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# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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28 August 1984

WORLDWIDE REPORT  
NUCLEAR DEVELOPMENT AND PROLIFERATION

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ECONOMIC ADVANTAGES OF NUCLEAR POWER PLANTS UNDERSCORED

Beijing NENG YUAN JOURNAL OF ENERGY in Chinese No 2, 25 Apr 84 p 32

Article by He Mingxing /0149 3046 2450: "The Economic Accounting of Nuclear Power Plants"

Text I. The Future of Nuclear Energy

The nuclear energy is 2-3 million times greater than chemical energy, the fission energy of 1 kg of uranium is equivalent to the energy released by burning 2,500 tons of standard coal and the fusion energy of the same mass is three times the fission energy.

The second half of the 20th century is the first stage of the development and application of nuclear energy. As of August 1982, there were 273 nuclear power plants operating in 24 countries and regions, producing a total of 168.35 million kilowatts of electric power. There were 229 nuclear power plants under construction with a total generating capacity of 215.27 million kilowatts, and 111 nuclear plants were on order with a combined capacity of 108.41 million kilowatts. It is predicted that by the year 2000 approximately half the countries in the world will have nuclear power plants and nuclear power will account for 30-40 percent of the total power output in some major western industrial nations and the percentage will be even higher for France.

II. Developing China's Nuclear Power

China is a large country with rich reserves of energy resources. But with 1 billion people, our per capita energy resource of China is only average among the countries in the world. In particular, China's energy resources are not uniformly distributed, coals are concentrated in Shanxi, Nei Monggol, and Henan, water resources are concentrated in the southwest and on the mid- and upper course of the Huang He and oil resources are concentrated in the east and west. The population, industry and agriculture of China, on the other hand, are concentrated in the coastal areas in the southeast. This distribution has caused great difficulties in the transportation of energy in China. In view of this situation, China must build a number of nuclear power plants in the south, the east, and the northeast where the industry and agriculture are developed and where the population is concentrated in order to relieve the shortage of energy in these regions and to promote the continued production of industry and agriculture in these areas.















TAIWAN

CHINA POST ON U.S. NUCLEAR DEAL WITH BEIJING

OW232010 Taipei CHINA POST in English 18 Jul 84 p 4

[Editorial: "Nuke Deal With Peking Hits Snag"]

[Text] U.S. President Reagan promised to sell Peking nuclear technology. The latest news from Washington reveals the Reagan administration is postponing submitting the treaty to Congress while ways are being explored, ways to tighten guarantees that the Communists will not use the technology to enable other Communist nations to make nuclear weapons.

A Washington newspaper reports the Reagan administration is demanding greater assurances from Peking that it will guard against the spread of nuclear technology. It is believed Peking has aided Pakistan's nuclear program. Peking refuses to give new assurances, contending the American demand is an attempt to reopen the deal.

Members of the U.S. Congress are even more skeptical than the Reagan administration. We can tell the Congress and the American people the Communists are not to be trusted. They do not keep their word. It appears that the nuclear deal is off permanently.

CSO: 5100/4135





























BRAZIL

GOVERNMENT TO SIGN NUCLEAR AGREEMENT WITH PRC

PY031518 Rio de Janeiro O GLOBO in Portuguese 2 Aug 84 p 24

[Text] Brasilia -- The Brazilian Government will sign a nuclear agreement with the PRC during the visit of PRC Ministry of Foreign Affairs Wu Xueqian, who will be in Brasilia 11-15 August. The final agreement is being negotiated in Beijing by officials of Nuclebras [Brazilian Nuclear Corporation] and Abdenur, Itamaraty's main economic adviser.

During President Figueiredo's visit to China last May, the two countries signed a memorandum of understanding in the nuclear field establishing basic guidelines for cooperation and the peaceful use of nuclear energy.

The memorandum included an exchange of basic research on nuclear energy and the development of technology related to research, projects, construction, and operation of power plants and reactors, in addition to studies on prospecting and processing of uranium, fabrication of fuel elements, and research on nuclear safeguards and radioisotopes.

The initiative for an agreement came from the Brazilian Government. The Chinese, who have serious problems in distributing their energy resources, were interested. The Chinese already have nuclear cooperation agreements with the United States and the FRG, but the agreement with Brazil will be the first nuclear agreement with a developing country. Brazil, in addition to an agreement with the FRG, has signed agreements also with Argentina, Venezuela, Peru, and Iraq.

CSO: 5100/2125

BRAZIL

REPORT ON NUCLEAR COOPERATION AGREEMENT WITH PRC

PY162255 Sao Paulo FOLHA DE SAO PAULO in Portuguese 16 Aug 84 p 15

[Text] Brasilia -- Brazil and the PRC yesterday signed a nuclear cooperation agreement which was not published by request of the PRC authorities, because the text must be submitted first to the PRC National People's Congress. But according to official reports, the document anticipates the exchange of atomic technicians, the supply of Brazilian uranium for PRC nuclear plants, and the supply of Brazilian nuclear equipment for the PRC atomic program, which foresees the construction of nine nuclear plants within the next few years.

The signing of the nuclear agreement was held at Itamaraty after the meeting between Foreign Ministers Saraiva Guerreiro and Wu Xueqian, who discussed the possibility of expanding bilateral relations. According to Foreign Ministry spokesman Bernardo Pericas, two subjects prevailed during the talks. The first is the creation of a maritime line between the two countries. This maritime line will use large grain ships to take cereal and iron ore from Brazil, and to bring PRC oil for Brazilian Petroleum Corporation [Petrobras]. The second subject is the problem of the Brazilian foreign debt and the possibilities for renegotiation from government to government. The signing ceremony and the meeting with Saraiva Guerreiro marked the end of Wu Xueqian's visit to Brazil, in which he visited Sao Paulo, Rio de Janeiro, and Brasilia, and in which he held talks with President Figueriedo and ministers of the Brazilian economic area.

CSO: 5100/2133

















































during the Janata regime. In mid-1978, the then Indian Prime Minister, Mr. Morarji Desai, did sign an agreement with Libya involving the transfer of nuclear know-how, including plutonium reprocessing techniques, in return for two million tonnes of crude oil worth about 400 million U.S. dollars. However, later India did not carry out the agreement for domestic political reasons. The *HINDUSTAN TIMES* disclosure does show nevertheless that the inventors of the so-called "Islamic bomb" are wide of the mark. It is time the concerned quarters took Pakistan's upright stand on this issue more seriously than they have done so far and spared this country the obligation of rebutting monotonously allegations and insinuations that have been contradicted convincingly a hundred times before.

CSO: 5100/4739













## NUCLEAR WASTE STORAGE PROJECT ABANDONED

Paris AFP SCIENCES in French 7 Jun 84 pp 48-49

[Unsigned article]

[Text] The inhabitants of St. Priest-la-Prugne, the small Loire commune which has been fighting for four years against the installation of a storage center for radioactive waste in its midst, has made its slogan, "Goodbye Garbage," come true. The government has indeed officially announced that it was dropping the project.

"This time it's for sure, it's over," declares the satisfied mayor of St. Priest, Jean Rathier, who is finally rid of "a great worry." The letter which Jean Auroux, secretary of state for energy, wrote him on 3 May, is unambiguous: "It is my pleasure," wrote the minister, "to confirm that any project for storing radioactive waste on your commune's territory is abandoned. I am certain that this decision was awaited by many people in your commune, and that it is consistent with your wishes."

Ever since the project was announced in 1979, the commune bristled at the thought of having on its territory the second center for storing waste from nuclear plants. The only center, in Hague (Manche), should very soon be full, and those responsible for energy policy are urgently looking for other possible storage sites.

The idea of transforming the former uranium mine at Bois-Noirs, located about 2 km from St. Priest village, seemed appealing. No need for impact studies nor public domain inquiry, since the land was owned by Cogema, a full subsidiary of the AEC. It was also believed at the time, that the inhabitants, with a long custom of coexistence with uranium and radioactivity problems, would not show any opposition.

That was a mistake. An association, the Bois-Noirs Collective, formed against "atomic dumping," immediately found support from the socialists and from the Socialist Party mayor of Roanne, Jean Auroux.

When the left came to power hope was rekindled in St. Priest. Between two presidential campaign visits, Francois Mitterand had promised the elimination of a project "unanimously condemned by elected representatives and the people." In 1982, Alain Herve, minister of energy, confirmed that this "inacceptable" 1979 project was abandoned, without officially confirming anything to the inhabitants. St. Priest became concerned again one year later, when Mr Auroux, the new man in charge of energy, announced without any further details that storage sites were being prospected. Since then, rumors and suspicions about the possibility of a new project in St. Priest mobilized the population once more.

During a decisive meeting in Roanne on 25 May, in the presence of Mr Auroux, Cogema acceded to the government's request to yield, for a symbolic one franc, the mine's four hectares of land and its 5000 square meters of buildings, which according to Cogema represent a value of 5 million francs. Moreover, the company promised to provide 2-3 million francs for the commune's economic development.

They are now breathing more easily in St. Priest-la-Prugne. Cogema's former plant will become a factory for granulated fuel made from wood waste. The mine's decanting pool will be transformed into a waterway, and the small river, la Bresbe, which flows through the community, will become the object of a "clean river" contract. On 10 June, St. Priest will have a festival, and the Bois-Noirs collective, which is organizing it, will celebrate "the victory of a fight which now belongs to the past."

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CSO: 5100/2579

FRANCE

AUROUX REPORT ON NEW RADIOACTIVE WASTE STORAGE SITES

Paris AFP SCIENCES in French 21 Jun 84 pp 42-49

[Speech by J. Auroux, former secretary of state to the minister of industry, in charge of energy, at the Higher Council for Nuclear Safety; date and place not specified]

[Text] Paris--The two new surface storage sites for radioactive waste that should be planned in France for the early 1990's (see announcement in the chapter on Scientific Policy, page 1) will be realized according to the very strict criteria defined in the Fundamental Safety Rule (FSR) which Mr Jean Auroux made public on the very day of his speech at the Higher Council for Nuclear Safety.

In particular, very low thresholds are planned as far as the activity of alpha emitters is concerned, both for shipments received at the center and for the general activity prevailing there. This will therefore force the CEA [Atomic Energy Commission] to continue its studies on how to process and package waste containing these emitters.

The guidelines also provide that "it should be possible to return the land used for these sites to normal use after three centuries."

We are giving below the full text of Mr Auroux's speech.

The development of the French nuclear program makes it necessary to create two new surface storage centers in addition to the center on the Channel which, for the past 15 years, has been receiving all low and medium activity nuclear waste produced in France, as well as an underground laboratory designed to determine the conditions of permanent underground storage.

This is the gist of the recommendation made by your Council on 19 April 1983 when, based on the report of the scientific commission chaired by Professor Castaing, you advised the government, among other things, to take measures to

open two surface storage centers and to continue and expand research programs on deep-strata geology, and especially exploratory drilling in potentially suitable geologic formations.

In this respect, I would like to stress the deeply innovating aspect of the approach adopted: to obtain the opinion of an independent group on the subject of radioactive waste, so as to have outsiders cast some light on decisions amounting to long-term commitments. I would also like to express my warmest thanks to Professor Castaing and all the members of his commission for the quality and seriousness of the work accomplished.

On several occasions, the constitution of a commission was denounced by many commentators as the surest way to do nothing; we are therefore justified in asking today what happened of the recommendations issued then.

This is why, after taking enough time for reflection, evaluation and decision, I wanted to address you today to take stock of the progress already accomplished, and more precisely to let you know how we shall now go about the tasks that will lead to the selection of waste-storage sites by the operators and with the agreement of the local population, these sites being chosen in agreement with all the parties involved.

My statement will therefore include five points which will show you that considerable background work has been accomplished since the Castaing report and my communication to the IAEA [International Atomic Energy Agency] in Vienna.

1. Work leading to a new Fundamental Safety Rule;
2. Criteria for site selection;
3. Our radioactive waste management program;
4. Structures which we acquired to carry out this program;
5. Finally, I shall describe how work will proceed in the field.

First, I would like to point out that industrialized countries using nuclear energy, some of which are our European neighbors, must face the same problem, and recently announced decisions made on this question:

- the British just selected two sites, one in surface and one underground, for which the NIREX [expansion unknown] organization will make the necessary qualification studies;
- Sweden has undertaken the construction of a storage center for short-lived waste produced by reactors in operation. In that country, exploratory drillings were also made at eight different sites to acquire data on the deep-strata geology of the formations that could house an underground laboratory;

- the Federal Republic of Germany has selected the old Konrad mine to store low and medium activity waste, and the Gorleben site for underground storage. It has undertaken the construction of a research laboratory in the Asse salt mine;

- finally, Switzerland recently made public the names of three sites that will receive waste management centers.

As for us, our radioactive-waste management objectives are well defined; essentially, they are as follows:

- on the one hand, and above all, to protect workers and the public from radioactive substances and the ionizing radiation they emit, until the potential nuisances they represent have disappeared;

- on the other hand, to restrict to a minimum the interim storage of waste whenever satisfactory solutions to processing, packing and long-term storage problems already exist.

These objectives are the subject of fundamental safety rules established by safety authorities; they indicate what measures must be taken to conform to French regulatory practices.

In this respect, I would like to stress an important decision: following the work of your Council, the Fundamental Safety Rule concerning surface storage centers for radioactive waste was entirely revised and considerably improved, so that we are now the world leaders in this respect.

Indeed, this rule contains a number of guidelines on which future operators will be able to rely not only to select suitable sites, but also to design surface centers and for operating guidelines.

Among other things, it contains very strict criteria concerning acceptance of parcels at surface centers. The alpha-emitter radioactive element activity of a parcel received at a surface center shall, as a rule, never exceed 0.1 curie per ton, and under no circumstances shall it exceed 0.5 curie per ton; finally, the average activity of parcels accepted shall be below 0.01 curie per ton.

Taking this limitation into account, a person who would have to stay on the site starting today would be exposed to an irradiation from alpha emitters that would be only 10 percent higher than the average natural radioactivity in our country.

This rule was the subject of thorough discussions within the standing committee in charge of basic nuclear facilities other than reactors, with the participation, among others, of representatives of the Ministries of Health and the Secretariat of State to Environment, and experts from the CEA, the BRGM [Bureau of Geological and Mining Exploration], the Paris School of Mines, etc.

Thus, all the parties involved reached a consensus on the rules to adopt. This consensus shows that our approach was right and that we can still rely on the sense of responsibility in our country.

France and the United States are now the only two countries to have regulations of a general character established by the administration and setting a maximum content.

However, the U.S. text does not set a maximum permissible average content and therefore we can say that our rule is the most stringent and the most complete now in force worldwide; according to experts, it is thus the rule providing the greatest protection that can be reasonably established. But as La Fontaine--like your servant a great friend of nature--once said:

"It is well to make assurance doubly sure;  
Excess in this respect was never found useless."

The rule specifies our doctrine with respect to surface storage, and I think it may be useful to recall it here. It can be expressed in three points:

- during the operation and monitoring stage, no radioactivity should be disseminated; most of the radioactivity will decrease during this stage;
- it should be possible to return the land to normal use after three centuries; the residual background radiation will then be low enough to restore the land to any use; this is how the alpha-activity limitations which I mentioned previously are established, and they are the most stringent of all those that are now in force;
- finally, site selection must comply with well-defined criteria.

These criteria will lead to a strict scientific selection of storage sites. They involve in particular:

- land stability: zones with strong slopes or where landslides might occur and zones exhibiting some seismic activity shall be carefully avoided;
- hydrogeologic properties: we shall look for zones that can easily be modelled so as to obtain certainties as to the final destination of percolation water, and zones presenting also outlets with good dilution capacities, and finally zones with zero flooding risks;
- finally, the geochemical properties of soils, and in particular their retention capacities, shall be carefully examined.

Compliance with these provisions will enable us to guarantee that the radiologic impact of a waste-storage center at any given time will remain extremely low, lower than the fluctuations of natural radioactivity, and that it will not entail any risk for the workers or for the neighboring populations, or for the environment. A center thus created and operated will present fewer radiologic risks for the population than many regions of France that have a granitic underground.

We shall also be guided in our action by the principle of candor, the natural consequence of being responsible; therefore, I have decided that this rule should be made accessible to the public. I am pleased to announce today that it will be published.

Your Council also heard remarks from the commission chaired by Professor Castaing, concerning the general radioactive-waste management program established by the CEA; numerous recommendations were formulated, and taken into consideration by the CEA; thus, special emphasis was placed on research concerning processing methods designed to increase recovery of long-lived alpha emitters, and contacts were made with the CNRS [National Center for Scientific Research] to increase the involvement of the scientific community in the theoretical work that is still required to model the very long-term trends in the storage of long-lived radioactive waste.

I shall take the risk of making this meeting look like a school prize-day by announcing that this program, revised in the light of recommendations made by the working group, will also be published.

In addition, I would like to bring again to your attention two important measures that show what priority the government is giving to waste management. The first has to do with the CEA budget for this item. From 1982 to 1984, its civilian research budget for research and development designed to improve our knowledge of radioactive waste nearly doubled. The second has to do with structures: in this respect, I would like to express again my concern not to let any confusion arise between the parts played by the several actors involved:

- the CEA is in charge of research and development for processing, packing and storage methods;
- the Central Service of Nuclear Facilities Safety of the Ministry of Industry and Research is in charge of preparing regulations and making sure they are applied;
- the ANDRA [National Agency for the Management of Radioactive Waste] is a public service operating within the CEA; it is in charge of managing waste on behalf of the State and in the necessary context of its perennality;
- producers are responsible for the waste produced until it is taken over by the ANDRA, and they are expected to make a contribution in the form of a just remuneration.

Personally, as far as public opinion is concerned, I am extremely attached to this institutional clarification which, however, is not incompatible with purely scientific, less hierarchical and broader structures.

To that effect, changes were made in the internal organization of the CEA; the functions of waste producer and waste research within the CEA will therefore be provided by two entirely distinct structures. Second, the status of the scientific commission in charge of examining and assessing programs was modified to make waste producers and scientists more aware of their responsibilities.

I shall now consider the most important recommendation of your council: the recommendation to start as soon as possible the operations that will lead to the opening of two new surface storage centers on the one hand and, on the other hand, of an underground laboratory designed to study the conditions of underground storage.

A number of regions whose geological potential is suitable a priori exist and were inventoried with the assistance of the BRGM. Within these regions, we must carry out the preselection, then the selection of sites, making a clear distinction between what is involved in the case of future surface storage centers for short-lived waste and in the case of the underground laboratory designed to study the conditions of underground storage.

I shall be more specific about what is going to happen from now on, first for surface sites: the ANDRA is already in charge of making a preselection based on the criteria I just mentioned, i.e. it will pick at least half a dozen sites in suitable regions, and confirmation work will be carried out; to this effect, contacts will be established with the local communities involved; indeed, we shall have to set up a dialogue at all stages of these projects. The ANDRA, which will be the operator for all exploratory work, will also make sure that the public is informed and will be available to answer all questions that could be raised locally by the exploratory work. This will ensure that the public is well informed from the start of these projects. Nobody will have to face a fait accompli.

The confirmation work will be carried out by small teams (about 10 people) and will last about 1 year; on this occasion, drillings made at small depths and with lightweight equipment will be made to collect data on the geology and hydrogeology of the sites.

If the site is accepted after this confirmation stage, it will then undergo the procedure applicable to nuclear facilities, which will require an extensive knowledge of the environment (geology, hydrogeology, geochemistry, climatology, etc.) in order to prepare the preliminary safety report; additional qualification work will be required and will last about 2 years, during which some 15 people will have to work on the site--at the same time, the ANDRA will buy the land. We shall then proceed with the construction and operation of the center.

The work involved in preparing the site and building the infrastructures will last about 3 years and will represent approximately 120 jobs in various local firms. After this stage, the center will be operated and will generate approximately 70 jobs in local firms and 70 jobs at the ANDRA.

The research programs concerning deep-strata geology will involve more extensive exploratory work, and especially deep-hole drilling. Therefore, confirmation stages will be longer: selecting a site will take at least 3 years; in addition, since this is for a laboratory, the introduction of radioactive waste will not be considered at first; therefore, the laboratory will not follow the procedure of authorization applicable to basic nuclear facilities.

There will be a single operator for all future operations: the National Agency for the Management of Radioactive Waste. It will carry out the initial exploration work in the field; it will then develop and operate the waste storage centers and be in charge of building the underground laboratory.

For all the exploration, preselection, qualification and, as the case may be, confirmation work, the ANDRA shall establish the necessary contacts and make the studies required to ensure that proposals are submitted to the authorities within 1 year for the selection of two surface sites, and within 3 years for the selection of the underground site. So much for the timetable that, as an extension of your work, properly reconciles the requirements of our industry and those of our environment.

As for relations with local communities, I expect them to be exemplary and characterized by a responsible attitude on both sides; in other words, beyond the safety considerations that are now reflected in our regulations, they should be based on information, consultation and cooperation.

Information and candor shall be the rule in the field and at all levels. I shall therefore reject any accusations based on assumptions rather than facts, and any biased views as, under these conditions, they could not have any serious basis.

After that, both parties will be associated in consultations already during the first stage of exploration, so that a climate of confidence will create the best possible conditions for both parties to arrive at an agreement should the site explored be finally selected.

Finally, cooperation with the local communities involved will develop on the sites selected. This cooperation will certainly acquire an ecological dimension involving follow up and permanent monitoring in this respect, but also--and this deserves being stressed--a veritable economic dimension.

Indeed, it did not seem fair that the sites of nuclear power production could bring considerable indirect economic--especially fiscal--benefits to the communities where they are installed, and that the sites where nuclear products are stored and decontaminated--although they are designed to be reversible, based on our current research and studies--should not generate significant resources for their own communities. Without going into details here, I would like to give you just a few orders of magnitude that give an idea of the industrial and economic implications of a surface storage center.

- As far as the initial investment and the various infrastructures required are concerned, we can advance figures of FF 200 million and 120 jobs over a 3-year period.

- As far as permanent activity is concerned, we can advance figures of FF 55 million per year with a personnel of 70 people or so in local firms and another 70 working for the ANDRA.

- To take into account the impact that the creation of this industrial operation will have in a community (community facilities, housing) we are contemplating--not a large-site procedure that would not be really warranted--but a significant dotation of some FF 30 million that would be allocated to the local community for its development. To this, we should add--in the spirit of equity in the treatment of nuclear sites which I just mentioned--a specific resource, in addition to traditional tax revenues, that would make financial means available to the community to the tune of FF 1 to 1.5 million per year.

Finally, to abide by the rules of decentralization and answer applications that might be the result of community decisions, I am asking the ANDRA to examine the possible candidacy of local communities, exerting of course the same scientific rigor as in the case of the sites it would have identified on its own.

In both cases, the sites will have to meet the criteria I have just defined. In other words, we might have to turn down sites that could be offered to us by local communities.

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CSO: 5100/2581

## FRAMATOME SEEKS DIVERSIFICATION

Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 11

[Unsigned article]

[Text] The year 1983, characterized by a retrenching French nuclear program, and by limited prospects for exportation, was a turning point for Framatome, which is considering a diversification. In its annual report, the company--held 50/50 by Creusot-Loire and the AEC--explains that "the massive national program is reaching its end" and "the expected cruising period with one or two installations per year will lead to a reduced workload." "Exportation prospects," it adds, "will be limited in the years to come, and will not compensate for the reduction in French programs."

"While maintaining the development programs indispensable for its nuclear construction capabilities, and continuing its pursuit of exportation orders," Framatome has "started studies aimed at finding profitable complementary activities, either by increasing its nuclear maintenance and services, or by seeking future activities in other fields."

At the end of 1983, 59 Framatome PWR (pressurized water) units were in service or under construction in France and throughout the world. With the connection of four new 900 MW generators into the network in 1983 (Cruas 1, Le Blayais 3 and 4, and Chinon B2), 28 generators are now operating in France and 24 are under construction (seven of them at 900 MW and 17 at 1300 MW). In Belgium, Tihange 2 was placed in service in April 1983. In South Africa, 1983 was essentially devoted to repair the damages caused by the previous year's attacks, and to a resumption of tests. In South Korea, "construction is advancing under particularly difficult conditions." Bids were supplied to Finland, Turkey, and Egypt.

Still abroad, the maintenance division completed a deal to export PWR steam generators supplied by other manufacturers. In general, the development of maintenance and service activities was one of Framatome's priorities in 1983. Deliveries from the Chalon and Creusot plants "have remained high": 29 heavy components were supplied seven reactor vessels, six pressurizers, 13 complete steam generators, and three lower portions of steam generators for South Korea).

The personnel was "stabilized" in 1983, and on 31 December the company had 5419 employees. Revenue grew last year by 12.64 percent, from 3,929.9 million francs in 1982 to 4,426.8 million francs (of which 787.6 million in maintenance and services). Net profit (after taxes) dropped, from 276.4 million francs in 1982 to 201 million last year. Research and development costs amounted to 374 million francs.

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CSO: 5100/2579

## BRIEFS

MARCOULE REACTOR SHUT DOWN--The management of the Marcoule (Gard) Atomic Center announced that the G3 reactor of the graphite-gas plant is definitely shut down. This reactor, which made nuclear history 25 years ago, had been stopped in April following detection of a carbon dioxide gas leak in the hot gas tubing. During this inspection, technicians had also noted several cracks, as well as significant changes in the metal's mechanical characteristics at these cracks. "These irreversible modifications," the management points out, "have led to the joint decision by the AEC and Cogema." Twin sister of the G2, the G3 reactor had a career of 25 years, although its operation was not supposed to exceed 10 years. It went critical on 8 June 1959, and its power increase ended on 4 April 1960, when its 250,000 kW were plugged into the network. According to the management, "this reactor had an exemplary performance, and as such, holds the world record for steadiness of operation among nuclear reactors." [Text] [Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 12] 11,023

INCREASE IN NUCLEAR POWER--On 5 June, Electricite de France (EDF) indicated that nuclear plants have provided 62 percent of France's electric power production during the first four months of 1984, thanks to a 48 percent increase over the corresponding period in 1983. This was made to a 48 percent increase over the corresponding period in 1983. This was made possible by the start of new reactors and by the excellent performance of the plants. During the first four months of 1984, the availability ratio of the plants--ratio of available power to maximum power--reached nearly 87 percent compared to 72 percent during the previous 12 months. These excellent results for nuclear power have allowed EDF to reduce the more costly production of conventional thermal plants (oil and coal) by 13 percent. Coal consumption in April thus dropped to 1.07 million tons compared to 1.26 million in April 1983, while oil usage was three times lower (93,000 tons against 271,000). Overall EDF production grew by 16 percent during the first four months of 1984, with 103.4 billion KWh, of which 63.7 billion came from nuclear plants, 20.6 billion from hydroelectric plants, and 19.1 billion from conventional thermal sources. EDF was able to fully meet consumer demand, which grew by 7.3 percent during this period, and achieve in its foreign exchanges a surplus twice as large as last year's--8.7 billion KWh against 3.8 billion. [Text] [Paris AFP SCIENCES in French 7 Jun 84 p 44] 11,023

PALUEL PWR REACTOR--The management of the Paluel (Seine-Maritime) nuclear plant announced that the first phase of the plant supplied its first kilowatts to the electrical network on 22 June at 0039 hours. This connection to the network was performed in three stages: manual at first, followed by automatic systems, with a stoppage each time to perform controller tests. The Paluel plant is the first REP (pressurized water reactor) unit in France whose nominal power is 1300 MW for each of the three production sectors planned. The uranium charging of sector 2 is finished, and the first precritical cold tests are now being performed. [Text] [Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 11] 11,023

CSO: 5100/2579

END