro Commercial Association, also said that the draft of the agreement calls for the participation of various sectors of the national private industry in the distribution of gas in Sao Paulo. He cited as an example Confab, in the piping area, and other firms which might participate in the distribution. But the latter, according to a specific clause in the agreement, will be "limited to firms with native capital."

Nuclear Accord

During the seminar, Goldemberg proposed the renegotiation of the nuclear accord with the Germans, from the standpoint of procuring greater participation by the native industry, science and technology in the sector. He claimed that Brazil has the bargaining power for this, because the Germans do not want to see their projects deactivated. "The Angra dos Reis (Angra II and III) projects must be reoriented, so as to meet the nation's needs when it becomes necessary to use nuclear power, that is, not before the year 2000." Goldemberg noted that this does not mean a repudiation of the accords made previously, but rather renegotiating them in terms of deadlines and financing, and expanding the national participation.

The CESP president summarized the history of the nuclear program, dividing it into three phases: the first, up until 1974; the second, from 1974 to 1980; and the third, from 1980 to the present. He said: "The first phase was

marked by major national development in the sector and, if it had continued on the same basis during the 1960's, we would now have the capacity to design and build reactors." But that period ended with the purchase of the North American package for Angra I and, in the second phase, a reaction was expected to the frustration caused by the earlier outcome. He commented: "President Geisel made a correct diagnosis of the problem, but adopted the nuclear accord with Germany, the mechanisms of which for the transfer of technology did not work, in addition to not attaching value to the importance of the participation of internal industry, science and technology."

2909
CSO: 5100/2102

COOPERATION WITH SOUTH AFRICA ON NUCLEAR PURSUITS ALLEGED

Tel Aviv DAVAR in Hebrew 13 Apr 84 pp 1,2

[Article by Yosi Melman: "Israel Aiding South Africa in Development of Nuclear Weapons in Exchange for Uranium"]

[Text] Israel is aiding South Africa in the development of nuclear weapons in exchange for uranium. This claim was made in a new book scheduled for publication the early part of next week in London. DAVAR has acquired the exclusive rights to publish the book, "The Unnnatural Alliance," in Israel, and sections of it will appear concurrently beginning Sunday in DAVAR and the London SUNDAY TIMES.

The book surveys the history of the diplomatic and military relations between the two countries and states that during the visit of South African Prime Minister John Vorster in Israel in April 1976, an agreement was signed for scientific and technological cooperation between Pretoria and Jerusalem. Since that time, within the framework of this agreement, Israel has been providing South Africa with nuclear information and sending technicians and scientists who are assisting in the development of nuclear research, including atomic weapons.

Among other things, Israeli scientists have flown to South Africa in order to advise on the establishment of Safari Two, a nuclear research reactor. In addition to the nuclear cooperation, the book claims that extremely close military ties have developed between the two countries. Instructors from Israel, including senior military officers, have been advising on the development of the naval, ground, and air forces of South Africa and their modernization. Israeli experts in counterterrorism and counterguerrilla warfare are training units of the South African Army and its police in combating the guerrilla organizations in Namibia (South-West Africa) and in South Africa itself. Within the framework of this training, hundreds of police officers, security personnel, and South African officers have visited Israel and participated in training camps.

The weapons industries of the two countries have increased their cooperation in recent years, and the steady exchange of information and raw materials is taking place regularly. Among other things, the Tadiran, Elbit, and the

Aircraft Industry firms have assisted in the establishment of the infrastructure for electronic industries in South Africa. These industries are now producing on their own, but with Israeli know-how, communications equipment, radar stations, and secret monitoring and sensory equipment. Also, South Africa has procured the rights to produce, with Israeli know-how, the Gavriel sea-to-air missile that it calls the Scorpion. South Africa is also producing on its own missile boats called Minister that are based on the know-how of the Haifa dockyards in the building of the Reshef boats.

The two countries are cooperating in the development of a new boat with a displacement of 850 tons. Recently, major weapons transactions have also been signed including, among others, the sale of 36 Kfir aircraft manufactured by the Aviation Industry for the South African Air Force. The cost of the transaction is $450 million.

Another transaction about to be completed is the sale of Merkava battle tanks to the South African Armored Corps after Israeli experts had previously provided assistance in the replacement of the old armor with personnel carriers and the Centurion tanks with more modern and less penetrable steel.

"The Unnatural Alliance" claims that the two most important projects in which the two countries are involved are the development of the future fighter plane, the Lavi, and the building of a submarine. The agreement on these two projects was finalized during the secret visit in March 1980 of the then Minister of Defense Ezer Weizman to South Africa.

According to the plan, Pretoria is participating in the funding of the research and development for the Lavi that is being manufactured by the Aircraft Industry. In exchange for this, some of the aircraft parts will be manufactured in South Africa which has even committed itself to purchase a substantial number of the aircraft when production is completed. It is also stated that the two countries will share the profits from the sale of the aircraft to other countries.

In regard to the submarine project, the book bases its information on western defense and security experts who say that South Africa has recently and surprisingly renovated the shipyards of its fleet in the port of Simonstown. This shipyard is now able to handle ships, and primarily submarines, up to a displacement of 1,000 tons. The same experts estimate, therefore, that the renovation is designed to establish an infrastructure for the building of a new submarine.

The claim is that Israel and South Africa, whose submarine fleets are antiquated, are cooperating in the building of a new submarine. However, the book rejectsthe reports as though they were talking about the building of a nuclear submarine. The author of the book, James Adams, a senior reporter of the SUNDAY TIMES and who is now serving as a special assistant to the editor of the newspaper, visited Israel and South Africa for the purpose of writing the book and doing the research appended to it. He met here with security personnel and experts who are involved in studying the relations between the countries.

5830
CSO:5100/4503

ROESSING'S COMPUTER FOR EQUIPMENT

Johannesburg SUNDAY TIMES-BUSINESS TIMES in English 22 Apr 84 p 13

[Text]

**ROSSING mine, together with computer company ICL, has introduced an innovative planned maintenance programme that uses a computer to keep track of preventive maintenance on every piece of equipment used by the mine.**

**This controls 10 000 jobs, or 1 600 jobs a week.**

**The planned maintenance application also deals with inventory, predefined maintenance and details of the work done and conditions of all plants.**

**As the mine operates 24 hours a day, engineers must have details of items such as truck schedules and source requirements. To achieve this, they have installed ICL terminals in each of the workshop areas, all of which are linked to the mine's three mainframe machines. Information is immediately accessible.**

**The mine's computer installation also handles personnel, payroll, tender analysis, material supply, general ledger, creditors, maintenance costing, fixed assets, medical aid, short-term mine planning and metallurgical systems.**

**Rossing is expanding its computer installation and has placed an order for two additional graphic workstations for its drawing office.**

**By the end of 1984, the mine will have installed 10 major new computer systems and expanded the network from 30 terminals and six printers to more than 100 terminals and 35 printers.**

**Rossing extracts around one million tons of ore and waste rock each week from the open pit. The mine has a production capacity of some 5 000 tons of uranium oxide per annum, the final product being exported for use as fuel in nuclear power stations.**

CSO: 5100/35

## BRIEFS

URANIUM PLEDGED FOR TAIWAN--The South African ambassador to the Republic of China, Mr Pieter van Vuuren, says South Africa will supply Taiwan with uranium if the country wants more of the metal for the generation of nuclear power. Addressing a news conference in Taipei, Mr van Vuuren said that South Africa used its uranium resources for peaceful purposes. South Africa supplies about 70 percent of the Republic of China's uranium needs. [Text] [MB271700 Johannesburg Domestic Service in English 1115 GMT 25 May 84]

MORE NUCLEAR REACTORS NEEDED--The managing director of the Uranium Enrichment Corporation (UECOR), Dr (Wallie Brandt), says that South Africa will have to rapidly expand the number of its nuclear reactors by the end of the century because the country's coal resources are limited. Dr (Brandt) was speaking at a party in Pretoria in which he and the head of the Department of Mechanical Engineering at the University of Pretoria, Professor T.C. (Harhoff), received awards from the South African Institute of Chemical Engineers for their contribution to the invention and development of UECOR's uranium enrichment process. Dr (Brandt) said that South Africa did not possess the necessary technology at present locally to build the nuclear reactors which would be needed in the next century. This was why everything possible would have to be done in the coming 15 years to meet this challenge. [Text] [MB300749 Johannesburg Domestic Service in English 0500 GMT 30 May 84]

CSO: 5100/38

INTERNATIONAL AGENCY INCREASING CHECKS ON CANADIAN REACTORS

Ottawa THE CITIZEN in English 17 Apr 84 p 3

[Article by Margaret Munro]

[Text]

The international agency trying to stop the spread of atomic weapons is stepping up surveillance of Canada's nuclear reactors and investigating the idea of improving safeguards at this country's nuclear fuel plants and uranium refineries.

Canadian nuclear officials, who Monday announced a $15-million, five-year extension of their cooperative safeguards program with the International Atomic Energy Agency, say the expanded effort is a reflection of nuclear proliferation problems abroad and not due to problems in Canada.

There is no question, however, that the Vienna-based agency is busy in Canada.

On agency orders, thousands of highly radioactive fuel bundles in storage at Ontario Hydro nuclear generating stations are being repackaged. The agency is also paying for installation of a surveillance system at the eight new reactors under construction in southern Ontario.

John Beare, the Canadian Atomic Energy Control Board offical co-ordinating Canada's contribution to the IAEA program, says the agency even wants safeguards improved at the small research reactors at Manitoba's Whiteshell Nuclear Research Station and the Chalk River Nuclear Laboratories, north of Ottawa.

"But the basic thrust of the program is for Canada to set a good example for the rest of the world," says Beare.

Under the scheme, the AECB and Atomic Energy of Canada Ltd., the Crown corporation promoting Candu reactors, will spend $15.4 million giving the international agency technical assistance.

Beare says a large part of the program is aimed at improving the efficiency of the system of safeguards developed for use in Candu reactors operating in Quebec, New Brunswick, Korea and Argentina.

The remaining funds will be spent on salaries for three "free-time" consultants Canada is lending to the agency, which is associated with the United Nations, and on studies to examine methods of improving surveillance at uranium refineries and fuel fabrication plants both here and abroad.

The IAEA, which told the Canadian government in the mid-'70s that safeguards on the Candu system were inadequate, is concerned with the Canadian system because it is continuously and automatically refuelled. Most other reactor systems must be shut down for refuelling, making it easier to keep track of potent spent fuel.

It takes about eight kilograms of spent fuel to make a nuclear bomb.

Since the IAEA warning eight years ago, Canada has spent $14 million developing a safeguard system and installing it in the four 600-megawatt units located in Quebec, N.B., Korea and Argentina. The system counts the fuel rods as they enter and leave the reactors and also keeps spent fuel bundles under constant camera surveillance.

Canada paid for the development of the system under a previous safeguards program with the IAEA. But Beare says an international agreement dictates the agency pay for the systems being installed in Ontario Hydro's eight new reactors at the Pickering and Bruce nuclear stations. Each system is worth about $750,000, he said.

CSO: 5120/1

NEW SERPENTINE ROBOT 'ISIS' TO CLEANSE CORRODED CHINON-A3 CORE

Paris LIBERATION in French 11 May 84 p 26

[Article by Dominique Leglu]

[Text] Will a robot named Isis succeed in piecing together the parts of a crumbling power plant? Like a snake in a pyramid, this summer it will slither into the core of Chinon A3, which is threatened by corrosion.

Its name is Isis, but one could readily call it Crictor. Suspended from its frame, it might be easily be a metal python. All polished steel sleeves on the outside, accented with very becoming black cables, it wiggles about its three elbows and three wrists; the first snakelike robot is born. Its designer is Hispano-Suiza for EDF (Electricite de France), and it is prepared to coil its 11-m length and 21-cm diameter into the core of the nuclear power plant Chinon A3, whose innards are being gnawed by corrosion.

Within one or two months, five smart snakes will have crawled from the Bois-Colombes factory to the Loire region plant, ready for a summer campaign of repairs. Chinon's gangrene is no longer tolerable; the plant was turned off last week, in order for the core to cool down. Isis will then work very near this area, still hot (100 degrees), radioactive, so hostile in brief, that a man would rapidly perish in it; 120 rad/hour is a radioactivity level to which a worker must not be exposed more than two minutes per year according to current officially accepted standards.

EDF has been tangling with these corrosion problems at Chinon A3 for over 16 years. It is a particularly inane matter of secondary structures that are failing and bringing the high technology of nuclear power to its knees. In this case, it is now a matter of repairing steel frames that support cables essential for running the plant.

Hidden within its enormous 30-m wide by 33-m high concrete block, the natural uranium graphite-gas reactor (10 m high by 14 m in diameter) has operated without problems for 90,000 hours. Loading and unloading manipulators plunge through the 7-m thick concrete slab which serves as the reactor's roof, to renew the fuel. A veritable piece of swiss cheese with its 106 vertical bore holes.

It is into these pipes, 24 cm in diameter, that the five Isis robots will thread their way. Not in order to handle the fuel, but to refurbish the frames attached to the ceiling of this energy tank, by wiggling the end of their bodies (2.50 m, 25 kg) and performing a real Balinese dance in a forest of old iron.

Fifty Gangrened Pillars

A large amount of information, such as "thermocouple control" or "danger of sleeve rupture'" must be gathered to constantly verify that the reactor operates normally. The fuel is contained by sleeves which can melt if the reactor runs away; monitoring these hot spots makes it possible to alert the plant's operators in case of meltdown. Sensors located at the reactor's core collect the data which a cable carries to a computer.

It is to support these essential information channels that a forest of 109 metal columns was planted above the core. The engineers simply did not believe that the carbon dioxide gas at 425 degrees surrounding the installation would attack the metal pillars. Systematic photo studies proved the contrary.

For the past ten years, EDF found no other solution than to reduce the carbon dioxide temperature to 380 degrees, thus reducing the corrosion rate by a factor of four or five. But today, EDF deems that the situation has become critical. The risk is too high. "Twenty pillars are particularly gangrened," said the leader of the Chinon repair project two days ago, during a presentation of Isis by Hispano-Suiza engineers. "This summer's campaign begins with them." The objective is to scrape the crumbling metal and then enclose the column caps (or any other weak point) with other caps which will be welded over them. Some 2000 repair locations are planned at this time, or nearly 20 per metal structure.

The operation would be simple were it to be carried out in a familiar and accessible area. But the opposite is true. Not only is this metal bramble bush difficult to reach and hidden under a thick concrete slab, but EDF does not even have an accurate picture of the site's topography. To start blindly or with simple pilot cameras would not be enough. There would be a risk of bumping into everything, of loosening some columns, of damaging equipment, or of breaking cables. The only solution is Isis, the robot with eight degrees of freedom, which can do everything, carry parts, strip surfaces, and weld as well.

The operation has been divided into several phases. First, the robots enter the heart of the ailing area to perform a telemetric mapping, using their heads, which are capable of determining the exact geometry of the zone of intervention. Thanks to this data, the engineers will be able to modify the theoretical model of the site.

During the third stage, the work of the robots is then simulated on the "new" model. During this learning phase, the engineers will use a small scale brother of Isis. They will control motion on this "puppet" and during the actual project, the large robot will repeat the gestures of the small one centimeter by centimeter. This phase should make it possible to work much more rapidly later, inside the very heart of the reactor. All the major movements of Isis' articulated portion will thus have been prepared. From each bore hole, the robot can work on six different structures which it first has to reach. Following the tests on the model, it should be child's play for the robot to find its way at the end of the pipe.

Work In Situ

At last, the solemn moment arrives for the in situ work, and while a large portion of the motion is already programmed, there still remains an essential and difficult phase, the approach. The quality of the subsequent welds depends on its precision, and it is here that Isis must prove its worth and demonstrate its real robot know-how, guided by the strain gauges covering its arms and the "whiskers" (about ten very fine sensors) sticking out from its extremities to feel for surfaces.

The actual repair of a structure requires two robots, each of which, entering from a different hole, carries one half of the part to be welded. They meet at the ailing unit, place the parts they are carrying face to face, and when everything is ready, after having stripped the oxidized areas with needle-headed pneumatic hammers, they weld.

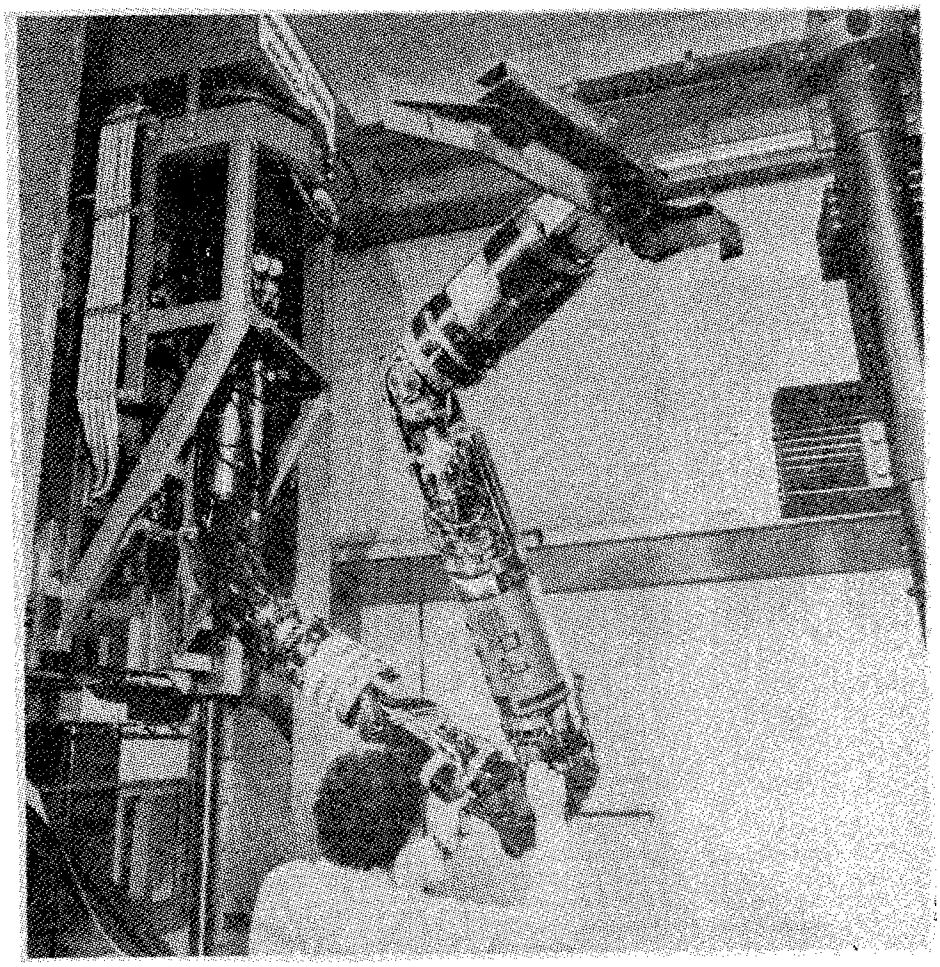
What if one the giant worms becomes stuck in the plant's innards? Everything has been foreseen: winches would unwind its large body, gently removing it through the pipe.

The Hispano-Suiza engineers are now feverishly waiting for their offspring to start their work. The Bois-Colombes installation has been bubbling with excitement about these new beasts for the past year. A robotic challenge that Hispano-Suiza accepted almost by chance, after having supplied EDF nearly 30 years ago with the first fuel loading systems.

Mechanical know-how combined with a rapid evolution in information processing was placed to the test during the 100,000 hours of experimentation and the 35,000 hours of machining needed for Isis. The entire project amounted to 200 million francs, an investment which EDF believes will be amortized in two winters of production for the Chinon A3 plant, which once repaired, can operate for another 10 years.

If the repairs succeed as planned, Hispano-Suiza can consider its first robotics attempt as a master stroke. With Westinghouse beginning to promote its Rosa robot, and with the English (who have been repairing graphite-gas plants since 1973) overselling their remote handlers, the time had come for the French to enter the field. A plunge into robotics, which although specialized in the nuclear pond, raises the hope of echoing ripples in more distant oceans. Isis could continue its career under water, near drilling platforms.

While awaiting these new horizons, Isis must at least show itself equal to the Egyptian goddess who succeeded in reassembling the scattered pieces of her brother and husband, Osiris, even if the modern Isis is only an accronym for Intervention in Upper Internal Structures!



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COUNTRY'S LARGEST NUCLEAR REACTOR, FORSMARK F 3, TO START

Stockholm SVENSKA DAGBLADET in Swedish 9 Apr 84 p IV

[Article by Bo Ostlund]

[Text] The fuel has already been delivered to the not-quite-complete reactor room at F 3, the third and last reactor at Forsmark. It will be loaded in September, and Sweden's 11th nuclear reactor--and its biggest to date--will begin feeding commercial electric current to the grid in May of next year.

But it will be an operation in felt slippers, both figuratively and literally.

"Literally" in the sense that safety requirements have been stiffened to such an extent that the systems will be hypersensitive: if a "strategically" placed door is slammed shut, the reactor will shut down, and if a bucket of scrub water winds up in the "wrong" drain, the reactor will shut down.

"Shutdowns are followed by startups, and that does not contribute to safety," says Alf Lindfors, manager of F 3, who is unique in that he is the only Swede to have been responsible for two loadings (F 1 and F 3).

Sweden's power companies, badly burned by close contact with politics, are not likely to get into another battle with the politicians, but one can scarcely say that mutual respect exists: systems that mistake a pail of scrub water for a burst pipe and slammed doors for explosions are not conducive to it.

More Expensive Electricity

All of this new built-in safety has sharply increased production costs. Electricity from F 3 will cost between 25 and 30 ore per kilowatt-hour (kWh), compared to 15 ore per kWh for older nuclear electricity.

And this is where the figurative felt slippers come in--for creeping around in the banking world in search of good loans.

Alf Lindfors says: "In our 10-billion-kronor investment, with loans taking 40 percent of the investment burden, better loan terms are the best way to increase operating profitability."

Safety as an Export?

Swedish power companies have accepted the idea of living with the world's most stringent safety requirements. Much of what has been done by the politicians in recent years will lead to successes in Swedish exports. One example--in a coming renaissance of nuclear power (because, of course, very little is being invested in nuclear power in the world today)--is Swedish technology for storing various kinds of radioactive waste.

Sweden is building a unique facility for the temporary storage of spent fuel in Oskarshamn (our CLAB) [Central Storage Co.]

In Forsmark, Sweden is building a new waste storage facility for the final deposition of reactor waste. So far, the tunnels go down about 300 meters below the sea, and by about 1988, the first stage of the storage facility will be complete.

And with full-scale studies underway a good 350 meters down in Swedish primary rock at Stripa in Bergslagen, Sweden has plans for the final storage of reactor fuel using the KBS [Nuclear Fuel Safety Project] method.

And Swedish reactors--ASEA's [Swedish General Electric Corporation's] boiling water reactors--demonstrate absolutely unique operational reliability from an international standpoint. The same is true of the Swedish turbines from ASEA-STAL.

But no one is concealing the fact that the Swedish nuclear debate has resulted in excesses that make rational electricity production more expensive and more difficult.

There is one more example from Forsmark's third reactor in addition to doors and buckets of scrub water, and here the technicians use plain language in their criticism.

"Local Earthquake"

Alf Lindfors says diplomatically: "The requirements forced us to make F 3 earthquake proof. But I can't see the logic in that when just across the road, F 1 and F 2 were both built according to less stringent requirements in that respect."

The same safety requirements also meant that F 3 had to be equipped with four completely separate safety systems.

"I must admit that production becomes more difficult as a result," says Lindfors, who comments that everyone will have to be watchful on that point when the many different safety systems themselves begin to present a risk as new sources of faults in the systems.

Forsmark 3 will be reactor No 11, as we said, and the third Oskarshamn reactor [O 3] will be number 12. F 3 and O 3 each have a capacity of 1,050 megawatts,

compared, for example, to our first reactor (Oskarshamn 1), which delivers 440 megawatts.

"Mega" and "giga" are the prefixes to most figures in this industry, and they can also be said to apply to employment. Forsmark and Oskarshamn are currently Sweden's largest construction sites, and from the standpoint of investment and employment, they represent more than the Swedish ROT [Repair, renovation and addition construction] aspiration for all of the 1980's.

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NUCLEAR REGULATORY AGENCY APPROVES NUCLEAR RESEARCH PROGRAM

Stockholm DAGENS NYHETER in Swedish 30 Apr 84 p 6

[Text] Vastervik (TT)--The Institute of Radiation Protection (SSI) is approving the research and development program that was submitted by the Forsmark Power Group Corporation and the OKG [Oskarshamn Power Group Corporation] as a condition for permission to load the last two nuclear reactors. But the SSI says that a few points in the program, which was worked out by the Swedish Nuclear Fuel Supply Company [SKBF], will have to be spelled out more clearly. This is stated in a report to the government.

According to the new law on nuclear technology, the owners of Forsmark 3 and Oskarshamn 3 are required to produce an acceptable method for the final storage of spent nuclear fuel and a research program as a condition for loading the nuclear reactors.

The final storage method proposed in KBS [Nuclear Fuel Safety Project]-3 calls for encapsulating the fuel in copper and burying it deep in bedrock. The SKBF's research program is also based on that method. But the final method has not yet been decided on.

In its report on the research program, the SSI points out in particular that clarification is needed concerning research into the spread of radioactivity in the biosphere. The SSI also feels that the SKBF must take a closer look at the question of the quality of the rock at great depths and of whether exploitable minerals may exist at those depths.

In addition, the SSI feels that in its research program for 1986, which will be more comprehensive, the SKBF must set a date for deciding on a method for final storage. The program must also include a timetable for various pilot and demonstration plants.

In its report to the government, the SSI also discusses the question of who will be responsible for ongoing supervision of the research and development work.

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BRITAIN CONSIDERS ABANDONING NUCLEAR RESEARCH BODY

London THE DAILY TELEGRAPH in English 23 Mar 84 p 10

[Article by John Izbicki]

[Text] Britain is considering a proposal to pull out of the European Organisation for Nuclear Research (CERN) and save its subscription of £35,600,000 a year as well as a further £14,450,000 spent by taxpayers on CERN-related work.

Sir Keith Joseph, Education Secretary, yesterday accepted the advice of the Government's Advisory Board for the Research Councils and agreed to "question the continued participation in CERN."

He told the Commons that he has ordered a full review to be conducted.

If the review favours severance, it means that Britain's part in the delicate area of high energy particle physics--the smashing of atoms by anti-proton-proton collider--will cease.

Sir John Kendrew, President of St John's College, Oxford, has been appointed to chair the inquiry. Among those taking part will be Sir Douglas Hague, chairman of the Economic and Social Research Council, Sir Jack Lewis, Professor of Chemistry at Cambridge, Prof Ken Pounds and Professor of Space Physics at Leicester University.

The recommendation to question continued participation in CERN came in a 67-page report published by the advisory board and delivered to Sir Keith who decided to make it and all correspondence between himself and the board public.

The report questioned the Government's cuts in this area. It disclosed that, because of lack of funds, some 650 out of a total of 3,000 applications for research grants had to be rejected.

"Of these first rate applications--that is, those which are essential to fund in valuable lines of research are not to be ignored--the Medical Research Council rejected 66 (11 percent), the Science and Engineering Research Council

451 (22 percent) and the Natural Environment Research Council 133 (43 percent)," it stated.

Prof John Kingman, chairman of the Science and Engineering Research Council and a member of the advisory board told a Press conference yesterday that constant rejections of major research project grants were frustrating.

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END