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# Worldwide Report

## NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 187



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## CONTENTS

ASIA

## BRIEFS

NUCLEAR TEST PLAN OUTLINED--The French Embassy in Canberra has outlined the purpose of its nuclear testing program in the Pacific Ocean following Australia's protest over the planned resumption of such tests. While noting Australia's position, the embassy says the new Australian Labor Government should also voice its opposition to nuclear testing by China, the United States and the Soviet Union. The embassy says the Pacific tests are an essential part of France's defense policy. It says the tests are aimed at maintaining the credibility of France's deterrent force thereby safeguarding the nation's independence. [Text] [BK060955 Melbourne Overseas Service in English 0830 GMT 6 Apr 83]

HAYDEN CONCERNED OVER NUCLEAR TEST--Australia and New Zealand have both voiced concern over France's first underground nuclear explosion this year at its Pacific testing site, Mururoa Atoll. The Australian foreign minister, Mr Hayden, and his New Zealand counterpart, Mr Cooper, but said they were disappointed that France had begun a new series of tests despite the opposition of countries in the Pacific region. Mr Hayden said he would discuss the issue of French nuclear tests in the Pacific with the French Government when he visited Paris next month. [Excerpts] [BK210619 Melbourne Overseas Service in English 0500 GMT 21 Apr 83]

CSO: 5100/4325

CONSTRUCTION OF URANIUM ENRICHMENT PROTOTYPE PLANT REPORTED

Tokyo ENERUGI FORAMU in Japanese Dec 82 pp 90-91

[Article by T. Ikeda, Economics Section, SANYO SHIMBUN]

[Text] Okayama Prefecture is spirited these days, with the simultaneous undertaking of large-scale projects such as the spanning of the great bridge of Seto and the construction of Kibi Plateau City and a new airport on the premise of attracting a technopolis (concentrated city for high technology). It has recently decided to add yet another epochal national project. Last June, the Science and Technology Agency and the Power Reactor and Nuclear Fuel Development Corporation (Donen) formally decided to build a "prototype plant" in Tsuyama region in northern Okayama Prefecture, in a step following the uranium enrichment pilot plant of Ningyo-toge in Okayama Prefecture.

Based on the "achievements" obtained at Ningyo-toge, it was considered to be sensible and natural to construct the prototype plant nearby. However, not only the target district but also the prefectural public rejoiced at receiving the good news about the decision. The road to the decision had been long. Although the concept of prototype plant construction was already formalized at the time of initial operation of the uranium enrichment plant (1979), the decision required an additional 3 years.

The local people were confident that their site was at the top of the site selection list for prototype plant construction. However, they "were, to be honest, not 100 percent certain" (Mayor Ikusue of Otsu city). The reason was that other prefectures such as Fukui and Fukushima were announced as leading proposed sites, and intensive moves were made to attract the plant; voices were raised objecting to the concentration of uranium projects in Okayama alone; and there were some local people who still doubted its safety and were concerned about environmental destruction.

Today, the greater Tsuyama region, consisting of 15 towns and villages centered around Tsuyama city, the base city in the northern prefecture, is bubbling with the second postwar "uranium boom." Since the discovery of uranium ore (Ningyo rock) in 1955, excitement is renewed after a 27-year interval.

Although the Science and Technology Agency and Donen have decided on plant construction in Okayama Prefecture, they have not yet focused on a single eligible site. It has been announced only as somewhere in Tsuyama region. Not to follow the example of the recent preliminary election for Liberal Democratic Party leader, but four proposed sites have been announced. They are Kamisaibara-mura, Tomata-gun (within the Ningyo-toge Works, 80 hectares); Katsukita-machi, Katsuta-gun (200 hectares); Kumemachi, Kume-gun (270 hectares); and Kagaminomachi, Tomata-gun (20 hectares). Site inspection such as topography, geology, etc., to focus upon one proposed site has been continuing here since August. The final decision on the precise site has been slightly delayed, and no decisive report has yet been issued at this stage (November 8).

Already Calculating for Enticement

The proposed sites are all in remote areas of the northern part of the prefecture. A vigorous fight for enticement, "Do come here," has developed among the local people, who wish to revitalize the region with the prototype plant enticement as the focus. This time, the fight is within the family. However, the "Tsuyama Region Association for Enticing the Uranium Enrichment Prototype Plant," which has been carrying on the enticement movement since 1980, states: "We have finally found a big treasure; whichever of the four proposed sites is chosen, we would like to carry on a smooth enticement task with concerted effort."

In the northern part of Okayama Prefecture the force lacks intensity compared with the southern part of the prefecture centered around Okayama city and Kurashiki city. There is a common awareness that "with plant construction, we can develop an energy industry to use as a nucleus for the future promotion of Tsuyama region." It is very obvious from the comments heard from the people involved that their intent is to wipe out the past underlying tone of "heavy south, thin north."

At one of the proposed sites, Katsukita-machi, an association for enticing the prototype plant was organized in June, and on the premise of being chosen, it is busy approaching and explaining the plan to landowners within the site (170 people). Since a special decision was made on enticement in the town assembly, Kumemachi has also been holding meetings headed by the mayor virtually every day to explain the plan to the local residents as "something equivalent to the great bridge of Seto."

At Kamisaibaramura, where the pilot plant is located, the village leaders are busy advertising the advantages while showing confidence: "We believe we are the strongest among the four proposed sites. This is the origin of Japanese uranium enrichment technology. There is no opposition movement among the residents, either."

According to the construction schedule of the prototype plant, the site will be decided on during this year. The construction will begin in the next fiscal year at a cost in excess of 70 billion yen. The Science and Technology Agency allocated 960 million yen this fiscal year for preparatory construction costs, and the work will be carried out by Donen with the cooperation of the private sector such as electric power companies. Partial operation is expected to begin in FY-86, and total operation, in FY-87. FY-87 is the year for the scheduled opening of the great bridge of Seto which connects Okayama with Kagawa. For Okayama, that year will certainly be a "year to commemorate" and it is eagerly being awaited by the 1.8 million residents of the prefecture.

The area of the plant construction site is approximately 120,000 square meters. Anticipated production capacity is approximately 200 tons SWU/year, almost tripling the capacity of the pilot plant. This output is enormous, equivalent to the fuel for 2 years for one unit of a 1-million-kilowatt-class nuclear power plant. Moreover, its success or failure will have a large effect on the next commercial plant (partial operation is scheduled to start in FY-89) on a private basis. Furthermore, it is also the key point for the desired Japanese autonomy in the so-called nuclear fuel cycle, from refining of uranium ore to uranium enrichment, nuclear fuel fabrication, reprocessing, and to radioactive waste disposal.

Although it is an important project in accordance with national policy, local residents regard the immediate merit of the enticement with utmost importance for the moment rather than such "difficult arguments." According to the estimate of the local office, the prototype plant will attract business investments of approximately 100 million yen, including related businesses such as manufacturing and repairing of centrifuges, etc. Not that all this money will drop into local hands, but it is enough to make accountants' hands dance on the calculator. This is understandable from the viewpoint of setting a goal for regional promotion as an energy town including increased employment.

In addition, what the prospective town wants as an immediate concrete effect is a grant for an energy source site promotional measure in accordance with three laws on energy sources. Initially, the grant was limited to the neighboring areas of nuclear power plants, fast breeder reactors, and reprocessing facilities. However, Okayama prefecture and the local towns petitioned the government, and the laws became applicable to uranium enrichment facilities as well. According to the current method of calculation, approximately 5 billion yen is granted to the town of the scheduled construction site, and approximately 5 billion yen to the surrounding towns, totalling 10 billion yen at the stage of enticement. When regional finances are extremely tight, this grant is incredibly attractive.

At the construction stage of the uranium enrichment pilot plant, Donen Ningyo-toge Works, approximately 2.07 billion yen was granted to Kamisaibaramura and 2 billion yen to the neighbors consisting of one city, four towns, and one village. Knowing this result, they are all after the fish where it was once found.

Kamisaibaramura, nicknamed uranium village, is a humble village with a population of a little over 1,100 near the border of Tottori Prefecture. Because of the presence of uranium enrichment facilities, it is watched eagerly by advanced countries with nuclear energy. The number of workers at Donen Ningyo-toge exceeds 100. It has become a place of large employment for the villagers. The return of young people is also conspicuous. "The village is again showing vitality. n addition to the energy source grant, the annual municipal property taxes paid are high, and the village roads, forest roads, and educational facilities have been repleted splendidly" (village Mayor Mifune).

Awakening to Energy Problem

The construction of the prototype plant is at the countdown stage. However, from the specialists' viewpoint, many problems exist. First, there is the safety problem. Uranium enrichment technology is a national secret, and its content is still completely covered with a veil. There is no way the local people can confirm the safety of the operation with their own eyes.

At the International Conference of Nuclear Energy Experienced Countries held in Vienna in September, Donen reported that the failure rate occurring in factories is less than 0.2 percent. Compared with the failure rate for private enterprises (several percent), the safety record is much better. Is this also true of prototype plants? Donen personnel explain that the first priority is to advance construction with the understanding of the local community. Nevertheless, there is a faint flavor of "fishing with money."

In order to make the most of the great goal of the prototype plant, "to establish an enrichment technique that is as inexpensive as possible, tie it to the realization of commercial plants in the private sector, and be able to say goodbye to the current state of total overseas dependence for uranium fuel" (Donen Uranium Enrichment Development Office), dialogue with the local community is indispensable. On this account, I believe that it will help the Japanese people to become interested in the energy problem in the end, and this will be the first step for them to consider it as their own affair.

7722
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COMPUTER COMPANIES INCREASING ACTIVITIES IN NUCLEAR FIELD

Tokyo ENERUGI FORAMU in Japanese Dec 82 pp 85-89

[Text] "Without computers, there is no way the nuclear power plants of today can be operated."

This is a comment I heard from a technologist at a nuclear power plant manufacturer. At present, there are 24 light-water reactor units in Japanese nuclear power plants producing 17,177,000 kilowatts of power. Even under the low-growth conditions for electric power demand, the trend is toward nuclear power plant construction alone. What may be called the brain and central nervous system of the operation of these nuclear power plants is made up of various kinds of computers. In addition, computers are being used for design and various kinds of analytical work.

An infinite variety of computers are used, ranging from small control computers to supercomputers used for aseismic analysis, etc. Indeed, when hardware and software are included, nuclear power plants form the front line of computer utilization. Consequently, computer know-how, not only in hardware but also in the software field, is especially valuable. Thus, nuclear power plants have become and will continue to be an increasingly important market for Japanese computer manufacturers and software houses.

Expanding Computer Use

Then, how are the computers used in today's nuclear power generation? The uses can be roughly divided into: (1) the field of nuclear engineering, (2) the field of nuclear power plant control systems, and (3) the area of radiation control. Currently, computers that are actually installed in nuclear power plants are for the reactor core control and operation control sectors of the (1) nuclear engineering field, and (3) radiation control area (personnel monitoring and environmental monitoring). In the future, both the (2) nuclear power plant control system and (4) nuclear code control are expected to be performed by computers. When that is accomplished, it is likely that a computer network covering all aspects of nuclear power generation will also become possible for the integrated control of all data from (1)-(4) cited above.

Meanwhile, what is the current state of computer utilization and the outlook for the near future at nuclear power plants in actual operation? The first to be cited is (1) the central surveillance system.

This is usually comprised of three systems: (A) the operation surveillance control panel and CRT display system, (B) the plant automation system, and (C) the computer system.

(A) The operation surveillance control panel and CRT display system can provide core performance prediction surveillance and a display system that efficiently displays necessary plant information, such as plant abnormalities according to plant operation conditions, and perform overall operation management control based on the above display.

On the other hand, (B) a plant automation system aims at automation of major manipulations of plant startup and shutdown or load operations based on overall control computers (process computers) centered around various control systems.

And, (C) a process computer system is a computer central to the functions of (A) and (B) and is capable of process computation for plant operation and management. This system consists of a data processing computer, a core performance surveillance computer, a CRT display control computer, and a backup computer. Even this is enough to show the diversity of computers used in nuclear power plants.

In addition, computer functions are incorporated into (2) instrumentation and control facilities. They include all sorts of instrumentation and control systems such as neutron instrumentation, a radiation monitor, a reactor recirculation control system, a reactor protection system, etc.

In addition, computers are also being used for (3) employee monitoring systems and environment monitoring systems. An environment monitoring system using radio communication centrally controls and records various types of data from a multiple number of monitoring posts around the nuclear power plant. Computers are also used for processing this data.

Computer functions are also widely used in the area of simulation, etc. for BWR [boiling water reactor] operation training centers and PWR [pressurized water reactor] training centers.

In the past, computers were used in the field of nuclear power directly by the electric power industry itself, and emphasis was on the operation sector as observed above. Recently, however, a new move began in the electric power industry as well. For example, Tokyo Electric Co developed a program for core fuel control on its own. In addition, Kansai Electric Power Co has begun the development of a "nuclear power data system" which freely uses reliability engineering techniques for upgrading nuclear power generation performance reliability.

While light-water reactor nuclear power generation is maturing, it may be said that electric power companies themselves are in the stage of expanded computer use directed toward improved reliability and efficiency.

From the viewpoint of the relation between nuclear power generation plants and computers, the nuclear power plant makers Toshiba, Hitachi and Mitsubishi Heavy Industries occupy an important place. As noted previously, these makers have entered into and supply the related fields of nuclear power plant process computers and instrument controls. And only the plant makers can design the computer system after integration of the entire nuclear reactor process. This is the area which the superlative IBM and Fujitsu can not get into.

Moreover, these plant makers actively use computers in the design area of nuclear power generating plants. This area does not allow other computer makers in.

For example, we can mention the CAD system which is used in basic design operations, the NUPIMAS (Mitsubishii Heavy Industries made) which is a pipe center of plant design dialogue system and the CADDIE (Toshiba).

Forerunner Reactor Manufacturer

According to an estimate of a certain computer manufacturer, the amount of information required for the "lifetime" of a nuclear power plant from design stage to reactor shutdown is said to be 20 million sheets of paper when converted to an ordinary sheet count of documents. Even if one skims them at the rate of 10 seconds per sheet, it is an unbelievably large amount that requires a person approximately 2,300 days, or as much as 6 years just reading them without stopping. Of these documents, the design graphics alone are said to exceed 100,000 sheets, including basic and detailed designs. An enormously large number of parts, which may well be 1.5 million pieces, are used for a nuclear power plant, which pushes the design graphics sheet count. Difficulties are encountered under such conditions when design changes occur.

Conventionally, when a change is made in the structure of a building, piping and duct design must also be changed. Thus, the drawing for the building where a change has been made is traced onto several sheets and distributed to design groups for piping and duct work, etc. where each change in design must be made.

A CAD system allows various design groups free access to the only data stored in the computer and to use them simply by changing the scale. As a result of simplified design data control, it has become possible to realize improved design quality and a shorter period of time for designing. Therefore, even when a design change occurs in building shape, etc. various related drawings can be automatically and instantly modified by changing the design on the computer screen.

In addition, detailed design systems centered on piping, NUPIMAS and CADDIE; input information such as building shape data, equipment shape data, piping route data, duct route data, tray route data, etc.; and imaginary two- and three-dimensional plant models can be created within a computer; this allows a cross-interference check or optional cross-sectional drawings. It also allows design changes, additional corrections, etc.

A design system such as that developed by Hitachi, Ltd also has such design features. Basically, it is soft know-how developed in the United States which each company handled independently to match its reactor model. Drawing attention in this respect is the CAD system application started by Toshiba and Ishikawajima-Harima Heavy Industries with a common computer data base.

Nuclear power plant manufacturers are also performing safety analyses necessary for various kinds of safety checks as well as structural analysis work through the use of computers. These analyses are performed at simulations divided into spatially and temporally detailed parts and are utterly impossible to accomplish without computers. These firms began development of independent codes in addition to public codes and are making efforts for the accumulation of soft know-how.

On the other hand, making use of the strength of being directly involved in plant design and construction, each company is planning expanded computer applications in the nuclear power plant. One example is a nuclear power plant diagnostic system developed by the Toshiba group. The object of the system is to analyze the noise in the nuclear reactor and diagnose the core control system. It processes data signals from the reactor core, jet pump units, recirculation flow rate control system, etc. compares them with stored diagnostic reference data, and performs automatic diagnosis in an interactive mode. Great expectations rest upon its being useful for the strengthening of safe operations in future nuclear power generation.

Information management and its processing functions are also essential for a diagnostic system, and here again, computers play an active role.

Other new directions for computer applications that may be cited include a plant status monitoring system developed by the various firms (realizable only with enormously fast input processing and high responsiveness of the CRT display), a core performance prediction system (makes predictions, etc. of output distribution), and a control rod manipulation guide system (the ordinary manipulation sequence can be automatically guided and displayed on screen).

Various nuclear power plant firms are making wide use of computers ranging over these software fields. These software developments were realized only because the companies are thoroughly acquainted with the facts of nuclear power plants.

However, aside from these plant manufacturers, engineering firms such as Japan Gasoline Co and Toyo Engineering Co (TEC) are planning to enter this field. For example, TEC signed a technical collaborative agreement with a U.S. consultant firm and is considering computer software services for power companies. In reality, the future development awaited is a system for systematic consolidation of information on nuclear power plants.

## Specialty Firms Also Show Diverse Development

On the other hand, computer specialty manufacturers such as IBM, Fujitsu, Univac, etc. are also undertaking positive development in the nuclear power field. However, although they are the world's largest computer manufacturers, the area of process control computers involving a nuclear reactor itself is held by plant manufacturers such as Mitsubishi Heavy Industries, Toshiba, Hitachi, etc. The center of action for computer manufacturers is in the area of peripheral hardware and software for the nuclear reactors and overall computer application systems for nuclear power plants.

First of all, there is the giant IBM which holds 55.5 percent (in monetary base, end of 1980) of the world's general purpose computer market. Nippon IBM is its Japanese subsidiary.

IBM is showing an enterprising spirit by announcing a future large-scale, general-purpose computer, "IBM 3081K," in which software has been incorporated as a fixed electronic circuit. However, the strength of IBM is above all in the accumulation of a wide range of software. One may say that Nippon IBM is leading in this software field for nuclear power. For example, Nippon IBM holds a "Nuclear Power Symposium" virtually every year. In addition, it conducts seminars and conferences such as the "Japan-U.S.-Europe Public Works Information System Conference" under its own sponsorship and gathering specialists from various countries.

For example, the new state of computer applications and new technological information in overseas nuclear power plants are exchanged at the "Nuclear Power Symposium." In Japan, to become a customer of Nippon IBM leads to having the opportunity to learn about such software know-how. IBM has a rich accumulation of both hardware and software, including control computers for the nuclear reactor itself, directed especially to U.S. nuclear power plants.

Therefore, it may be said that as the area of computer application expands at nuclear power plants in the future, IBM's software know-how will have greater significance. Nippon IBM has announced the concept of "a nuclear database" which integrates systems such as work management and equipment control, etc. This concept is now being used, in part, in U.S. nuclear power plants and in systems such as nuclear power records management. Its "software power" is likely to become highly meaningful in the future.

Nippon Univac is emphasizing this concept of a nuclear power database. The above firm came about through the merging of U.S. Sperry and Mitsui & Co and is strong in the large-scale machine class. It has just recently announced a super-large-scale unit, UNIVAC 1100/90. The company has delivered various kinds of computers to power companies such as Tokyo Electric Power, Chubu Electric Power, Hokkaido Electric Power, etc. and positive deployment is also being made in the field of nuclear power as an extension of the above achievement. The company has not only supplied hardware equipment directed to nuclear power in the past, but it has also succeeded in various types of software development such as fuel plan, safety analysis, core management, fuel management, etc. in the area of operation and maintenance.

Because of its relationship with U.S. Sperry, the company is in a position to supply Japanese users with the actual "state-of-the-art" nuclear power software as used extensively in European and U.S. regions. The company is especially aiming for the development of software which is "geared to Japan" or "easier to use" to meet the demands of the users. In this respect, although it lacks IBM's brilliance, it possesses steady power for software development.

One of the future development plans of Nippon Univac is the nuclear power database concept mentioned previously. This does not mean merely the consolidation of a database related to nuclear power generation. In addition to the process computer for the nuclear reactor, a medium-scale computer is installed in the power plant, and it is linked with the computer at the main office using the on-line network technique in which Univac is strong. The concept is for partial distributed processing and partial centralized processing, with the respective computers as the database.

Since this nuclear power database supplied by Univac began operation in Sweden, expectations in Japan are all the greater. One may say that Nippon Univac has grown into a firm having the capability for integrated systems building.

On the other hand, Fujitsu, the only all-Japanese manufacturer that can compete in the world's market of large-scale, general-purpose computers, is also showing a positive posture in the area of nuclear power.

The strategy Fujitsu employed was slightly different from that of IBM. In other words, Fujitsu has been building a bridgehead from the research and development sector in the nuclear power field. Since the early 1970's, the company has had overwhelming achievements with nuclear power research and development organizations such as the Japan Atomic Energy Rsearch Institute (Genken), the Power Reactor and Nuclear Fuel Development Corporation (Donen), etc., as well as the scientific research organizations of universities such as Tokyo University and Kyoto University.

In the meantime, it has also been emphasizing software development. Although software for the nuclear reactor itself is scarce, Fujitsu has undertaken its own code development centered around safety analyses, structural analyses, etc. It as a rich store of achievements as exemplified by the creation of several codes in the fields of reactor physics, reactor engineering, and nuclear fusion under joint development with Genken; the development of environmental monitoring systems with several autonomous bodies such as Tohoku Electric Power Co, Tokyo Electric Power Co, Donen, and others; and the development of personnel monitoring systems with Donen. For example, a practical application of this environmental monitoring system includes the environmental radiation telemeter system delivered to Miyagi Prefecture (the area surrounding the Onagawa Nuclear Power Plant). The especially noteworthy aspect of the company's system is that it employs a "duplex mode" which is comprised of two computer units, and when one unit is down, the other unit automatically comes on line. It may be called a system with a further increase in reliability. In this field of environmental monitoring systems, the firm is likely to grow into a leading manufacturer along with Toshiba.

Another area on which Fujitsu focuses may well be the "supercomputer" field. This field of ultra-high-speed computers for scientific and technical calculations has been monopolized by such computers as CRAY-1 and CYBER 205 of the United States. Finally, however, Japanese manufacturers are now announcing supercomputers one after another.

Fujitsu has announced the introduction of the FACOM-VP200/100, and Hitachi, Ltd, has announced the HITAC-S810/20, and both are scheduled for shipment beginning in the third and fourth quarters of 1983, respectively. These are special computers required for scientific and technical computations such as nuclear energy, meteorological analyses, space development, etc. However, in the future, the areas of application will be broad, extending to semiconductor circuit analyses, plant simulations, structural analyses of automobiles and aircraft, etc. In particular, nuclear energy is a major area of supercomputer application. These computers are the world's newest and most powerful mechanisms, having 500-600 MFLOPS (1 MFLOP is a unit for performing 1 million floating point calculations per second). The use of these supercomputers enables various nuclear energy-related analyses and simulations which previously were impossible because they were too time-consuming. It may also be said that they are the tools to open a new field between theoretical and experimental physics called simulation physics, and future developments in the field of nuclear energy are eagerly awaited.

Notable Group of Software Firms

The presence of software houses concerned with nuclear energy and computers will become important in the future. In Japan, there are several hundred of these firms, among which approximately 10 are thought to be engaged in full-scale development in the field of nuclear energy. The influence of nuclear power plants in this area is also great. Naturally, the software development directed to complex and diverse nuclear energy tasks is frequently undertaken by plant manufacturers and related engineering firms.

However, in many cases, the companies' own group alone cannot meet the needs sufficiently, thus leaving a place for the activities of general software houses. The several hundred nuclear codes now in existence will steadily increase in number in the future as well, and expectations for software houses are also mounting. However, even if limited to the area of safety analyses, there are requirements such as: (1) familiarity with the actual state of safety inspection of nuclear reactors, (2) having the absorptive power of overseas safety inspection codes, (3) fundamental knowledge of the actual state of nuclear reactors, and (4) ability to develop by grasping future technological trends ahead of others.

In that sense, companies like Kozo Keikaku Kenkyusho [Structural Design Research Laboratory], Century Research Center, Toyo Information System, Nippon CDC, Nuclear Data, Mitsubishi General Research Laboratory, etc., are notable as software and engineering-directed manufacturers in the field of nuclear energy.

In particular, Century Research Center possesses the supercomputer CRAY-1 (Mitsubishi General Research Laboratory also installed the CRAY-1) and is skilled in various safety analyses, structural analyses, etc., through a CRC network.

Nippon CDC also shifted its focus of operations toward software directed to nuclear energy in recent years and is strong in safety analyses, nuclear fuel combustion calculations, etc. Its parent company, the U.S. CDC, possesses long experience and a strong software group trained in the field of science and technology. In addition, the company is able to coordinate in a form of linking with supercomputers, etc., by using the computer network connected even to the United States.

In addition, Nuclear Data may be cited as a nuclear energy-directed software speciality firm--such firms are scarce in Japan. It is noteworthy as an operation utilizing its strength as a specialty software house.

Also, there are software firms related to the power companies themselves. Of these, some firms such as Kaihatsu Keisan Center are actively venturing into software development for nuclear energy.

As indicated, computer applications directed toward nuclear energy have reached a new stage as nuclear power generation matures, and various manufacturers are seeking new operational developments.

7722
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GERLE VIEWS PROBLEMS IN NUCLEAR PLANT COMPLETION

Prague LIDOVA DEMOCRACIE in Czech 28 Feb 83 p 3

/Interview with Deputy Premier Eng Ladislav Gerle, CSc, by L. Kyptovia: "A Demanding Year in the Nuclear Age"/

/Text/ Power production is now justifiably a center of attention for the entire Czechoslovak public, our leading state organs are according top priority to the fuel and energy base, and the maximum amounts of construction manpower and resources are being concentrated in this field. This is no accident, for if we want the Czechoslovak economy to continue developing, and if we want to maintain and strengthen our current standard of living, it is a primary concern to us that we have sufficient amounts of fuel and electrical energy. Such a sufficiency of course depends on hos effectively we succeed in using the fuel and energy sources which are already available to us and how we prepare for the future. Only nuclear power plants are or can be the kind of "energy springboard" which is needed.

We talked with Deputy Premier of the federal government Ladislav Gerle, chairman of the CSSR government commission on the solution of problems associated with assuring smooth provision of fuel and energy to the national economy.

/Question/ We have begun the new year, of course, with a quite tight fuel and energy balance, and in spite of a favorable winter thus far, this fact is manifesting itself throughout the national economy. What are the causes of this undesirable state of affairs?

/Answer/ Many among us believe that the cause is inadequate resource development capacities and that we just are still not extracting enough coal or producing enough electrical energy. Actually the truth is somewhat different: the problem is not resources, but their utilization, i.e. the fact that we are not using them in the most effective way. In spite of all steps which we have taken in this connection, and in spite of many individual successes, the energy-intensiveness of the entire Czechoslovak economy is still about a fifth higher than in comparable industrially developed West European countries. If we compare just industrial production, in some cases our energy requirements are still considerably higher. The lower technical level of some of our industry, leading to higher specific fuel and energy consumption in most manufacturing processes, the rather low efficiency of our power production equipment and power-consuming devices, and a continuing low level of utilization of waste heat and all usable secondary energy sources, are circumstances which we much change radically.

/Question/ Then achieving a balance in fuel and energy involves consistent improvement of consumption efficiency?

/Answer/ Yes, although it will not be simple or cheap, frankly, to achieve the desired turn for the better in the efficiency of utilization of fuel and energy resources. For we have gradually exhausted the most accessible potential for conservation. And if we wish to significantly decrease energy-intensiveness, as we must, this will require extensive reconstruction and modernization. In other words, we must make structural changes in production which will yield the requisite energy results.

In order to decrease the energy-intensiveness of the Czechoslovak economy to the required level in accordance with our actual conditions, we have instituted in the fullest sense a long-term program for improving efficiency in the consumption, conservation and use of all types of fuels and energy. This program, State Special Program 02, will be expanded to include additional suggestions and possibilities which may be uncovered by the current social inspection of the way fuels and energy are managed.

However, I should note that improved efficiency will not solve all of the energy problems that are now troubling us. Although it will enable us to obtain energy with half the expenditure that would be required to develop new resources, the accomplishment of the efficiency-improvement programs alone, even given the best possible industrial management, will not be enough to fully meet increasing energy demands in the future. In brief, efficiency-improvement is not enough, and we must also develop new sources of energy; the only chance available to us is nuclear power stations.

The demanding program of nuclear power plant construction, based on close cooperation with the Soviet Union, which we have undertaken is not intended to "take us back" to past decades in energy terms. For even in the current five-year plan we are expecting nuclear power to provide for all of our increase in output of electrical energy, about 6½ billion kilowatt-hours. This is why we are so impatiently awaiting the completion of both of the two stations now under construction, the V-2 at Jaslovske Bohunice and the Dukovany station; we cannot tolerate the deficiencies which are emerging in their construction, resulting in slippage and postponing of deadlines.

Another factor also obliges us to devote this extraordinary attention to the development of nuclear power. We all know that solid fuel, particularly brown coal, remains our main primary source of energy; we consume practically 70 percent of all we mine for the production of electricity or heat. But we cannot increase our output of brown coal indefinitely, because even now, in our principal coal basin, the SHR /North Bohemian Brown Coal Basin/, we are mining about 3.5 percent of our coal resources every year, a rate which is hardly paralleled anywhere in the world. The resources expended to increase output in this opencast are increasing from year to year, and the ultimate effect from them is much less than what we are used to. Further expansion of coal output will involve certain difficult problems, and, like it or not, we will simply have to reconcile ourselves to the fact that output will remain at the same level for some time and eventually will quite naturally drop. Nor can we expect to prevent this development, for example by increasing our output of black coal, just as we cannot expect to further increase import of primary energy resources from abroad--quite the opposite, in fact. And since the use of nontraditional energy sources will not be able to completely replace "conventional" fuels either, there remains only one possibility, accelerated construction of nuclear power plants. Moreover, even during the Seventh Five-Year Plan, nuclear power stations will have to cover a drop of about 3.5 billion kilowatt-hours in the production of electrical energy from fossil fuels.

/Question/ The large-scale program of nuclear power plant construction which we have undertaken creates the conditions for us to develop the Czechoslovak fuel and energy base on a truly modern technical level and in addition to gradually solve the ecological problems which have hitherto resulted from the burning of brown coal. Will you tell us which points in this program are of the most immediate concern?

/Answer/ This country was the first in CEMA--after the Soviet Union, and thanks to its invaluable assistance--to undertake the in commercial utilization of nuclear power. This is not all. Nuclear power, as a component of the development of our national economy, is now the most thoroughly worked-out of any development program, involving a great deal of integration. This is indicated, among other things, by the fact that we have now concluded intergovernmental agreements with the Soviet Union for cooperation in the construction of 12 units with VVER-440 reactors (let me add by way of illustration that they include four units at Jaslovski Bohunice, four at Dukovany, and four at Mochovce) and four units with VVER-1000 reactors, whose construction we are beginning at Temelin in the South Bohemian Kraj. We signed the intergovernmental agreement with the Soviet Union on cooperation in the second stage of construction of these power stations, involving two power generation units, at the end of last year. We will have all of these capacities in operation by 1995, and if we manage to carry out this program as planned, during the next 12 years our power production will gain a total of 9.280 megawatts of installed power generating capacity. Obviously it must be added that we have agreements assuring delivery of nuclear fuel from the Soviet Union for all of these power stations throughout their expected lifetimes, i.e. 25 to 30 years.

As for the required equipment, I can state that our Czechoslovak industry has already mastered the production of components for the VVER-440 units; we are using them to build nuclear power stations in this country, and are also becoming able to share this capability by delivering machinery to other CEMA countries for power station construction. For example at the end of the year the first unit of the nuclear power station in Pacs, Hungary, for which we produced certain primary circuit equipment, began operation. Naturally, mastering the production of these components was not the end of our work, for we must prepare for the time when we will build units with more advanced reactors and will produce them ourselves. The first 1000-MW unit at the

Temelin station is to be started up on 31 December 1990, and the fourth and final one in 1995; far off as these dates may seem, we must already be thinking about production of the necessary equipment in order to master it sufficiently in advance. We are no longer the only socialist country other than the Soviet Union which is capable of producing this process equipment: thanks to Soviet help, this demanding type of production is being mastered by other CEMA countries as well, and we expect that mutual deliveries of the equipment will be agreed upon this year.

/Question/ But some very serious deficiencies have emerged in the construction of our youngest nuclear power stations, the V-2 at Jaslovske Bohunice and the Dukovany plant, involving such major shortfalls in construction and installation work that at the end of last year it was necessary to further postpone the date for startup of their first units. Obviously this was a quite extreme resolution of the situation, but we believe that postponing the startup date is likely to have a negative effect on the energy balance this year and next year. Would you tell us, therefore, what led to this important decision?

/Answer/ First, I agree that this was an extreme decision. At the same time, I want to stress that any further postponement of the deadlines is simply unacceptable in terms of the fuel and electrical energy balance. This is a fact of which all organizations taking part in both projects must be aware. Our power industry, and with it the entire national economy, simply cannot do wtihout the megawatts of power from Bohunice and Dukovany.

And what are the causes of this complex situation? Frankly, we had not been satisfied with progress in the construction of these power stations for some time: the problems actually arose at the very beginning of work on both of them. Then, however, it seemed that the difficulties could be contained and mastered. But the problems multiplied and grew, and the earlier failure to persist in solving them eventually came back to haunt us: earlier delays in construction work expanded, and to this was added slippage in the installation of the process equipment. In addition, the measures which the contractor ministries undertook in the second quarter of 1982 with respect to the general managers of the participating enterprises were not entirely effective. Regretabbly, the capabilities afforded by State Decree No 115 of last June, the objective of which was to provide further room to eliminate these shortfalls, were not utilized. Although we created the conditions for the participating contractors to master their assignements on both projects, there was no significant improvement. The deadlines proposed by the contractors are now lengthening the delay by half a year for the V-2 station and by an additional 3 months for the Dukovany station, with the result that the startup of additional units will have to follow at intervals of a year or less. In this connection I must add that this year we have taken steps to assure that the Czechoslovak power industry will not be excessively affected by the half-year's delay in the 440-MW unit at Jaslovske Bohunice. But in 1984 these postponed deadlines will mean a loss of about 3½ billion kilowatt-hours of electrical energy from the output called for from these stations in the five-year plan. Every further delay will only make the situation worse, so that our entire national economy will ultimately feel it.

/Question/ Actually, another question arises here, namely why our organizations involved in the construction of both of these power stations did not use all of the good experience gained in building the V-1 station at Bohunice. For we did not have such complex problems when building this first Voronezh-type station with light water reactors.

/Answer/ The answer to this question is not so simple. We acted on the assumption that the construction of the V-2 power plant basically involved a repeat of the V-1, and that after certain modifications in construction and equipment the experience of the construction contractor and the auxiliary equipment on site could be utilized. In addition, it takes about 6 years for us to build a nuclear power plant, which is in accord with the results achieved by the most advanced countries.

But it turned out that the new power stations, beginning with the V-2, would be more advanced technically. This was reflected both in the preparation of the blueprints and in the discussion of construction budgets. As a result of the stage-by-stage handing over of the design documentation, and to some extent because of the unpreparedness of the contractors, the construction organizations took on lower work assignments for certain years than would have been desirable. While it was possible to fulfill and actually overfulfill these plans, the real fulfillment of the tasks (for both projects) fell behind. The equipment contractors also made some contribution to the increasing slippage by not delivering certain components on time, and also by having inadequate numbers of skilled workers on both projects. Because the contractors did not take advantage of the opportunity of exceeding the financial volume specified in the state plan last year, which would have created the material basis for smooth continuation of construction at the beginning of this year, in the first months of 1982 there will be a considerable increase in the accumulated work to be done on both projects. The ultimate consequence of all these factors is that the time losses resulting from slippage in construction and subsequently in machinery installzation are concentrating in the installation of the electrical equipment, where usual schedules are being cut by fully a third compared with the construction organization plan.

During my visits to both sites (most recently on 17 January of this year to Jaslovske Bohunice, where a conference of ministers and general managers was being held), I became convinced that the pace of construction that has been adopted still does not meet the actual requirements of such extensive, important, costly projects. To date the available weekly time is being used primarily in a single, sometimes extended, shift; often, fewer than 15 percent of the workers are present during the second shift, and there is quite inadequate amount of work being done on Saturdays and Sundays. If we want to carry out construction and installation work at full scale, in both instances this requires a suitable increase in the number of workers in certain trades, such as welders. Even though we decided last year that it was necessary to increase the number of persons on both sites, the participating enterprises are not carrying out this assignment with the full degree of responsibility, and the necessary workers are still not available. However, I believe that even if we go considerably beyond the present numbers, this will still not produce the desired effect, because when they begin work these people will not be ready for the job and their organizations will not be functioning perfectly.

/Question/ It follows from all this that the problems stem from construction organization. Would not some possibility of a solution be offered by making a single enterprise or economic organization, for example one managed by the Federal Ministry of Fuels and Power, responsible for it?

/Answer/ The current method of organizing the construction of nuclear power stations in this country is that Energoprojekt is in charge of working out the planning documentation, the construction contractor is in charge of the construction work, and the general contractor for equipment sees to installation of the process equipment for the entire power station. Therefore I do not think that we should create a new single responsible organization, or that there is any need to do so; I believe that this role must be taken on by the general designer, Energoprojekt. Who but the general designer can assure complete coordination between the construction and equipment aspects from the very beginning? And who else can provide the necessary technical data for timely decision-making on possible changes and additions or for solving disagreements over which trade is most important for the project at a given time? Therefore we have created at the V-2 plant (and will probably create at Dukovany) a specialized operational group which will deal with these problems and will begin, under the leadership of Energoprojekt and with the assistance of Soviet specialists, to solve expeditiously all of the current deficiencies in all stages of construction. We expect that this solution will lead to better coordination of the actions of the individual contracting organizations.

/Question/ We have discussed the deficiencies which are hindering the construction of the V-2 station and the Dukovany station. It is quite clear that we absolutely must not allow any further slippage on these projects. What, then, is the solution for this situation, and what are the routes to fulfillment of the tasks which lie ahead for both power stations?

/Answer/ I have partly dealt with this question in my preceding answers. One principle must apply to all participating enterprises or organizations: that the decisive factor in the further development of the Czechoslovak economy is sufficient energy, and that nuclear power stations are our only way of expanding the supply. This means that--with no exaggeration--the stability and further development of our national economy depend on the timely construction and failure-free operation of these power stations.

However, we must not think in terms of acquiring nuclear power at any price. We require a maximum sense of responsibility for every koruna expended, for billions are invested in both projects. This is not all: we require a responsible attitude toward the fulfillment of all planned assignments. It suffices to recall the immense size of the resources which are in action in the construction of a nuclear power station. This year alone, for example, we have to carry out construction work, deliveries and installation worth more than 4 billion korunas at Dukovany. This means that we invest more than 80 million korunas a week, more than 10 million korunas a day there. What we invest in a week at Dukovany is equivalent to the expenditure on a medium-construction project which would last 2 or 3 years.

But what is the specific solution for the situation? As I have already explained, it begins with high-quality planning preparation, with the development of schedules and with the assignment of material and time targets.

Associated with these preconditions are the preparation for and performance of all plans, and, of course, quality work by the people on site. All of these interacting factors must be significantly improved so that the newly proposed dates for startup of the first units at Jaslovske Bohunice and Dukovany will be the last such schedule adjustments. We simply have no other solution. But it is not only these two power stations that are involved. This year we face equally demanding tasks in beginning the construction of the nuclear power station at Mochovce and Temelin, so that today actually determines whether the deadlines that have been set for starting up these power stations can realistically be met. Therefore we must devote all our strength and use all our experience to assure that the current problems will not be repeated on similar projects in the future, and so that we do not literally waste weeks and months, sometimes even years, in the preparatory stage, and so that we do not have to make up days and hours in the construction itself.

/Answer/ Thank you.

8480
CSO: 5100/3015

RESENDE SITE OF URANIUM REPROCESSING PLANT CONFIRMED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Mar 83 p 27

[Text] The director of the Brazilian Petroleum Corporation (PETROBRAS), John Milne Albuquerque Forman, said yesterday, at the meeting to evaluate the energy programs of the Ministry of Mines and Energy held at the Foreign Ministry, that the uranium reprocessing plant will be installed in Resende (Rio de Janeiro), thus confirming that the Brazilian Government had given up building it in Vitoria (Espirito Santo).

He revealed also that the fuel element factory already installed in Resende is operating partially and has already begun to produce the first discharge [as published] for Angra-1. He revealed that that plant is being tested at 30 percent capacity and is being synchronized to the electric power distribution network with a power of 36 megawatts.

He revealed also, that at the present time the NUCLEBRAS Heavy Equipment Corporation (NUCLEP) is building a pressure [as published] vessel for the Argentine reactor of the Atucha plant, in addition to components for Angra-2 and Angra-3, which originally were to be supplied by the Germans. He emphasized that, in a general way, equipment costs represent 50 percent of the cost of a nuclear plant but that about 30 percent of the Angra-2 and Angra-3 equipment will already be nationally produced.

John Milne also spoke about the situation of the reprocessing of irradiated fuel. He pointed out that the construction of the pilot plant has not begun but he guaranteed that it will go into operation in 1986 and will be an integral part of the complex that will include the storage and treatment of radioactive wastes. Included in that complex are the laboratories for the analysis of irradiated material.

In the general evaluation, the NUCLEBRAS director said that the Brazilian nuclear program is proceeding at a good pace and emphasized that the country will have ample conditions to achieve complete independence in that sector through the development of a national technology, including fast-breeder reactors.

Minister Cesar Cals said yesterday that he did not know how much the government has already invested in the nuclear program but he guaranteed that it does not reach the figure of $63 billion, as one newspaper announced.

ELETROBRAS

The president of the Brazilian Electric Power Stations Corporation (ELETROBRAS), General Costa Cavalcani, pledged in Vitoria yesterday that the government's energy programs "that are underway will not suffer any delays as a result of the current world crisis." The statement was made when General Cavalcanti was attending the installation of the new directors of the Espirito Santo Electric Power Stations. He declared that the Angra-1 nuclear plant "is in a preoperational test phase."

8711
CSO: 5100/2052

NUCLEBRAS HEAD COMMENTS ON LAYOFFS, NUCLEP IDLENESS

Rio de Janeiro JORNAL DO BRASIL in Portuguese 18 Mar 83 p 18

[Text] The nuclear equipment factory of the NUCLEBRAS Heavy Equipment Corporation (NUCLEP) in Itaguai which cost $400 million was idle, the president of the Brazilian Nuclear Corporation (NUCLEBRAS), Dario Gomes, admitted yesterday. Within less than 6 months, he had to lay off 700 employees (253 of them in NUCLEP) in the whole NUCLEBRAS group to adapt the Brazilian nuclear program to the country's economic-financial situation. "The factory now has work for the whole year," he observed. Dario pledged that there would not be any more dismissals: "We are making an effort not to have that painful duty any more."

In addition to rescheduling the timetable for the construction of the Angra-2 and Angra-3 by more than 1 year (the forecast now is for 1988-1990), the president of NUCLEBRAS also announced the bidding for the projects of the Sao Paulo Iguape-1 and Iguape-2 plants will no longer be held this year but in 1984. All those changes stem from the financial squeeze that the company is suffering this year. Dario said that its budget was cut from 376 billion cruzeiros to 295 billion.

Obtaining Foreign Funds

Dario said also that NUCLEBRAS is going to obtain funds abroad in the order of #350 million. That money will be used for the payment of the service on the loan (interest and amortization) that "is beginning to come due now, and to complement the receipts for investment of the company itself." The dollars will come from the "jumbo" loan that the Brazilian Government is negotiating with banks abroad, according to him.

NUCLEBRAS will receive only 160 billion cruzeiros from the national treasury for investments and costs. "According to Dario, "the budget cuts and the dismissals do not mean a savings but an adjustment of our work within the budget. We were given the job of implementing the nuclear program within the budget of 295 billion cruzeiros.

This year, NUCLEBRAS is not only paying the service on the debt, it has also begun to return the yellow-cake (uranium beneficiated at Pocos de Caldas) which it received for the manufacture of the fuel elements for the first charge of the Angra-1 nuclear plant purchased from the American Westinghouse Company. According to Dario, of the 500 tons borrowed from Argentina and France, "we have already paid back more than half, also in the form of yellow-cake."

The beneficiation of the uranium is done at the Pocos de Caldas plant. Five hundred tons per year are produced there. Each kilo of yellow-cake is currently being quoted in the world market at $100. Dario said also that "we are in a position to sell the product but the market today is not good for the seller. It is preferable for us to wait a while longer to sell it as a finished product; that is, in the form of fuel elements."

Equipment

The delay in the Angra-2 and Angra-3 plants is going to be a financial burden on NUCLEBRAS. Beginning in 1984, the company will begin to pay interest in addition to storage charges for a large part of that equipment that is stored in Germany. The company has already paid out a good part of the payment for the equipment (he did not say how much). But the delay in the nuclear program also has its advantages, he said. One of them is that today the NUCLEP factory is equipped to develop almost all the heavy equipment of a nuclear plant.

The containment vessel of the Atucha-2 nuclear plant of Argentina, for example, is almost ready at the NUCLEP factory and will be delivered this year. KWU, the German company responsible for transferring nuclear technology to Brazil participated in the construction of the containment vessel. It furnished the forgings and NUCLEP prepared the rest of the vessel in Itaguai. Dario said that equipment has doubled the volume of the one that will be used in "our plants."

The president of NUCLEBRAS declared again that Brazil's contract with Germany is for the construction of four nuclear plants. But after the four, there is nothing to prevent the Germans from continuing to participate and collaborate with NUCLEBRAS selling equipment, especially since, owing to the delay in our nuclear timetable, "a large part of the equipment is being built here with the help and agreement of the Germans."

Dario Gomes does not believe that the transfer of nuclear technology to Brazil depends on Brazil purchasing the whole fuel cycle from Germany. According to him, "the fuel cycle in general will come in relation to the plants that are going to operate in the country." Also, the fuel element factory is already in condition to supply the charge for Angra-1.

8711
CSO: 5100/2052

FRG SOURCES COMMENT ON IMPACT OF DELAYS, NEW NUCLEBRAS CHIEF

Reasons for Delays

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Mar 83 p 33

[Dispatch by special correspondent Estelina Farias]

[Text] Bonn--"From what we read in the newspapers--the most eloquent interpreter of public opinion--we deduce that one of the factors that caused the delay in the Brazilian nuclear program was that the government had assumed too big a commitment," said the chief of the International Energy Cooperation Division of the German Foreign Ministry, Werner Rouget, yesterday, with regard to the 1-year delay in the operation of Angra-2 and Angra-3 and the suspension of the beginning of the civil works of Iguape-1 and Iguape-2. According to him, the second cause of the delay is the economic crisis itself. Rouget discounted the possibility of pressure by the United States against the Brazilian nuclear program, pointing out that it existed during the Carter administration but does not continue with Ronald Reagan.

Rouget asserted that there is no interest on the part of the German Government to alter the nuclear agreement with Brazil and believed that the same is true on the part of the Brazilian Government. He considered that the delay of the Brazilian nuclear program is not really abnormal and acknowledged that other countries, such as Argentina and Spain may delay their nuclear projects due to economic problems, thus following the same course taken by Brazil.

Asked if, despite the delays, the German Government will continue to finance equipment for Brazil in the nuclear area, the German official relied affirmatively, "because we start from the assumption that the nuclear agreement signed in 1975 will be fulfilled." According to him, delays are problems of Brazilian as well as German companies.

The chief of the Division of Advanced Reactors of the Ministry of Research and Technology, Manfred Hagen, asserted also that the delay in the program will not hurt the transfer of technology to Brazil. Hagen also disputed the possibility of Brazil being hurt in the transfer of technology by the fact that for 8 months NUCLEBRAS has not sent technicians for training in uranium reprocessing, as WAK, the company responsible for this sector, has revealed.

According to Hagen, the duration of that training is approximately 10 years "and an interruption of 8 months does not mean anything."

Reprocessing

The fact that the Brazilian Government has given up building a pilot plant for reprocessing uranium in Vitoria (Espirito Santo) reveals that the slowdown of the nuclear program is such that it sharply delays the beginning of the fuel cycle since just the selection of another site will require a lot of time.

In addition, there is the aggravating factor of NUCLEBRAS not having sent technicians to Germany for training in uranium processing for the past 8 months.

Those statements were made yesterday at the Karlsruhe Nuclear Research Center by a representative of the WAK company, Karl Dieter Kuhn, whose relationship with Brazil is connected with the training of technicians. He also provided consultation in the selection of the site for the construction of the plant. Kuhn said that he does not know whether or not the plant will still be built in another site because NUCLEBRAS has not communicated anything in that regard nor explained why it stopped sending its technicians to be trained in Germany.

In view of the lack of explanations, UHDE, a company that is the consortium partner of KWA for providing engineering services and supplying equipment to Brazil, sent one of its directors to NUCLEBRAS to find out what is happening but so far there is no information about the results of the contracts in Brazil because he left last week and has not yet returned.

Document Still Maintained

Explaining the NUCLEBRAS contract, Karl Dieter Kuhn, representative of WAK, said that the changes have not yet been made on paper but acknowledged that the change in the presidency of NUCLEBRAS, with the departure of Paulo Nogueira Batista and the installation of Dario Gomes could imply changes in the Brazilian Government's nuclear policy. Kuhn explained that NUCLEBRAS is in a position to select another site for the construction of the plant without the consultation of WAK. However, he emphasized the need for Brazilian technicians to continue to receive training in Germany because it is important for Brazil to absorb the reprocessing technology. On this point, he was sarcastic, saying that if construction of the plant is delayed another 30 years, the Brazilian technicians already trained will be retired and will not be able to be retrained. In this circumstance, Brazil would have thrown away money on the training of personnel in uranium reprocessing.

The plant planned for Brazil is the eighth stage of the nuclear fuel cycle. The new stage is the reuse in reactors of the uranium and plutonium resulting from reprocessing and at the same time the treatment of the waste to be stored. WAK operates in the Karlsruhe Nuclear Research Center the first reprocessing plant in Germany on a semi-industrial scale, with a capacity of 35 tons of uranium per year. It has been in operation since 1971 and is 10 times smaller than the industrial reprocessing plant that is here in the licensing phase and costs a total of 4.5 billion marks.

Centrifugal Jet

The uranium enrichment process by centrifugal jet is not only going to show its efficiency on an industrial scale but can become a big business for Brazil, which will be able to export enriched uranium beginning in 1990. Two hundred thousand tons of natural uranium in the form of hexafluoride now cost $20 billion on the world market and this same amount of enriched uranium is worth $40 billion. Brazil has reserves of over 30,000 tons of uranium, and Germany, whose reserves of the mineral amount to only 12,500 tons, signed a contract with the Brazilian Government to obtain uranium on a preferential basis in the most beneficiated form possible. At least that is what Professor Erwin Becker, the inventor of the centrifugal jet, asserted yesterday in the Karlsruhe Nuclear Research Center, as he was showing a group of Brazilian journalists the facilities for testing complete stages of uranium enrichment on an industrial scale using the process he created. He showed three sizes of installations. The smallest is the size of the plant that is being built in Resende, in Rio de Janeiro. The medium-sized one corresponds to the future expansion of the Brazilian plant, and the largest is the stage used for a future industrial plant.

Physicist Ruprecht von Siemens, a member of the Siemens family and holder of 9 percent of the stock of the company of the same name, confirmed all of the information in Munich yesterday during a slide show on the operation of the centrifugal jet.

Von Siemens explained that under the contract with the Brazilian Government, Germany has preference in acquiring 20 percent of the production of NUCLEBRAS Mining Auxiliary Corporation (NUCLAM).

Therefore, Brazil is left with the uranium of NUCLEBRAS plus the 80 percent of NUCLAM's uranium to supply its plants and for export.

Professor Becker agreed that his uranium enrichment process consumes more energy than the ultracentrifugation process but showed that the centrifugal jet consumes only 5 percent of the energy later generated by the enriched uranium. Thus, according to him, Brazil has advantages with the centrifugal jet because it possesses cheap and abundant energy. Other technicians of the Karlsruhe Nuclear Research Center showed that, in any case, Brazil would not be in a position to obtain ultracentrifugation from Germany because that process belongs to a consortium which also includes the Netherlands and Britain, and for political reasons, that consortium cannot sell its technology.

The professor guaranteed that Brazil is still going to benefit from the research to perfect the centrifugal jet since, by contract, it has the right to 50 percent of the whole process for the use and sale of the technology. In that regard, he showed that Germany has already invested 170 million markes in research on the centrifugal jet and is going to continue investing 15 million marks per year until 1986 to perfect it.

In addition to all those factors, the professor predicted that in 1990 there will be a great shortage of uranium in the world at which time Brazil can then sell part of its reserves of that mineral already enriched.

Asked if Brazil will already have the enriched uranium technology by that date, he replied that that depends on the investments that Brazil will make in the coming years in facilities and the training of personnel in enrichment. According to him, the centrifugal jet is feasible from a technical point of view. Professor Becker guarantees his part.

## Technology Available

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 3 Apr 83 p 42

[Dispatch by special correspondent Estelina Farias]

[Text] Bonn--"The technology that NUCLEBRAS needs is here at its disposal." That statement by physicist Reprecht von Siemens, an official and large stockholder of the Siemens company of which KWU, that is participating in the construction of Angra-2 and Angra-3 is a subsidiary, summarizes what other technicians and businessmen in the nuclear sector told a group of Brazilian journalists during the past 2 weeks here in Germany. All of them made it clear that the transfer of German nuclear technology to Brazil depends much more on the ability of the Brazilian technicians to absorb it and the investments that Brazil must make, than strictly the willingness of the German companies to transfer it.

The Germans showed the greatest interest in seeing that the Brazilian nuclear program succeeds. It is not a matter of altruism but of interest in selling more nuclear plants and the nuclear fuel cycle to Brazil and other developing countries. If the Brazilian nuclear program is successful, it will serve as advertising and will facilitate the sale of more technology from West Germany.

The German Government does not show any hurry to implement the Brazilian nuclear projects. However, the businessmen made it clear that whatever may be the economic situation of Brazil, investments in the nuclear sector must continue at least at the current level or risk their becoming very high in the future.

The delays that have already occurred in thedates scheduled for the operation of Angra-2 (1988) and Angra-3 (1990) have reached the limit, according to the technicians.

The Iguape-1 and Iguape-2 projects must be started in 1985 to give the nuclear program a pace that will make the transfer of technology feasible. In summary, the German businessmen were positive in saying that the Brazilian nuclear program cannot be delayed any more.

KWU and the German Government made it a point to show the Brazilian journalists the main stages of the nuclear cycle, beginning with the company's sales division in the city of Erlangen. Then they showed the Grafenrheinfeld nuclear power station in Schweinfurt, which serves as a model for Angra-2 and Angra-3, and then the atomic waste storage site located near Hanover.

The technicians also made it a point to observe that the construction of Grafenrheinfeld was begun 3 years after Angra-1, which uses American Westinghouse technology. They pointed this out because Grafenrheinfeld is already being prepared to receive the first recharge of fuel and Angra-1 is still not in operation. In view of that disparity one German technician asked the Brazilians: "Why didn't you begin everything with us?"

Centrifugal Jet

The longest visit was made to the Karlsruhe Nuclear Research Center, where the uranium enrichment technology by centrifugal jet sold to Brazil is being developed and regarding which Brazilian scientists have raised doubts about its efficiency on an industrial scale.

For 2 hours, the creator of that process, Professor Erwin Becker, explained to the journalists how the centrifugal jet works, showing its advantages for Brazil which, in his opinion, are not only the future supplying of the country's nuclear plants but a good business for the future with sales of enriched uranium abroad. Since Brazilian uranium reserves total over 300,000 tons, Professor Becker believes it possible that Brazil may export the mineral beginning in 1990 in the amount of up to $40 billion.

The uranium reprocessing technicians complained about the fact that NUCLEBRAS had given up building its reprocessing plant in Vitoria (Espirito Santo) and stopped sending Brazilian technicians to be trained in Germany. All of this without giving the slightest explanation to the German partners.

From everything that was seen in Germany, one concludes that in 1975 Brazil began to pursue an irreversible course because in order to absorb nuclear technology it is not enough to build a single plant but a combination of at least four and, along with that, to develop the new processes of the fuel cycle, which begins with the production of uranium and ends with the reuse of the mineral and the plutonium already spent in the nuclear reactors. Concurrently the waste is then vitrified for final storage.

The expense of all those stages sound incalculable to a Brazilian because the Germans refuse to quote figures. To get an idea, the construction of a plant in Germany costs 3 billion marks. And one day of operation of a 1,300 megawatt plant costs more than 2 million marks. Those costs are even low because Germany possesses all the technology.

In the last 2 years, expenditures in the nuclear sector have doubled in Germany, a country where the annual inflation rate is 6 percent. With regard to the rise of those costs in Brazil, where the annual inflation has been bordering on 100 percent, the German technicians kid and refuse to make any estimate, saying that the "increase of costs in Brazil is part of everyday life."

## Delay Increases Cost

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Mar 83 p 33

[Dispatch by special correspondent Estelina Farias]

[Text] Erlangen, West Germany--As a result of the 1-year delay in the entrance into operation of the Angra-2 and Angra-3 nuclear plants--now scheduled for 1988 and 1990, respectively--the equipment purchased in Germany is becoming more expensive, an average of amost 10 percent per year, because NUCLEBRAS is paying KWU to store it. The equipment that began to be stored last year amounts to 15 percent of the total equipment ordered by NUCLEBRAS from KWU. Of the total orders, Brazil received only 5 percent; 15 percent are in the warehouses and the remaining 80 percent is still being built by KWU or other contract companies.

That information was provided yesterday by the KWU sales director and general engineer abroad, Gerold Herzog, to a group of Brazilian journalists. Herzog made it clear that the more delay there is in constructing nuclear plants, the costlier will be the equipment and it will take even longer for Brazil to complete [assimilation of] the nuclear technology. However, Herzog and the other KWU directors did not want to reveal the total value of the equipment.

At the same time, he said that the equipment is being paid on time because, as it becomes ready for delivery, the consortium of 30 banks that financed it releases the payment to KWU. The KWU directors could not answer if there is a possibility of the consortium of banks distraining or repossessing the equipment that they financed in the event that NUCLEBRAS does not pay the financing. We are not jurists," observed Herzog, "and that is a complicated case even for jurists because it would be unprecedented." The equipment that is stored consists of 1 reactor vessel, 1 turbine, 1 electric generator and steam generators for Angra-2. For Angra-3, only the reactor vessel is stored at the GHH company, subcontracted by KWU, and the turbine and electric generators are ready for storage at KWU.

Herzog and the KWU superintendent for the transfer of technology abroad, Kurt Backhaus, said that KWU guarantees not only conservation of the equipment by work to prevent corrosion and any other damage but also the quality of the technology that is being transferred to Brazil. They also made it clear that the construction of the Angra-2 and Angra-3 plants needs to be maintained at least at the present pace so that the transfer of technology will not be jeopardized. They emphasized also that NUCLEBRAS needs to begin construction of Iguape-1 and Iguape-2 in Sao Paulo by at least 1985 to insure the continuity of NUCLEN's work and for assimilation of German technology.

The two engineers explained that maintaining the pace of Angra-2 and Angra-3 and beginning Iguape-1 and Iguape-2 in 1985 are basic for the transfer of technology and to keep the Brazilians trained in nuclear technology occupied (about 340 engineers, technicians and physicists in addition to 200 scholarship students from Brazilian institutes and universities). The KWU public relations [representative] in Brazil, Wolfgang Breyer, stressed the importance of keeping that personnel occupied because as he said, "Brazil learns by doing." Of the total number of personnel trained in Germany, 130 are from the engineering sector, 70 from the fuel factory and 40 are in uranium enrichment.

The KWU representatives said they are expecting to have their first contact with the new president of NUCLEBRAS, Dario Gomes, next week, at which time they hope to discuss adaptation of the timetables for the manufacture of equipment by KWU to the new rate of construction of the Brazilian plants. As for storage of the equipment, they believe that NUCLEBRAS may have the technical conditions to store it in Brazil and has already studied various ways of doing this but it has not decided or, at least, has not informed KWU if it is going to take the equipment to be stored or when it will be able to do so.

KWU made it clear that Brazil has reached an impasse (although it may not have declared it officially), because it must either continue to invest to guarantee the assimilation of German technology or cease investing and bear the enormous losses of the expenditures it has been making since it signed the agreement.

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CSO: 5100/2052

# DACCA NEGOTIATING FOR NUCLEAR POWER PLANT

Kuala Lumpur BUSINESS TIMES in English 17 Mar 83 p 19

[Article by Atiqul Alam in Dacca]

[Text] BANGLADESH, still heavily dependent on dwindling primitive sources of power, is planning a nuclear reactor that officials say could revolutionise its energy resources.

They say the US$650-million reactor at Ruppur in the country's north-western area, will generate 300 megawatts of power when it goes into operation by the end of 1990.

Air Vice-Marshal Sultan Mahmud, Bangladesh Air Force chief and Energy Minister, said recently that the nuclear plant was part of a plan to boost energy on a massive scale.

The Bangladesh government is negotiating with three European companies — from Britain, France and West Germany — about setting up the proposed reactor. Bangladesh signed the Nuclear Non-Proliferation Treaty in 1979 and has said the Ruppur plant will be used exclusively for development purposes and would be open to international inspection.

Bangladesh uses oil, coal and natural gas as the three principal fossil fuels to meet its energy requirements. Officials cite economic problems as the main reason why Bangladesh is still the world's lowest consumer of energy.

Only 150,000 homes in Bangladesh use natural gas for cooking. The other 15 million in 65,000 villages use firewood, chopped hay, jute stems, cow dung and rice husks, according to official figures.

About two-thirds of commercial goods move along Bangladeshi waterways in vessels mainly propelled by wind and human muscle.

But Air Vice-Marshal Mahmud said in a recent seminar that many of the primitive sources were rapidly dwindling and increasingly unable to match the growth of population.

"We ought to replace the traditional sources of fuel by commercial ones if we are to make an economic breakthrough and increase our GDP (gross domestic product)," he said.

## Problem

At present less than 20 per cent of the nation's non-traditional energy is deprived from indigenous natural gas and over 80 per cent from imported oil and coal, the official figures say.

The country spends nearly US$400 million each year about two-thirds of its annual export earnings — to import 2.5 million tonnes of crude oil needed to produce the required energy.

Experts in Bangladesh say the only way to stop the drainage of such huge amounts of foreign exchange is to step up production of indigenous fossil fuel as a substitute for oil.

The Ruppur nuclear plant would replace all the seven thermal power stations in Bnagladesh's northern and western zones which produce 200 megawatts of electricity, they say.

"It will open up a a vast potential for rapid industrialisation of a hitherto barren area starving for ages for power," one official said.

Figures released by the Bangladesh Ministry of Energy show the country currently has a total of 1,670 million tonnes of coal equivalent energy resources, of which coal itself is estimated to be over a thousand million tonnes.

But the ministry acknowledges that the deposit in the Bogra area of northern Bangladesh lies some 3,000 to 4,000 feet below the alluvial soil and so its exploitation poses a big technical problem.

Peat deposits of 68 million tonnes of coal equivalent energy which occur in good rice growing areas, are also wasted because they go under water during the monsoon season.

By far the most important fuel resource available in Bangladesh is natural gas. The country has vast reserves in its 10 gas fields.

The current natural gas offtake is about 100 million cubic feet. It is mainly used for electric power generation, manufacture of fertilisers, drying leaves in tea gardens and domestic cooking in homes. Experts says reserves should last over 30 years.

They also say the reserves would easily be doubled if an extensive exploration programme got underway. — Reuter

CSO: 5100/8103

## BRIEFS

RADIOACTIVE MATERIAL STOLEN--Johannesburg, 25 April, SAPA--A cylinder containing radioactive material was stolen from a bakkie [pickup truck] on the Durban Esplanade at the weekend, South African Broadcasting Corporation TV news reports. Durban police have issued an urgent warning to the thieves not to open the cylinder as the contents are "very dangerous." Anyone who can help in the case is asked to contact the nearest police station. [Text] [MB251905 Johannesburg SAPA in English 1839 GMT 25 Apr 83]

CSO: 5100/33

DETAILS ON ESMERALDA PROJECT, SODIUM FIRES

Paris REVUE GENERALE NUCLEAIRE Jul Aug 1982 V---, N0004, pp 371-376

[Article by Y. Sophy and J. C. Malet: "Esmeralda and Sodium Fires"]

[Excerpts]II. The Esmeralda Project

Until now tests have been carried out on quantities up to 1,300 kg of sodium. But, if a "guillotine" break of pipes on the secondary sodium circuit of a Super-Phoenix type reactor is considered, it is calculated that there would be a maximal leak of 70 tons. Therefore, the CEA [French Atomic Energy Commission] is going to have at its disposal an Esmeralda facility (fig. 7) in which it will be possible to make fires involving such quantities of the metal. The objectives of this facility are dual:

--to demonstrate that the results obtained until the present can be extrapolated to this type of leak;

--to make research and development studies in the area of the fast reactor type possible.

This facility is built and operated under a specific agreement.

II.1. Dimensioning the Facility

The following working hypotheses have been selected:

a) The quantity of sodium to involve must correspond to a guillotine break of the Super-Phoenix secondary circuits, or 70 tons over 200 $m^2$;

b) The largest component to be studied is the Super-Phoenix barrel tank (diameter = 4.4 m, length = 13 m);

c) The rate to be accounted for in the study of spray fires has been estimated at 2 t/h;

d) The vapor generator tower must be at least on a 1/2 scale and allow work on 20 to 30 t of sodium in order to result, under natural ventilation, in representative aerosol dispersions (1/2 scale in dimensions).

From which the composition of the facility, which covers a surface of 2,300 $m^2$ (fig. 8):

--a 3,600 $m^3$ vessel (L = 20 m, W = 15 m, H = 12 m) withstanding wall temperatures of 120 to 130°C and an effective steam pressure of 1 bar;

--a 2,000 $m^3$ vapor generator tower (L = 10 m, W = 10 m, H = 20 m) operating in natural ventilation;

--auxiliary areas for the storage of sodium, its generation (or its heating up from 140 to 555°C), the preparation of experiments, the treatment of combustion residues, the washing of components and the ventilation of the areas and the vessel;

--a spreading station for extinguishing powders.

II.2. Objectives

The objectives assigned to the Esmeralda program were defined as a function of preliminary studies done at the Cadarache Center and requests made by the parties who are to use the results.

This leads to the 13 points cited below:

1) Reactor-level confirmation of the static sodium fire smothering device (container-smotherer).

2) Development of leak recovery devices in the technical buildings (floors, funnels).

3) Large-scale confirmation of the effectiveness of the devices for powder distribution and spreading.

4) Study of sprayed fires.

5) Study of mixed fires: Esmeralda should make it possible to study this type of fire, from simulation of large sodium leaks, on portions of representative circuits in the reactor surroundings.

6) Validation of calculation codes for sodium fires in sprayed or mixed layers (codes already developed, like the FEUNA code applicable to film sodium fires, or to be developed, thanks to other programs, for the other types of fire (PYROS code).

7) Study of aerosol release by a vapor generator building and of the harmfulness of sodium aerosols. The tests of releases concerted from the model of the vapor generator building will make it possible to measure the quantity of aerosols that will be released during a sodium fire in a naturally ventilated area, as well as the speed of transformation of $Na_2O_2$ aerosols into soda and carbonate.

8) Study of the effectiveness of filtration systems (prefilters-filters) for aerosols.

9) Study of the intervention during and after a sodium fire: treatment of combustion residues, study of the treatment of combustion residues, soidum-sodium oxide separation, study of individual shielding for personnel, returning the facility to normal conditions after a fire.

10) Study of simplified container-smotherers and of passive extinguishing systems.

11) Validation of calculation codes relative to aerosols.

12) Study of the sodium-water reaction outside of vapor generators.

13) Study of the behavior of miscellaneous components and equipment in the atmosphere of a "sodium fire."

II.3 Measurements and Experimental Procedure

It is a matter of measuring various parameters required for the understanding of the mechanisms of sodium combustion and the behavior of the reactor components.

The corresponding measurements involve: temperature, pressure, humidity rate, air and fluid rates in circulation, hydrogen content, concentration of aerosols formed and the thermo-mechanical behavior of the components during experimentation.

The tests take place either in the 3,600 $m^3$ vessel or in the vapor generator tower, depending on requirements. As an example, two types of use are outlined below:

a) Study of the behavior of the overflow tank of the Super-Phoenix barrel in case of a large sodium fire due to a leak. This test is combined with the test of spreading and of the effectiveness of the extinguishing powder capable of fighting the fire (fig. 9).

b) The study in the vapor generator tower of the formation of aerosols in a moist atmosphere and of their circulation within this area under natural ventilation. Since the tower is open to the outside, in addition, the dispersion of sodium oxide aerosols in the environment and their chemical transformation at contact with the air is studied (fig. 10).

The paramaters measured are recorded continuously (after preprocessing, if required) for the purpose of a more detailed processing, by competent personnel, in specialized laboratories. Likewise, a certain number of solid and gaseous samples are kept for later analysis.

The behavior in real time of all of the equipment is followed up with classical or speeded up cinematography, as well as by a closed-circuit television.

The safety of the facilities is assured by a series of dynamic or static devices such as: smothering tanks, filtered extraction circuits, relief valves, vacuum breaker valves, shielding of concrete floors by steel sheets, wall covering with special paint, etc.

The Esmeralda facility, currently being built at the Cadarache Nuclear Research Center, was to be operational starting in September 1982.

[Boxed, p 74]

From Sodium Salts to Marcalina Powder

Until now, the only means of fighting sodium fires were:

--either sodium carbonate, a very mediocre extinguishing agent that can only be used with a shovel;

--or a sodium chloride based powder whose grains are covered with an organic product and which, among other problems, has the disadvantage of being extremely corrosive.

In addition to these processes, there is the one based on the expanding property of graphite when complexed with certain products in the presence of heat. This process is not without interest to the extent that it could be used, like smothering tanks, as a so-called passive method. However, above all, it requires a vast test program whose purpose, among other things, is to determine what becomes of the complexing agent (in this case, sulfuric acid which represents 10 percent by weight of the product) and the effectiveness of this process as a function of temperature (in the breeder reactor, the sodium temperature can vary from 180 to 550°C.)

The development of Marcalina powder, therefore, marks clear progress. The components of this powder are alkaline carbonates and graphite. The proportion among carbonates is close to eutectic. Thanks to this property, at high temperature, the powder forms a sticky air-tight film on the surface of the sodium. At low temperature the mechanism is different: one of the peculiarities of this product is that one of the components contains a small quantity of crystallization water. The role of this water is two-fold:

--On the one hand, it reacts at the sodium-water interface with the sodium oxides and the sodium to form a fine film of soda that is a powerful extinguishing agent. The quantity of water reacting with the sodium, however, remains very small, because it has not been possible to detect the presence of hydrogen.

--On the other hand, as it is eliminated, it causes an agglutination of the components that form a compact insulating layer at the surface of the metal.

That is why this powder is as effective at low temperature as at high temperature, as has been demonstrated by the tests carried out at Orleans and at Cadarache. The role of the graphite is dual. It is both a liquifier, allowing the powder to flow better, and an extinguishing agent.

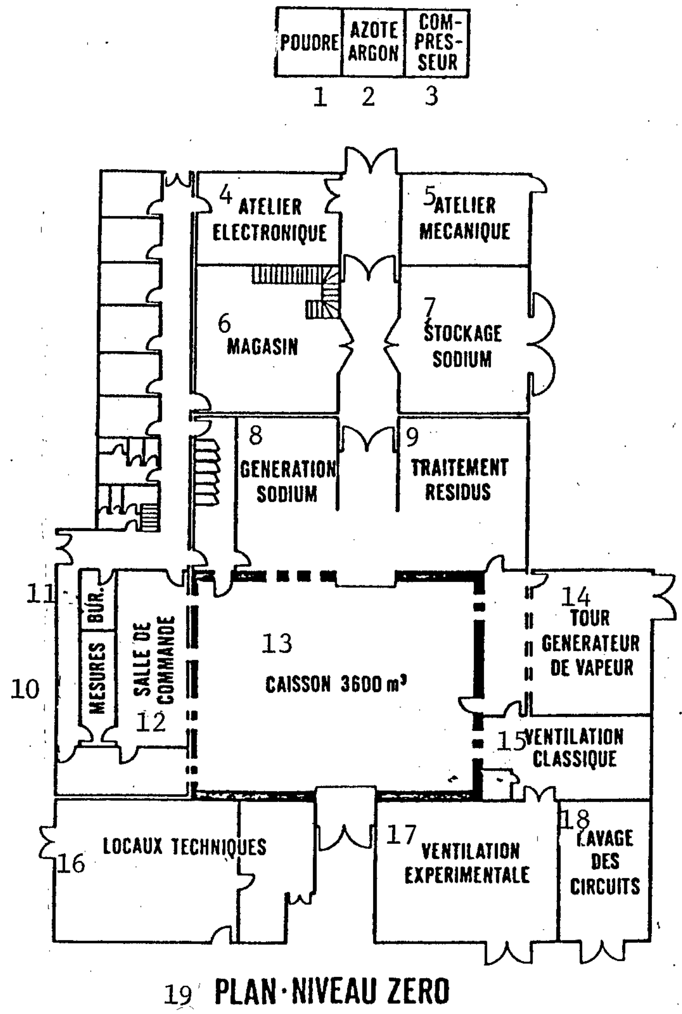


Fig. 8. — **ESMERALDA : vue en plan.**

Figure 8: ESMERALDA: Floor Plan

Key:

1. Powder
2. Nitrogen/Argon
3. Compressor
4. Electronics shop
5. Mechanical Shop
6. Storage
7. Sodium Storage
8. Sodium Generation
9. Residue Treatment
10. Measurements
11. BUR. [office]
12. Control Room
13. 3,600 $m^3$ vessel
14. Vapor generator Tower
15. Classical Ventilation
16. Technical Areas
17. Experimental Ventilation
18. Circuit Washing
19. Floor Plan: Level Zero

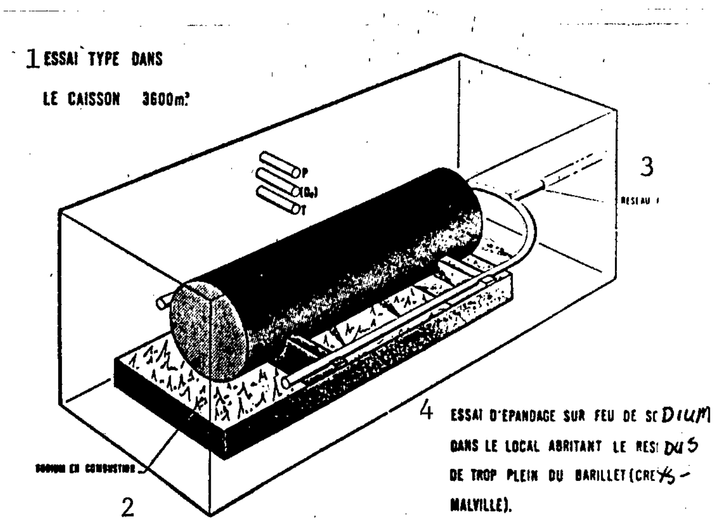


Fig. 9. — **ESMERALDA : essai type dans le caisson.**

Figure 9: ESMERALDA: Typical Test in the Vessel

Key:

1. Typical Test in the 3,600 $m^3$ vessel
2. Sodium in Combustion
3. Network 1
4. Spreading Test on Sodium Fire in the area containing the overflow residues from the barrel (Creys-Malville)

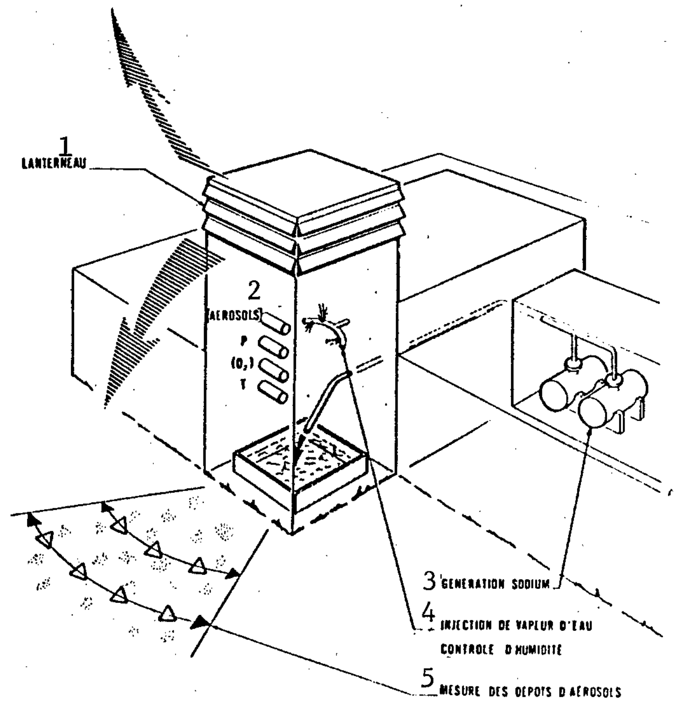


Fig. 10. — **ESMERALDA : essai type dans la tour « générateur de vapeur ».**

Figure 10: ESMERALDA: Typical Test in the Steam Generator Tower

Key:

1. Skylight
2. (Aerosols)
3. Sodium Generation
4. Injection of Steam, Moisture Monitoring
5. Measurement of Aerosol Deposits

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CSO: 8119/1060

VIOLENT DEMONSTRATION AGAINST LEMONIZ FACILITY

Madrid YA in Spanish 29 Mar 83 p 9

[Article by Luis Maria Landaluce]

[Text] The National Police were obliged to bring charges of disturbing the peace against the demonstrators who took part in the march on Lemoniz last Sunday, which was called by the anti-nuclear committees and was supported by pro-amnesty representatives and other political groups. The confrontations between police and demonstrators, which lasted for approximately an hour and a half, began when a group of demonstrators hauled down the Spanish flag from the Piencia City Hall, throwing it on the ground, in the presence of a number of Basque Autonomous Police, who did nothing to stop them.

Troops of the National Police, equipped with anti-riot gear, concentrated in the Arminza area, 4 kilomters from the nuclear plant, preventing the demonstrators who were trying to reach the immediate area of Lemoniz from going any further.

The demonstrators started out from Algorta after 10 am, behind two large signs which read "Lemoniz apertu (Pull down Lemoniz)" and "Nuclear State, Police State."

When the march, which had begun in Berango, arrived in Arminza, the National Police captain who was in command of the force told them through a loudspeaker that they would not be allowed to go any further, and that the demonstration should dissolve then and there. At that moment a hail of rocks and lead pellets launched from slingshots was begun against the police, who repelled the attack shooting numerous rubber bullets and smoke canisters, although no arrests were made.

At about 3:30 in the afternoon, when the demonstrators persisted in trying to get near Lemoniz, the National Police broke up the march, following the demonstrators with police vans. Although at first there was talk of arrests, official sources consulted by Logos reported that no arrests were made.

However, there were four arrests made hours before Sunday's demonstration began, when two patrol cars of the "091" were travelling through the Calle de Ronda in this capital. Four youths, sympathizers with the anti-nuclear groups, threw insults at the personnel in the patrol cars. When the National Police proceeded to ask for the identification of the four individuals, some 40 persons surrounded the police cars. The police fired a warning shot into the air with a rubber bullet rifle, and arrested the four, who were taken to the Santiago district police station in the old center of this capital. Shortly afterward, some 50 demonstrators went to the area, and hurled bottles and other heavy objects against the door of the police station. Police forces had to act to disperse the demonstrators. Those arrested were identified as Joaquin Villafruela, age 42, Roberto Villanueva, age 44, Jose Luis Pena, age 31, and Juan Jose Pellechea, age 50. They were placed at the disposal of the law.

8131
CSO: 5100/2585

NUCLEAR PROGRAM FACES CUT, ANTICIPATED ON-LINE FACILITIES

Madrid ABC in Spanish 14 Apr 83 p 55

[Text] Madrid--Part of the scheduled nuclear program will have to be slowed down, or possibly abandoned, according to a statement made yesterday by the general director of energy, Carmen Mestre, at the close of the seminars held under the title of "Nuclear Energy Today," which were organized by the magazine VIDA PUBLICA and which took place at the Ministry of Industry and Energy.

In her remarks, Carmen Mestre explained: "The lack of a joint plan for the electric sector geared to meeting the requirements explains the presence of investments which have been started and, in some instances, amount to large volumes of funds which could have been allocated for other uses. All of this (she said) is in the context of major financial restrictions and maintenance of freedom of enterprise in the sector."

Insofar as safety is concerned, the general director of energy noted: "The criteria for safety must take precedence over any other type of conditions in the decisions on putting a nuclear powerplant into operation." In this connection, she said that the postponements of the opening of Asco I, requiring a prior modification in the steam generator, or the delay in the operating permit for Almaraz II, awaiting the necessary tests to ascertain that the repairs made are considered adequate, are convincing examples of this new way of dealing with the nuclear field in Spain.

The general director of energy has stressed the need to change the current situation, which has involved the development of an extensive program of nuclear powerplants without progressing in the same effort to develop solutions to the problems, and to determine negative and positive consequences that this program entails.

Awaiting the New PEN

The change in the currently existing plan will have to take shape in the new National Energy Plan [PEN] being devised at present by the ministry, with the advice of five specialists in each of the crucial areas. According to Carmen Mestre's statements, this new PEN will reduce the expectations that had been created, calling for the attainment of nuclear power totaling 12,546 megawatts by 1990.

At the present time, the powerplants in full operation are the three of the first generation: Jose Cabrera (Zorita), Santa Maria de Garona and Vandellos I. The first Almaraz group is in operation limited to 50 percent, owing to the problems detected in its steam generator, and Asco I is completing its preliminary period after the uranium loading, and it is likely that it will only be allowed an operation similar to that of Almaraz I.

The entry of Almaraz II into operation had been planned for the near future, but it has been slowed down by the same steam generator problem. It was to have been followed by Cofrentes and Asco II. Lemoniz I had been planned for this year, but it is now left out of any schedule. In addition to the ones cited, Trillo I, Valdecabellos I and II and Vandellos II are under actual construction.

The delay in the nuclear program, which absorbed an investment of about 400 billion pesetas during the past 3 years, has been caused by the controversy surrounding this type of energy, but primarily by the drop in the consumption of electric power and the utilization or development of other sources making electric production possible.

The prospects of a delay, although not expressed officially, were reflected in the schedules and the statements per se made by the previous energy officials. Just 1 year ago, there was an announcement of the virtual abandonment of the Lemoniz II project, and the definite delay of Trillo II, a group which would subsequently be controlled for the most part by the public enterprises in the electric sector. This over-equipment also affected one of the thermal groups planned for using imported coal, which has been put off "sine die." This is the situation of the second Carboneras group. The Regodola, Sayago and Vandellos III projects are very far off, and by now virtually scrapped.

Nuclear Powerplants Under Construction

| Group | Owner | Power-MW Rate |
|---|---|---|
| Lemoniz I | Iberduero | 930 |
| Almaraz II | 1/3 HE, 1/3 Cia. Sevillana, 1/3 UE | 930 |
| Cofrentes | HE | 975 |
| Asco II | 0.4 FECSA, 0.4 ENHER, 0.15 HECSA, 0.05 E. H. Segre | 930 |
| Trillo I | 0.8 UE, 0.2 ENHER-ENDESA | 1,032 |
| Valdecaballeros I | 0.5 HE, 0.5 Cia. Sevillana | 975 |
| Valdecaballeros II | 0.5 HE, 0.5 Cia. Sevillana | 975 |
| Vandellos II | 0.54 ENHER, 0.08 FECSA, 0.10 E. H. Segre, 0.28 HECSA | 982 |

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CSO: 5100/2591

END