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# Japan Report

(FOUO 27/81)

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POLITICAL AND SOCIOLOGICAL

## LIBERAL DEMOCRATIC PARTY FACTIONAL STRIFE DISCUSSED

Tokyo NIHON KEIZAI SHIMBUN in Japanese 19 Mar 81 p 2

[Excerpt] "You Would Be Disinherited About This Time"

On the night of the 12th [March], the birthday of the deceased Prime Minister Ohira, "memorial gathering" was held in Tokyo by his relatives and friends. MITI Minister Tanaka, in a tribute, spoke in an unusually sober tone, "I myself have committed various errors. If he were alive, he would probably reprimand me, asking 'What on earth are you doing?'"

Whereupon Foreign Minister Ito remarked, "A bad thing never dies."

This was followed by a retort by Yoshitake Sasaki, "If he were alive, you would be disinherited about this time."

One member of the gathering saw these remarks as actual heckling cloaked in seeming jest. One person reportedly stated, "I am a member of the Kochikai (Broad Lake Society) group, but I have never belonged to the Ohira faction." Chief cabinet secretary Miyazawa, who once enfuriated Ohira admirers within the Kochikai, was not present at the evening gathering.

"The close associates of the deceased prime minister, who purport to represent the politics of harmony, are showing absolute lack of harmony," The inception last fall of the policy group Shin-Setai Kenkyukai (New Generation Study Group) by MITI Minister Tanaka provided the spark for the internal affairs of the Suzuki faction (Kochikai) in becoming the subject of gossip among political circles. The group attracted many of the younger Diet members of the Kochikai, who were elected during the past three elections. Like a true "policy group," it began to function actively by inviting a top economist on 27 January to conduct a lively debate.

Those close to the MITI minister explain the reason for the inception of the group by saying, "Because the younger members of the Kochikai increased so suddenly the officers were no longer able to look after them with care." "Therefore, the MITI minister decided to take them under his wing after consulting with the prime minister." "We did not lure them, but they joined in unexpected numbers."

Auto Issue Is a Good Example

"Rokusan (Rokusuke Tanaka), isn't it rather premature?" (Chief cabinet secretary Miyazawa) Not only the Kochikai, but also the political circles saw it as Tanaka's

"declaration of intent to participate in the successor race" for the post-Suzuki leadership. "Rokusan's true intention is probably: 'Miyazawa is not the only of the Kochikai. I am also qualified. If he could lead the Heigakai group, what is wrong in my heading another study group?'" Such was the general outlook within the Liberal Democratic Party.

Subsequently, Tanaka heeded the advice of former Welfare Minister Saito and other factional cadres, and promised that "the study group would limit itself to policy research and refrain from holding general meetings." It avoided all meetings during February and March. As a result, "there is no longer any issue concerning the operation of the Kochikai." (A Suzuki faction cadre) The Suzuki faction cadres also take the calm view that "if Rokusuke Tanaka really has power, the faction would probably move forward under his leadership. On the other hand, if it is merely a lone ploy on his part, time will solve the problem," and they appear to be tightening control over the younger members.

Although the actual situation has simmered down, the drama of internal dissension continues to be a topic of conversation in political circles on various occasions. In mid-February, the controversy between the ministries of foreign affairs and MITI over Japan's mandate for negotiations concerning the Japan-U.S. auto issue was widely rumored as a typical case of the "rivalry between Kiichi Miyazawa, Rokusuke Tanaka and Masayoshi Ito." Heeding the advice of his advisers who said, "We regret having to bother the prime minister with such a problem, but we cannot afford to have this continuing exposure of our internal problems," Prime Minister Suzuki took it upon himself to coordinate the delegation for the Japan-U.S. negotiations.

Lack of Tension Indicates Absence of a Successor

Takeshi Sakurada (honorary chairman of Nikkeiren [Japan Federation of Employers Associations] and the opinion leader of the Kochikai since the reign of the Ikeda faction) could not stand the internal party turmoil any longer. He called the three factional leaders together and demanded, "What do you mean by bringing such a predicament to the Kochikai, which has produced three prime ministers and a speaker of the Diet?" Nonetheless, the three appeared to be unaffected, according to one member's observation. They appeared to be more concerned about the "culprit who leaked the details of the meeting with Sakurada to outsiders."

Behind the scenes of the "scandal within the Shogunate," rumors concerning the various factions are rife, such as "the elders of the Fukuda faction proposed to [former prime minister] Fukuda that Tatchan [minister of education Tanaka] might be able to consolidate the factions," or that "the question of the successor to the Tanaka faction has become uncertain since the sudden appearance of Ganri Yamashita." Of course, the fact that the various successor questions are casually mentioned without any air of tension might indicate that "the appearance of a new leader is still premature."



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POLITICAL AND SOCIOLOGICAL

SOVIET THREAT: HOKKAIDO CITIZENS' VIEW REPORTED

Tokyo YOMIURI SHIMBUN in Japanese 30 Jan 81 p 3

[Text] Amidst the rumor of a "northern threat," the construction of Japanese-Soviet friendship centers and the establishment of sister-city relationships are now actively under way in Hokkaido. Following Sapporo and Kushiro where such [friendship centers] are already geared to action, Wakkanai City completed one last July and other cities are also planning to build similar centers. In addition, six cities have established a sister-city or friendship-city relationship [with Soviet cities]. Although the people involved with these centers simply explain it away by saying "Hokkaido and the Soviet Union are neighbors; its purpose is simply to promote friendship." But it cannot be denied that there is a real motive "to induce favorable economic trade including fishery," when one considers the ensuing troubles over the 200 nautical miles. Seen from a different angle, however, Hokkaido is "a starting point" of the campaign for the return of [Japan's] Northern Territories. The organizations concerned with the Northern Territories issue and participate in the campaign are therefore voicing a warning: "on the pretext of friendship it is trying to subvert the campaign. There is a danger of using it as a base for an anti-Japan campaign." The situation is thus complex. With the approaching of the first "Northern Territories Day" (7 February), heated arguments are taking place in Hokkaido revolving around the issue of Japanese-Soviet friendship centers.

Sister-City Relationships Flourishing

The first case which became the harbinger of the construction of Japanese-Soviet friendship centers in Hokkaido can be found in 1972 at Saruharai Village, Soya County in the vicinity of Wakkanai City. It began with the construction of a memorial tower for the crew of the Soviet freighter, "Indigirka," which became aground and sank in the Sea of Japan off the coast of the village. After completing the construction of its center, there was no center activity in the village for a while; then in 1977 "Eastern Hokkaido Japanese-Soviet Friendship Trade Center" and "Japanese-Soviet Friendship Cultural Center" were built in Kushiro City and Sapporo City respectively. Also opened last July was "Wakkanai Japanese-Soviet Friendship Center" in a corner of the Tenboku Pier of Wakkanai City. In addition, construction plans are on the way in cities like Hakodate and Otaru. As for the establishment of sister-city or friendship-city relationship, it exists between Otaru and Nakhodka, Asahigawa and Yuzhno-Sakhalinsk, Rumei and Ulan-Ude, Wakkanai and Nevelsk, Kushiro and Kholmsk, and others.

Though generally referred to as Japanese-Soviet friendship centers, their histories of establishment and managements are different from each other. [Let us] look into the case of "Hokkaido Japanese-Soviet Friendship Cultural Center" (Director, Yasusaburo Shibano) in Sapporo. Managing Director Morio Mizuno said "our organization comes under a financial foundation which is approved by the minister of foreign affairs. Its advisors are the people like the governor of Hokkaido and the mayor of Sapporo, and its Board of Directors is made of non-partisan members with broad backgrounds; all of the officials are working without any political party coloration." He seemed dismayed by being looked at through "tinted glasses."

The total cost of the construction of the center [in Sapporo] required 500 million yen. After applying for a permit to raise funds and approved by the Finance Ministry the construction cost was met by raised funds, per share valued at 10,000 yen. Since the center is a "government approved facility," all of its businesses and programs are carried out with the approval of the government; and most of its programs are limited to those which will become basis for the promotion of understanding and friendship between Japan and the Soviet Union, and the program includes activities such as cultural seminars, Russian language instruction, Russian cooking classes, movies and record concerts. [The number of center memberships] reached 5,000 within 4 months during the first year; it then increased to 16,800 by 1978; it nearly doubled to 31,200 in 1979; and it jumped to 136,000 last year. Managing Director Mizuno said "there are many people joining these activities, and my personal opinion as the center's managing director is that I detect no feeling of "dislike toward the Soviet Union" among the members.

Even Gifts Are Being Sent to the Soviet Union

Compared to Sapporo where people promote friendship only, Wakkanai seems to be tainted with rather fishy stories. For it was revealed that, of several landings made on Sakhalin by the deputy mayor of the city, the secretary general and the deputy secretary general of the Fishing Cooperative and others between 1978 and September of last year under the cover of "conference at the sea," among them three were made without going through necessary procedures at the Immigration Office. Specifically at the time of landing on 25 September of last year, [they] took six tape-recorder sets with them without processing through the custom office, and gave them away to the Soviet side as gifts. It is said that the tape-recorders were specially ordered to be presented to the Soviet Union as a commemoration gift for the completion of the friendship center; but, because the inspector of the Sakhalin Fishing Control Bureau who had been invited to the occasion for the presentation did not show up, they were simply given as gifts. The mayor of Wakkanai City, Tatsuo Hamaori, commented with candor: "The incident was revealed at an inopportune time, thereby creating misunderstandings. Because the livelihood of this place depends on the fish caught within 200 nautical miles of the Soviet waters, Japanese-Soviet friendship is absolutely essential. If someone tells me to lead the way for the campaign [for the return of Northern Territories], he is asking too much."

Fish Catch Decreasing Year After Year

In the sea around Hokkaido, tragic Soviet seizure [of Japanese boats] is taking place even now. Thus far, 1,616 vessels and 13,256 men have been captured. Of these people, 37 died either from drowning after their ship's collision with the Soviet patrol boat or during the detention after their capture; and 13 are still being detained. Since the 200 nautical mile limit was established between Japan and the Soviet Union in March 1977, the fines paid to the Soviet side for troubles stemming from the operation totaled 1.72024 billion yen for 306 violations cited. Moreover, the total catch allowed within the 200 nautical miles of the Soviet sea was reduced from 850,000 tons in 1978 to 750,000 tons since 1979. As for the total catch of salmon and bass in the open sea, it used to be 115,000 tons in 1965; and this too plunged, after yearly decreases, to 42,500 tons since 1978 due to the pressure by the Soviet side. To maintain friendship with the Soviet Union is, thus, a way of survival for the coastal fishermen. And it is natural that those organizations and people promoting the campaign for the return of Northern Territories, including the Association for the Attainment of the Return of Northern Territories (Northern Association, for short), feel bitter about Soviet-Japan friendship centers where a friendly mood remains.

Apprehensive About Soviet Pace

The managing director of the Northern Association, Ryosuke Matsuzaki, spoke emphatically: "I am told that the construction of [friendship] centers had been initiated by the Soviet side. Their target centers are located in the coastal cities with the exception of Sapporo. It was undoubtedly aimed at the fishermen who are in need of fish. Would it not be the case that its real intention is to say 'we would not let you catch fish if you participate in the campaign for the return of Northern Territories?' Its aim is, namely, to erode the campaign."

Managing Director Matsuzaki gave a talk in January of last year at the New Spring Conference held at the Hokkaido prefectural building. The governor of Hokkaido, Naohiro Dogakiuchi, and 10 organizations participating in the campaign, including the Northern Territories Association were present, and there he said "the number of [friendship] centers in Hokkaido is high in density unparalleled in any other prefecture, and there is a danger of them becoming the Soviet base for the Hokkaido operation. Although we cannot deny the construction [of friendship centers] we must take some measures for the better management and control of [each center]. The Ministry of Foreign Affairs has a similar view, too."

As if to endorse this speech, Foreign Minister Ito made an emphatic statement in October of the same year at the Lower House Special Committee on the Okinawa and Northern Territories Issue saying "friendship centers are undesirable if it is going to throw a wrench into the campaign for the return of the Northern Territories." He thus expressed his displeasure for the prospect of the centers being used as a Soviet base, and tried to curb it.

Having been charged for "throwing cold water on the campaign," those people involved with the friendship centers could not keep their mouths shut.

Ikuo Watanabe, the managing director of the Wakkanai Chamber of Commerce, who once served as the secretary general of the Association for the Construction of the Wakkanai Japanese-Soviet Friendship Center, and is still serving as the managing director of its Executive Council, made a rebuttal, saying "the statement made by the foreign minister provokes the people and has the effect of instigating the idea of Northern threat. On many occasions it is necessary for us to have interchanges with the Soviet Union, such as emergency entry into each other's territory to avoid stormy weather or to treat injured crews. What is wrong with us being sociable [with the Soviet Union] and treating them like our relatives? We have no intention whatsoever of trying to get in the way of the Northern Territory campaign."

The Wakkanai Area Branch of the Northern Association, which is in the city of Wakkanai, has not held its general meeting for the last 4 or 5 years, and it has returned its campaign money for 1978 and 1979. An official from its administrative office explained the reason: "[Our] office is located in the Chamber of Commerce [Building], and the head of the branch is the president of the Chamber of Commerce and concurrently the secretary general of the Maritime Fishing Cooperative. If we hold the general meeting, the Soviet side will find that out the next day, and it may lead, some opined, to big troubles like our fishermen getting fined or captured. Besides, there was some talk about the construction of additional friendship centers..."

In Nemuro City too, there was some talk about the construction of Japanese-Soviet trade centers this year; but, because "the Ministry of Foreign Affairs and the government of Hokkaido did not welcome the idea and there were many other problems involved," construction of the center never materialized. In 1966, the same city was about to establish a sister-city relationship with Nevelsk; but it did not materialize because the Ministry of Foreign Affairs blocked the negotiations by saying "undesirable." At "the Soviet Friendship Exhibition" opened in 1979, the attendance of the diplomatic personnel of the Soviet Consulate General in Sapporo was expected; but they could not attend because the Ministry of Foreign Affairs did not issue their travel permits. Thus enters political consideration in every case.

Keiichi Mazaki, the Chief of the main office for Measures To Campaign for the Return of Territories and the Northern Sea Fishing in the Hokkaido Prefecture, maintains a cautious attitude, saying: "As for the problem of friendship centers, all I hear is rumor on the street and I do not know its real nature. Therefore, I will refrain from making any comment. All I wish is that we can solve the problem of territories on the basis of true friendship." From this statement, we can fathom the complex settings that Hokkaido is in.



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UNIQUE CHARACTERISTICS OF '81 DEFENSE BUDGET ANALYZED

Tokyo SEKAI in Japanese Mar 81 p 250-258

[Article by Yu Takaoka, a journalist: "Industry-Government-Military Combine Gets Underway--Three Problem Areas in the '81 Defense Budget"]

[Text] Inwardly Happy

It is still fresh in our memory that one of the news items from abroad spread across the front pages of the various newspapers in early spring was: "The United States is dissatisfied with Japan's '81 defense budget." Both the U.S. State and Defense departments issued official statements to the effect that "the United States is disappointed with Japan's defense budget."

About the same time, the official in charge of the weapons department of Mitsubishi Heavy Industries Ltd, which is ultrarightist among Japan's weapons makers, made the following comment: "Since it had been said that the defense outlay in the JFY 81 budget would be noticeably increased, we had big expectations, but we were disappointed with the budget. Only two of the F-1's--a fighter aircraft domestically produced by our company--were approved. I would like to emphasize that the number of aircraft approved is the yearly production and not the monthly output. From the commonsense viewpoint of various European countries, the figure should represent a month's production."

One of the leaders of the Defense Agency analyzed the reaction to the JFY 81 budget as follows: "Actually, everyone is inwardly happy, but they are repressing the smiles and putting on a somber front. They cannot naively appear happy. Because they have been criticized a number of times with regard to the defense problem, those associated with it have become wise."

How does the Finance Ministry, which drafted the defense budget, assess it? Finance Minister Watanabe and his subordinates, including the ranking officials of the Budget Bureau, were unanimous in stressing the following points:

"Compared with other budgets this was not a particularly outstanding defense budget, but the essential items were adequately covered. With this budget, it appears possible to carry out the early, accelerated attainment of the "Mid-Term Operations Estimate" requested by the United States and the Defense Agency (Defense Agency's 5-year armament procurement plan starting in 1981). The budget is adequate for Japan to obtain the full understanding of the United States."

The defense budget, which was the focal point in the formulation of JFY 81 budget, is assessed quite differently by concerned authorities, depending on their positions, but what is the actual truth?

There is no doubt that depending on his position, each person's opinion is valid, but the important point is: from the long-range standpoint of the 1980's, how should one assess next year's defense budget and put it into the proper perspective?

Upon reconsideration with these viewpoints in mind, I think that among the comments, the one by the Defense Agency leaders is very suggestive: "be inwardly happy but put on a somber front." The reasons for the happiness are: first, the defense budget was given favorable treatment, and second, the defense budget signified that confirmation was given, through national funding, to the Japanese formation of an industry-government-military combine. This indicates that in the management of Japan, from now through the 1980's an extremely important course was decided upon.

On the other hand, a "somber front was put on" out of political consideration for the fact that in the spreading conservative mood, criticism of militarization is strong and the environment is not conducive for military expansionists to implement their program hastily.

The defense budget for the coming year contains a number of important facets which cannot be detected by the rate of increase. To examine this point, the process by which the defense budget was formulated should be reviewed. Generally, the process can be divided into three periods: 1) the period from the May 1980 Japan-U.S. summit conference to the late July Finance Minister Watanabe-Defense Agency Director General Omura conference, when the 9.7-percent increase in defense budget estimated request was decided upon; 2) from the time the 9.7-percent increase was officially acknowledged until the mid-December visit to Japan of Secretary of Defense Brown; and 3) from that time to the year end, when the final decision on the defense budget was made (7.61 percent increase over the previous year).

Two Pillars

It is widely known that at the Ohira-Carter Japan-U.S. summit conference last May, the highest priority was placed on the subject of Japan's defense buildup, and as a result of the meeting a communique was issued to the effect that there was mutual agreement on strengthening the Japan-U.S. alliance and that Japan would "steadily and noticeably increase" its defense capability. Of course, at this stage, no promise was made as to how much increase there would be in the JFY 81 defense budget and no figure was mentioned. However, Prime Minister Ohira made it clear at the time that he wanted to "show the increase in the coming year's budget." Furthermore, the agreement rested on two pillars: 1) accelerated attainment of the Mid Term plan; and 2) sharing the defense burden as "a member of the Western side." As for the early attainment of the Mid Term plan, there were a number of preliminary coordination meetings prior to the Japan-U.S. summit conference.

As far as the Mid Term plan is concerned, when then Defense Agency Director General Ganri Yamashita visited the United States and explained the Mid Term plan, which was no more than an internal plan of the Defense Agency, the United States made it the nucleus of its request to Japan to accelerate the military buildup. Through the

series of Japan-U.S. talks during Defense Secretary Brown's visit to Japan in January 1980 and Foreign Minister Okita's visit to the United States in March, this problem of accelerating the completion of the Mid Term plan was discussed. This was the course followed in arriving at the Japan-U.S. summit conference, and Prime Minister Ohira's statement that "next year's budget will reflect a noticeable and steady increase in defense buildup" is tantamount to an official commitment to speed up the Mid Term plan. Thus, it can be said that at the Japan-U.S. summit meeting in May, the groundwork for the defense budget was laid. Since then, the budget formulation has been concerned with indicating the early attainment of the Mid Term plan with figures and supporting it monetarily.

The Defense Agency's budget request estimate was naturally concerned mainly with the acceleration of the Mid Term plan. On 28 July, at the Watanabe-Omura meeting, the ceiling for the budget request estimate was agreed upon: 1) an increase of 9.7 percent over the previous year (other general government expenditures were limited to 7.5 percent); and 2) in addition, consideration would be given to changes in the situation. Since the 9.7-percent increase did not include the 2.2-percent increase for personnel expenses, the total increase would be 11.9 percent. Therefore, it was decided that, both internally and externally, the impression would be given that the 9.7-percent increase was the maximum limit.

It would not be an overstatement to say that at this point a situation was created for the figure of "9.7 percent increase" to race around the world. On 19 September, in Washington, D. C., Foreign Minister Ito met respectively with Defense Secretary Brown and Secretary of State Muskie and the American side pressed its demands for acceleration of the Mid Term plan and the 9.7-percent increase in the JFY 81 budget. Former director generals of the Defense Agency, Asao Mihara, Michita Sakata and Shin Kanemaru, played a big role in impressing the Americans that the 9.7-percent increase was the minimum limit during their visits to the United States. For 3 days starting on 24 November they met with Defense Secretary Brown, Deputy Defense Secretary Komer and Richard Allen (present assistant to the President for national security affairs in the Reagan administration). Reportedly, Secretary Brown pressed for realization of the 9.7-percent increase while Deputy Secretary Komer questioned "whether Japan can meet its defense reponsibility toward the Soviet threat without raising its defense outlay to 1.3-1.5 percent of the GNP. Although Richard Allen pointed out the "defense responsibility of Japan as a great economic country," he did not make any concrete demand in figures. However, the common interest of the American side was the implementation of the 9.7-percent increase.

In response, Mihara and others said that "they would make the greatest efforts toward realizing it," and it cannot be helped if this statement, made repeatedly in various places, was interpreted as a promise. It appears that the statement served to greatly encourage the U.S. side.

Holbrooke's Speech

An organized presentation of U.S. thinking at the time was made on 21 November by Richard Holbrooke, assistant secretary of state for East Asian and Pacific affairs, at the Japan Society meeting in New York in a speech entitled, "U.S.-Japan Relations in the 1980's." He said:

"There is a myth in the United States that Japan does not possess armed forces. The question is not whether Japan should rearm, since it already has a defense setup worth noting. Look at the following facts: the Maritime Self-Defense Forces have 45 destroyers and escort ships and more than 35 minesweepers, and the Air Self-Defense Forces have more than 370 fighter aircraft. Japan has more naval ships and aircraft than the U.S. 7th Fleet or 5th Air Force, respectively. The real problem is to what extent and with what speed Japan will increase its present defense strength so as to contribute to its joint defense.

"During the past 10 years, Japan's defense budget has shown a real increase of nearly 7 percent annually and at present exceeds 10 billion dollars, including approximately 1 billion dollars for the maintenance, of U.S. forces in Japan. Furthermore, although Japan is forbidden to maintain a military attack capability by the Constitution, which was formulated under American influence, Japan is seventh or eighth in the world in the size of its defense budget. However, as far as the nation's per capita burden is concerned, Japan's share (82 dollars) is only about one-seventh of that of the United States (550 dollars), and the majority of the American people want Japan to strengthen its defense efforts. There is no doubt that during the past 3 years--or even the past 12 months--the nature of the defense discussions in Japan has changed greatly.

"The Japanese Government at present is considering an increase of nearly 10 percent in its defense budget. If the increase in defense outlay, together with economic aid, contributes to our joint national security, then the criticism of many Americans that Japan is getting a 'free ride' will soften. We do not think that Japan needs to change its Constitution.

"To continue a true bilateral partnership between the United States and Japan, we might not be able to wipe out completely any 'disparity' in our relations, but at least we must show a significant change. Today Japan occupies an important position in the world, and it must react accordingly. In national security matters, we are not asking that Japan's role be redefined. We recognize and respect Japan's constitutional restrictions. However, the challenges are great and financial resoucres are gradually becoming scarce. We ourselves are making greater efforts, but unless the various allied countries take meaningful measures, the Congress and the American people probably will not approve the shockingly large burden of defense costs.

"The issue of dividing the defense burden must be considered from a broader perspective than simply cooperation in the economic, political and national security matters of the allied countries. Through that means, Japan need not feel that it is being pressed into assuming an unconfortably high military posture and it would make it possible for Japan to find its own means to shoulder a 'fair share of the burden.' Also, it would reassure Japan's neighboring countries that it is not adopting militaristic policies even if the defense budget is increased.

"It is clear that Japan is gradually, in its unique way, proceeding to increase its defense budget. The Japanese will probably never proceed as rapidly as desired by a segment of the American nation. As you are aware, the Japanse tend to treat the defense budget just the opposite of the way we do. We try to make our defense budget appear as big as possible to our people, but the Japanese try to make it look smaller than its actual size. For this reason, there is widespread misunderstanding among the American people--and even among many concerned officials within the government--as to how much Japan has already accomplished."

Essentially, the United States will keep insisting that Japan accept a fair share of the defense burden, but since Japan is faced with constitutional restrictions and is increasing its defense spending in its own way, there is no advantage in making urgent demands on Japan. This fundamental position of the U.S. Government regarding requests to Japan is expected to be continued by the Reagan administration. At the Senate hearings in mid-January, Secretary of State Haig commented: "It is possible that if we err in our policies toward Japan, it might adopt a neutralist stand." This is an example of a U.S. judgment that trying to brazenly steamroll demands on Japan is not suitable to the Japan-U.S. political climate.

At any rate, as can be seen from Holbrooke's speech, there are two U.S. strategic policies toward Japan--one is to push U.S. demands on Japan and the other is to consider the special conditions of Japan. In any case, the focal point of U.S. strategy toward Japan at the time was apparently implementation of the 9.7-percent increase. The so-called national defense group of the Liberal Democratic Party [LDP], including the former directors general of the Defense Agency, incited the United States to make this demand. It can be said that through joint Japan-U.S. efforts, pressure was put on Japanese financial authorities. Actually, in response to U.S. actions, Mihara and others constantly maintained liaison with Defense Agency officials and conducted negotiations repeatedly with the Budget Bureau officials of the Ministry of Finance.

U.S. Insistence

On 12 December, en route to the ROK, Defense Secretary Brown stopped over in Tokyo and conferred with Defense Agency Director General Omura and then with Prime Minister Suzuki and he again emphasized the need for a minimum increase of 9.7 percent. However, at that time the prime minister's close associates, the LDP leaders and finance officials had practically reached the decision that a 9.7-percent increase was not possible.

It could be pointed out that one of the reasons underlying U.S. insistence on the 9.7-percent increase was a lack of understanding that under the Japanese budget formulation system, the budget request estimate might represent the maximum and not the minimum limit. On the other hand, it cannot be overlooked that one of the reasons why the 9.7-percent ceiling was not questioned was the late July Omura-Watanabe meeting at which there was agreement, in principle, that depending on subsequent changes in the situation, the 9.7-percent ceiling might be raised. After the meeting, the Iran-Iraq conflict began and the Polish crisis arose, with the possibility of Soviet intervention. From the standpoint of the Japan-U.S. military expansionist group, these changes in the international situation warranted special consideration as "changes in the situation."

However, when December arrived, the finance authorities decided that the 9.7-percent increase was impossible and began a rollback tactic. In principle, soon after the announcement of a 9.7-increase following the Omura-Watanabe talks, comments were repeatedly made that "since the figure represents only a budget request estimate, it is natural to cut it." However, it was only in December that aggressive efforts began to be made to cancel implementation of the 9.7-percent increase, which had almost come to be accepted as a fait accompli.

On 3 December, Finance Ministry leaders commented that, "if the increase in defense spending is kept at the 7-percent level, the ratio of defense outlay to GNP can be maintained at the 1980 level of 0.9 percent." Following that, on 5 December, Finance Ministry Budget Bureau chief Matsushita called on Cabinet Secretary Miyazawa at the prime minister's residence and explained that it was impossible to go through with the 9.7-percent increase. As reasons he gave: 1) in the difficult financial situation today it is not possible to give special recognition only to defense spending; and 2) criticism might begin of tax increases because of increased defense expenditures, and the large tax increases planned for 1982 and later might become difficult to carry out.

In addition, on 9 December, LDP Policy Affairs Research Council Chairman Abe stated in a speech at the Nippon Press Club: "The JFY 81 defense budget is a very serious political problem. The final decision will be made on the basis of three factors--Japan-U.S. relations, balancing the budget and guaranteeing national security. However, if the defense budget becomes conspicuously large, national feelings might become a problem." Thus, he indicated that the increase will be less than 9.7-percent.

At the Suzuki-Brown meeting on 12 December, Prime Minister Suzuki said: "Defense buildup is not a task for only 1981. In hooking a large fish, you might lose it if you try to land it in one stroke. It is important to take your time in landing it. It is also necessary to spend some time in obtaining the full understanding of the nation's people." Like the expert on fishery matters that he is, the prime minister used the simile of fishing and hinted that it was not advantageous to adhere to the 9.7-percent increase if defense capability is to be developed over a long-range period.

If only from the financial standpoint, it was apparent that it would be best to hold down defense spending as much as possible. However, if that were done, it would be difficult to maintain smooth Japan-U.S. relations and to carry out the vital task of guaranteeing national security. The financial authorities were in a dilemma on this point of how to resolve these two conflicting positions. The compromise measures adopted were: 1) to hold the increase to less then 9.7 percent; but 2) to draft a defense budget that would enable acceleration of the Mid Term plan as requested by the United States.

Once the basic policy of budget formulation was decided upon, thereafter the task centered on the selection or rejection of the types and quantities of armament. On 22 December, the Finance Ministry plan was revealed and until the government plan was to be made final a week later, on 29 December, the main types of armament specified in the Mid Term plan were reviewed one after another, but most of the requests were "anticipated actions" for the finance authorities. The Finance Ministry officials, who had stubbornly resisted the 9.7-percent increase, since summer had expressed very tolerant views toward the necessity of strengthening Japan's defense capability. Therefore, the finance officials were in agreement on cooperating, from the financial standpoint, in the early attainment of the Mid Term plan.

Of course, in the United States, there were doubts that the Mid Term plan could be expedited with next year's defense budget. The Defense Agency officials themselves are publicly announcing that "a start has been made toward early attainment of the Mid Term plan," while Finance Ministry representatives repeatedly comment that

"this budget can be fully justified to the United States." Underlying these statements is the above-mentioned process by which the budget was decided upon. Upon reviewing the budget formulation process, one realizes that although there were turns and twists, the defense buildup course, centered on the Mid Term plan acceleration which was proposed at the May 1980 Japan-U.S. summit conference, was adopted practically as officially promised to the United States. In the words of Holbrooke, "through Japan's unique means," a big stride was taken toward defense buildup. Cabinet Secretary Miyazawa stated on 25 January 1981 during the NHK television program, "Political Debate," that "it is not conceivable that the U.S. Government will make any specific requests hereafter with regard to the issue of next year's defense budget." The statement was made with the realization that Japan had expended its utmost efforts, in spite of financial difficulties, and made possible the early implementation of the Mid Term plan, which was actually the focus of U.S. requests.

Unique Characteristics of the '81 Defense Budget

If the 1981 defense budget is analyzed in greater detail, what are its unique characteristics?

First, the increase rate in defense spending is 7.61 percent over the previous year and slightly higher than the 7.60 percent for social welfare expanses. Of course, this is the first time this has happened since the war, and next year's budget, while favoring defense spending--or to be more correct, because of the favorable treatment of defense outlay--is epochmaking in the sense that it is bidding farewell to "lavish social welfare."

Second, the defense budget is 0.906 percent of the GNP, showing a very slight increase over the previous year's 0.900 percent.

Third, the ratio of defense outlay to general accounts is slightly lower than the previous year, but the ratio to general annual expenditures (general accounts minus national debt expenses, and taxes and funds allocated to local governments) which give the true picture of the budget, is 7.49 percent, showing an increase over the previous year's 7.26 percent.

Fourth, as pointed out earlier, a start was made toward early attainment of the Mid Term plan. Concretely, what is meant by the statement that "a start has been made toward early attainment"? (See Table 1).

Since the Mid Term Operations Estimate is a 5-year armament procurement plan starting in JFY 80, the second year is YFU 81. For example, taking the Type-74 tanks listed first under the Ground Self-Defense Forces in Table 1, the procurement objective under the Mid Term plan is 301 tanks. In JFY 81, 72 tanks were approved and together with the previous year's 60, the total is 132 tanks. The total of the 2 years amounts to 44 percent of the Mid Term plan objective.

There will be a 100-percent procurement ratio of the E-2C early warning aircraft and the submarine rescue tenders. Except for the 203 mm self-propelled howitzers, short-range SAM's, C-130H transports, etc, which appear for the first time in next year's budget, the procurement ratio is practically 40 percent overall. Within 2 years of the plan, the procurement ratio will be practically 40 percent and some items will

Table 1.

Procurement Ratio of Main Armament in Mid Term Operations Estimate (JFY 80-81)

| Main Armament | Goal of Mid Term Operations Estimate | JFY 81 Budget | JFY 80 Budget | Procurement Ratio (percent) |
|---|---|---|---|---|
| Ground Self-Defense Forces | | | | |
| Type-74 Tanks | 301 | 72 | 60 | 44 |
| Type-73 APC's | 44 | 9 | 9 | 41 |
| Type-75 155 mm self-propelled howitzers | 140 | 30 | 26 | 40 |
| *203mm self-propelled howitzers | 43 | 6 | -- | 14 |
| 84mm recoilless guns | 852 | 219 | 188 | 48 |
| Short-range SAM's | 24 | 4 | -- | 17 |
| Maritime Self-Defense Forces | | | | |
| *Missile escort ships (4,500-ton class) | 2 | 1 | -- | 50 |
| Escort ships (2,900-ton class) | 10 | 2 | 2 | 40 |
| Submarines (2.200-ton class) | 5 | 1 | 1 | 40 |
| Minesweepers (medium class) | 11 | 2 | 2 | 36 |
| Submarine rescue tenders | 1 | 1 | 0 | 100 |
| Anti-submarine patrol aircraft (P3-C) | 37 | 0 | 10 | 27 |
| Air Self-Defense Forces | | | | |
| Interceptors (F-15) | 77 | 0 | 34 | 44 |
| Support fighters (F-1) | 13 | 2 | 3 | 38 |
| Early warning aircraft (E-2C) | 4 | 4 | 0 | 100 |
| *Transports (C-130H) | 12 | 2 | -- | 17 |
| Advanced trainers (T-2) | 23 | 6 | 4 | 43 |
| *Short-range SAM's | 12 | 2 | -- | 17 |

*Denotes armament appearing for first time in JFY 81 budget.

reach 100 percent. Thus, although the condition is for "greater efforts after JFY 82," the Defense Agency assesses that a start has been made toward early attainment, i.e, to complete the plan "within 5 years" instead of taking the full "5-year period." To protect the sea lanes (maritime transportation routes), submarines, missile escort ships and even C-130H transports, which can blockade the three straits, including Soya, by laying mines from the air, are going to be procured. Since the protection of the sea lanes and blockade of the three straits are items strongly demanded by the United States, the armament to be procured can be said to meet U.S. requests.

The view is gaining ground among concerned authorities that the defense spending increase rate, which was held to a single-digit figure in the JFY-81 budget, must inevitably increase to a double-digit figure.

The increase is expected because the deferred payment system, which is a special characteristic of arms procurements, was used, through the extent to which "early attainment of Mid Term plan" is speeded up will also affect future increases.

For example, again taking the Type-74 tank in Table 1 as an example, 60 were procured in JFY 80 but the number was increased to 72 in JFY 81. With the main armament, there are many cases where noticeable increases were made in JFY 81. Although armament was approved in large quantities, defense spending was kept relatively low. The trick is the deferred payment system. In other words, only a small portion of the arms procurement expenses were included in the JFY 81 budget, and the balance was deferred until later years.

If this system is used, even if arms procurement on a huge scale is approved, the actual cash outlay can be held to a minimum for the year concerned. This system is possible because several years are required from the time an order is placed until the completion, as in the case of large items like escort ships. Of the 752.5 billion yen approved for procurement of new armament in next year's budget, the actual amount covered in next year's budget is about 45 billion yen, and the remaining 707.5 billion yen will be carried over as deferred payment. A total of 1.349 trillion yen is carried as a "charge account" for arms procurement. Furthermore, this charge account is increasing annually.

Through use of this so-called loan type method, next year's budget was kept below the "9.7-percent increase," but to pay off the charge account, it seems that a double-digit increase in JFY 82 is unavoidable.

Fifth, the ratio of spending for frontline armament (naval ships, aircraft, tanks, etc) has increased in the defense outlay. In JFY 81, frontline armament expenses amount to 458 billion yen, an increase of 17.7 percent over the previous year, and accounts for 19.1 percent of the defense expenditures. The ratio to defense spending is as follows: 17.1 percent in 1975, 14.9 percent in 1976, 15.8 percent in 1977, 15.5 percent in 1978, 16.5 percent in 1979, 17.5 percent in 1980, and it suddenly approaches the 20 percent level in 1981.

Adequate Procurement of Frontline Equipment

As the foregoing shows, a careful analysis of the defense outlay reveals that emphasis was placed on adequate procurement of frontline equipment and that the defense budget was given favorable treatment. Although the 9.7-percent increase did not materialize

as desired by the Japan-U.S. faction supporting military buildup, it would be erroneous to say that in the struggle between the ideology of the financial authorities who consider financial reconstruction as their supreme task, and the ideology of the Japan-U.S. military buildup faction, the former ideology won out. This would be like not seeing the forest for the trees and would be a false assessment of the whole situation. The main theme in this year's defense budget preparation was outwardly reconstruction of finances, but in spite of the financial straits, the aim was to put Japan's military buildup on the proper course. Again, borrowing the words of Holbrooke, "in Japan's unique way," the strategic moves were made to realize the aim by "making the defense budget appear smaller than it actually was for the nation's population."

What significance does this have for Japan in the 1980's? In the final analysis, wouldn't the priority distribution of national funds to the Japan industry-government-military combine stimulate its real functions? A strong impression is given that the Japan industry-government-military combine has finally begun to get underway. The Japanese combine, which emerged in place of the "Japan, Inc" which functioned as the strategic headquarters for Japanese operations in the 1970's, has placed in the forefront national security as a strategic objective for the 1980's, and harbors deficiencies in the scale of military buildup and in military industries. It also differs in a number of ways from the U.S. military-industry combine. These are special characteristics of the Japanese combine (for details, see this author's article, "Emerging Industry-Government-Military Combine," in the January 1981 issue of this magazine).

Naturally, military power is not the only weapon in maintaining national security. A significant feature of the JFY 81 general account budget is that, together with the defense outlay, ample funds were distributed for comprehensive national security expenditures, such as gaining energy sources (17.3 percent increase over the previous year), giving economic aid (11.2 percent increase), etc. In other words, the basic strategies of the Japan industry-government-military combine are: 1) deficiency in the defense share will be covered by strengthening economic cooperation; and 2) instability of oil supply caused by the Mideast crisis will be made up through development of alternate energy sources. This course of action meets U.S. expectations. One of the concrete manifestations is the government's rapid policy decision on 23 January that as the new mid-term objective of Overseas Development Aid [ODA], the grant for the 5-year period starting in 1981 would be "more than double" that of the 10.7 billion dollars for the preceding 5 years.

First Year of the Industry-Government-Military Combine

The financial authorities are designating 1981 as the first year of financial reconstruction and to paraphrase their statement, it can be said that 1981 is also the first year of the formation of the Japanese industry-government-military combine. However, as mentioned at the beginning of this article, what is the reason for the unexpected coolness of the Mitsubishi Heavy Industries Ltd which plays a leading role as a weapons maker in the "industry" element of the industry-government-military combine? It is true that as the company's official in charge of weapons department pointed out, only two F-1 support fighter aircraft would be built, but Mitsubishi also manufactures the T-2 advanced trainers and six of these aircraft have been authorized. Mitsubishi Heavy Industries is also responsible for the F-15's, the showpiece aircraft of the Mid Term plan, and because 34 aircraft were approved for the previous year, none was authorized for 1981, but new orders are expected in the 1982 budget. Mitsubishi is also manufacturing the large order of 72 Type-74 tanks specified in the JFY-81 budget.

The Defense Agency comments that "on the whole, Mitsubishi Heavy Industries, Ltd should have no complaints." Japan's weapons makers, which preach easing of export restrictions on armament at every opportunity and acheme to use such a breakthrough to stabilize and expand the military industries, are in a state of constant dissatisfaction. At any rate, because the confusion spread that the 9.7-percent increase in the JFY 81 defense budget would be implemented, the final outcome did not meet the expectations of the weapons makers. To satisfy the armament makers, military spending would have to be limitless.

It is anticipated that the Japanese industry-government-military combine will adopt a policy of gradual progress in its political tactics in order to realize its strategic goals. The LDP did win a stable majority and on 24 October, in the midst of the defense budget preparation, Prime Minister Suzuki met with Chairman Sasaki of the Democratic Socialist Party [DSP] and they mutually agreed on the principles of defense buildup. From the foregoing, it can be seen that though the DSP has openly become a member of the combine, the political base is not so strong that the government can bulldoze its strategic objectives through. Prime Minister Suzuki's strategic idea is that "it takes time to land a big fish." However, to land a big fish is nothing more than a strategy for the nation's people, who must be burdened with an incalculably large increased burden.



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SCIENCE AND TECHNOLOGY

EPOCHMAKING SUPER LSI

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 17 Mar 81 p 14

[Article: "ECL Masterslice Chip for IBM-Compatible Computers Announced by Mitsubishi"]

[Text] Mitsubishi Electric (President Jinhachiro Katayama) has developed a high speed bipolar super LSI logic circuit (ECL) with 2,500 gates per chip which makes it the highest class degree of integration chip in the world with delay time of 0.8 nanosecond. This logic circuit is a master slice which can be used in various ways by altering the internal distribution lines, and the power-delay time product is 0.44 PJ (picojoules) which makes it the smallest in the world in this respect which when used in a computer can be readily accommodated by present heat dissipation technology. This company plans to use this super LSI chip in the next generation large and superlarge computer (IBM adaptible) and also anticipates wide use in high speed and miniaturized applications such as in testers, measurement equipment, and communication equipment.

2,500 Gates, 0.8 Nanosecond

A large computer is a system of several ten thousand logic circuits (logic) referred to as gates, and this system is divided into a number of LSI logics. Now, even when the speed of the individual LSI is very fast, too many distribution lines serve to slow down the overall speed. At any given circuit speed, minimizing the length of the distribution lines and packing as much logic circuits into the LSI will serve to increase the speed of the system. This is why recently there has been the emergence of the superlarge computer equipped with LSI of very high degree of integration such as, for example, the M280H just announced by Hitachi, Limited with 1,500 gates and the ACOS 1000 developed by Nippon Electric with 1,200 gates LSI.

Now, there is increasing demand for electric power with increasingly high degree of integration, and the LSI can burn up if heat discharge is disregarded. There is need to install cooling devices such as fans and cooling water, but there are limitations to the degree of cooling which can be effected. High speed without consuming too much power is considered the performance index of bipolar logic LSI, and this value is represented by the power-delay time product (energy efficiency per unit gate, 1 PJ = 1 nanosecond x 1 milliwatt). Just how to minimize this product is the challenge to the industry. The unit announced recently is said to come below the 1 PJ level.

The master slice developed by this company is a 2.5 micron 64 K plus memory super fine fabrication technology finished product in the form of a bipolar IC which incorporates 21,952 elements placing it in the top class in the world together with 2,500 gates which also places it in the top of the world status where degree of integration is concerned.

At the same time, its speed is such that with gate power consumption of 0.5 milliwatt it operates at the subnanosecond speed of average delay time of 0.83 nanosecond (a 5-7,000 gate item was announced this year, but its speed was 2 nanoseconds and slow). As a result, the power-delay time product is 0.44 which places it at the top of the world.

This master slice was adapted to a 1,983 gate 9-bit memory register circuit and enclosed in a 224 pin plug-in package whereupon its power consumption was said to be 1.74 watts. This level of heat production can be adequately handled by heat dissipation technology currently in use.

The new technology used for producing this master slice utilizes 1) ISAC process (name of bipolar manufacturing process of this company) to divide the oxide film in which total ion injection technology is activated to attain a world emitter structure, miniaturization of elements, and reduction in parasitic capacity; 2) by joint use of the input transistor of the neighboring basic gate, the use efficiency of the input transistor is enhanced in the layout design; 3) use of low logic amplitude and new buffer circuits to bring about low voltage circuit design and realize maximum 2.5 watt low power consumption; and 4) use of the world's first two-stage construction inner lead package type multiple pin technology.



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SCIENCE AND TECHNOLOGY

## STATUS OF SUPER LARGE SCALE INTEGRATED CIRCUITRY DISCUSSED

### 64 K RAM

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 1 Jan 81 p 7

[Text] The super LSI (super large scale integrated circuitry) era has finally arrived. IC has already infiltrated all areas of industry, and the semi-conductor incorporating all its peripheral equipment has developed into a large basic trunk industry. Super LSI technology is the member which has the role of innovating the IC production process and further expanding the utilization area. The 64 K RAM is called the first generation super LSI. The 20 or so large semiconductor makers in Japan and the Western world have all completed research and development on this first generation super LSI and plan to enter and grab a share of the market.

Early Fireworks Just With Sample Shipment

Just how to nurture the super LSI area of the semiconductor industry and bring out its strength is the strategic theme of all the leading countries. That is because the smooth transition from "16 K" to "64 K" displayed the power to drag along with it the world's electronic industry. This is why the struggle for supremacy among the large electronic makers of Japan and the Western world is so fierce.

The super large computer ACOS 1000 which Nippon Electric will market this fall will have a memory capacity maximum of 64 megabits. If this were comprised completely of the 16 K RAM (instantaneous write-in and readout memory), 32,800 such units would be required. This number was reduced to 8,200 by using the 64 K RAM. If just one IC of a computer should be damaged, a major catastrophe might occur, such as the incident last year at the supreme defense command of the United States in which a missile carrying a hydrogen bomb was stopped just before it was to be launched against the Soviets or the incident at the central telephone office of the city of Kobe in which all the telephones in Kobe were paralyzed for a whole day. This is why the super LSI makers and users put in half a year or more to rigorously test their units. These test samples are called engineering samples.

American makers including Motorola and Texas Instruments and Japanese makers such as Fujitsu, Hitachi Limited, Nippon Electric, Tokyp Shibaura Electric, and Mitsubishi Electric started sending out engineering samples of 64 K RAM to many of their influential customers. There are many computer makers in the United States which buy large lots of IC, including companies such as Burroughs, Sperry Univac, Honeywell, Digital Equipment, Hewlett Packard, and Data General. The battle to become the leader in supplying 64 K RAM to this large market is really heat up.

Decrease Malfunctions and Lower Costs

Yasuo Tarui, who was previously a director of the Super ISI Technology Association Joint Laboratory, said: "A single chip is an assembly of more than 100,000 elements." A chip is usually a single silicon crystal a few millimeters square, but there is also the large unit produced by Japan Telegraph and Telephone Public Corporation measuring 3 inches in diameter (76 mm) which uses the entire crystal to provide 4 megabits ROM (special memory for reading out 4 million bits). The line width of the circuits inscribed in the silicon of LSI of the past was a minimum of 5 microns (a micron is 1/1000 of a mm) while a 64 K RAM has reduced this width down to the 3-micron level. There are some who refer to this product as super LSI because of this superfine line width, and a 64 K RAM is an assembly of about 150,000 elements, so that this degree of integration also warrants the name super LSI.

The 16 K RAM, with some 35,000 elements, is roughly the same size as the 64 K RAM, so that a memory device using the 64 K RAM with the same memory can be made just about one-fourth as large. Electronic equipment suffers the greatest incidence of malfunctions at the joint sections, and an enhancement in degree of integration of four times should reduce the probability of malfunctions to one-fourth. At the same time, the operating speed of an IC is faster the shorter the pathways through the unit. A highly integrated circuit will enable cutting down the power consumption, and it may be said of LSI that "smaller is better."

Another expectation semiconductor makers are anticipating of super LSI is its effect in reducing costs. IC uses repeated photographic treatments to create several tens of thousands of elements in one step. When a 5 mm square LSI is formed in a 4-inch diameter (102 mm) silicon wafer, simple calculation will show that more than 300 such LSI units can be made, but if the size is cut down to 3 mm square, close to 900 such units can be produced. As long as the problem of rejects can be resolved, it is not a dream that a three-fold production can be attained by the same process. By putting the capabilities of four units into a single unit, the metal used for containers and external terminals can also be reduced to one-fourth.

The fly in the ointment at present where the 16 K RAM is concerned is that only about 30 percent of the product is serviceable, while the same figure is at best 7-8 percent for the 64 K RAM. This is why where the 16 K RAM cost about 2-3 dollars apiece, a 64 K RAM costs 20-30 dollars. It is thought that it will be at least 1982 before the price of the 64 K RAM will be at a level advantageous to the user. The world market for the 64 K RAM is expected to rise to "1.8 billion dollars throughout the world (about 360 billion yen") (BUSINESS WEEK magazine of the United States) while the super LSI market in Japan is expected to be "500 billion yen in 1985 and 1 trillion yen in 1990" (survey department of Mitsui Bank), indicative of the large potential market.

Promote Research Through Joint Government and Private Efforts

The joint government-private project on super LSI basic technological development was initiated in JFY 76 and completed in March 1978. The government subsidy to this project was 30 billion yen, and the private sources accounted for 40 billion yen for research. Since then the super LSI Technology Research Group (the seven companies, Fujitsu, Hitachi Limited, Nippon Electric, Tokyo Toshiba Electric, Mitsubishi Electric, Combined Computer Laboratory and Nippon Electric-Toshiba Information System)

started on a 3-year project from 1980 through 1982 to complete the next generation computer equipped with super LSI. The initial year's budget was 10 billion yen.

The Nippon Telegraph and Telephone Public Corporation, which is playing a major role in super LSI development together with the Ministry of International Trade and Industry, started construction of a large laboratory intended for use in super LSI development. This building is being constructed at the city of Atsugi in Kanagawa Prefecture at a cost of 23 billion yen and is expected to be completed in 1982. This public corporation hopes to install a fully 64 K RAM computer and electronic exchange this year.

Aside from the joint government-private research effort, other independent super LSI development efforts on the party of private interests are appearing. The "independent route" industry is one such effort. Matsushita Electronic Industry is constructing a "super LSI plant" on the gounds of its Nagaoka Plant (Nagaokakyo city in Tokyo Prefecture) at an outlay of 20 billion yen. Sharp is investing 10 billion yen to add to its No 3 plant in Tenri city in Nara Prefecture, and plans an additional 15 billion yen funding. There is also the super LSI plant of Oki Electric for which 30 billion yen has been allotted, and this plant now under construction in Miyazaki is expected to start actual operation this fall. Sanyo Electric has assembled the technologists of the Sanyo Group at its Gifu plant where there is a super LSI technology development center at which practical development of "1.5-micron-width" technology is under development.

The super LSI production facility is undergoing major changes from the LSI production facility of the past. The mask (original circuit diagram) which used to be prepared by an optical process is now being replaced by an electron beam engraving facility. The photographic etching process has been changed from the wet process using a chemical solution to a dry process using gas. The implanting of impurities in silicon is mainly through an ion beam implantation method in place of the diffusion furnace. The placement of this thin membrane on the silicon surface is now carried out by sputtering (formation of a thin crystal layer) device or a CVD (chemical vapor phase deposition) instead of the usual deposition device used before. All of these unit costs run into the hundred million class, and a single electron beam facility can run up to several hundred million yen.

Practical 1 Megabit RAM Is Possible

Since a 3-mm-wide line width is used, the presence of a speck of dust or other foreign material will render a unit unsatisfactory. This is why clean rooms have to be set up in the plants (rooms where the air is filtered and purified), and super clean water is used. Because of the particular production system it employs, the various types of equipment and materials used in a super LSI production effort are creating a whole peripheral industry to provide the necessary items. The 11 large makers in this country put out a total of 170 billion yen for facilities in 1980, when the semiconductor makers turned over all their plants to the production of super LSI, and this was a 50-percent increase in outlay over the preceding year. If to this sum are added the outlays of Texas Instruments and Motorola which are promoting production in Japan and Nippon Denso and Suwa Seiko which are planning LSI production for use in their own products, the total will be considerably larger.

To be sure, this year finds the investments coming closer to the practical stage than last year, and many products are appearing on the market. In addition to the 64 K RAM,

various 64 K RAM (special memory readout), 4 K super high speed bipolar RAM, and 16 bit and 32 bit parallel treatment microcomputers have made their appearance. The American Intel Company, which is an internationally known maker of microcomputers, is publicizing the 16 bit to 32 bit family of microcomputers and it hopes to display its full line of computers in the near future. It is said that these microcomputers have the same capabilities as the large computers of the previous generation. It is possible that a 256 K RAM with four times the degree of integration of the 64 K RAM and a 1 megabit RAM of one-fourth scale may also become practical in the eighties. Super LSI technology has entered the stage of the "hundred flowers campaign."

Figure 1. Examples of 64 K RAM Products (MOS Dynamic Type)

64KRAM (MOSダイナミック型) の製品例

| 1 メーカー名 | 2 製品番号 | 3 性 能※ | 4 出荷開始 |
|---|---|---|---|
| 5 ○富士通 | MB8264 | 150/200 | 6 1980年 |
| 7 ○日立製作所 | HM4864 | 150/200 | 〃 |
| 8 ○日本電気 | μPD4164 | 150/200/250 | 〃 |
| 9 ○東京芝浦電気 | TMM4164C | 150/200 | 〃 |
| 10 ○三菱電機 | M5K4164S | 150/200 | 〃 |
| 11 ○沖電気工業 | MSM3764 | 150/200 | 12 1981年 |
| 13 ○モトローラ(米) | MCM6665 | 150/200/250 | 6 1980年 |
| 14 ○テキサス・インスツルメンツ(ク) | TMS4164 | 150/200/250 | 〃 |
| 15 ○インテル(ク) | 2164 | 100/150/200 | 12 1981年 |
| 16 ○モステック(ク) | MK4164 | 120/150/200 | 〃 |
| 17 ○ナショナル・セミコンダクター(ク) | NMC4164 | 120/150 | 〃 |
| 18 ○フェアチャイルド(ク) | F64K | 120/150/200 | 〃 |
| 19 ○シグネティックス(ク) | 2164 | 60/80/120 | 〃 |
| 20 ○アドバンスト・マイクロ・デバイシズ(ク) | Am9064 | 100/150/200 | 〃 21 |
| ○IBM(ク) | — | 440 | 自社用 |
| ○ベル研究所(ク) 22 | — | 170 | 〃 |
| ○シーメンス(西独) 23 | HYB4164 | 150 | 12 1981年 |
| ○ITTセミコンダクターズ(ク) 24 | ITT4164 | 150/200 | 〃 |
| ○インモス(英) 25 | — | — | 〃 |

26 ※読み出し書き込み時間、単位ナノ秒 (十億分の一秒)

Key:

1. Name of maker
2. Product number
3. Capacity
4. Start of sale
5. Fujitsu
6. 1980
7. Hitachi Limited
8. Nippon Electric
9. Tokyo Shibaura Electric
10. Mitsubishi Electric
11. Oki Electric Industry
12. 1981
13. Motorola (USA)
14. Texas Instrument (USA)
15. Intel (USA)
16. Mostec (USA)
17. National Semiconductor (USA)
18. Fairchild (USA)
19. Signetechs (USA)
20. Advanced Microdevices (USA)
21. for own use
22. Bell Laboratory (USA)
23. Siemens (West Germany)
24. ITT Semiconductors (USA)
25. Inmos (UK)
26. *1 nanosecond unit for readout and write-in time (1 billionth of a second)

Statement by Vice President Jun Ouchi of Nippon Electric

Super LSI (VLS very large scale + IC) is a term which was coined in Japan but now has come into use throughout the world, indicating that Japan's technology has risen to the level of the top group in the world. Following the technology of producing

fine products, the subjects from now on will be to perfect methods of design and examination. The examination of super LSI can be likened to the search for troubles within a computer large enough to occupy an entire building without opening the doors, but in order to go into mass production, we have to acquire the technology to be able to do so.

The super LSI age will probably continue to the end of this century. More precisely, this will be the age of super LSI "technology" or the age of super fine fabrication. It is not necessary that all IC compress 100,000-1 million elements into the space of a few square millimeters. On the other hand, superfine fabrication technology influences the production process of all IC. This is because there is demand for even smaller, faster, higher reliability, and lower cost IC. The stage of production of 64 K RAM in the quest for the most economical and optimum degree of integration was attained by an annual doubling rate. The developments will become even more difficult as we now approach the submicron (less than one micron) level, and I believe that the situation will not be as hectic.

## Super High Speed Elements

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 8 Jan 81 p 5

[Text] Research has been started on technology to control the production of the material used as the base plates of super high speed elements of silicon semiconductors operating at extreme limits at atomic levels. These efforts are directed at the development of elements variously referred to as super lattice elements, three-dimensional circuit elements, perfect crystal elements, or high degree of electron transfer transistors, and the development of the base material is the key to the practical state of the element. Research on these elements has just started at the fringes in the United States, and competitive research has just seen its beginnings in Japan.

Nippon Electric, Hitachi Limited, Tokyo Shibaura Electric, and Mitsubishi Electric are directing their research efforts on super lattice elements and three-dimensional circuit elements. The Ministry of International Trade and Industry in its 1981 budget activated the Next Generation Industrial Foundation Technology Research and Development System under the Agency for Industrial Science and Technology and is planning to support research and development on a broad front.

Super lattice elements can be used to enable super high speed responses several dozen times faster than present elements and can also be used to receive visible light, ultraviolet light, and x-ray radiations. The crystal which is the base of a semiconductor has atoms arrayed in regular order, and this network-like array is called the lattice. Dr Reona Ezaki, working at the IBM Laboratory in the United States, stacked alternate layers of potassium and arsenic and aluminum and arsenic in one hundred-millionth millimeter thickness and test produced elements with the same lattice configurations as single crystals.

Single crystals can be produced comparatively easily with a single element such as silicon or a single compound such as that of gallium and arsenic, but it is extremely difficult to prepare perfect single crystals of two or more compounds. It is clearly evident that if the production of a "super lattice state" can be achieved, a very high speed element is possible. It is said that IBM is using a computer to control the deployment of molecules and thereby control crystal growth.

A three-dimensional circuit element is an attempt to go from the planar array of elements which has been the practice up to now to a stereo arrangement of the circuit elements. A stereo deployment of circuit elements involves the stacking together of crystal base plates one after another. The technology whereby these base plates can be stacked together with the molecules in perfect array is called epitaxy, and the stacking together of base plates with differing properties has experienced great difficulty in the past.

At the Massachussetts Institute of Technology in the United States, a technology called "grapho (notched) epitaxy" has been developed in which a laser beam is used to cut notches into the base plate over which crystals are grown, and this technology is being applied in attempts to alternately sandwich silicon single crystals and silicon oxide layers and obtain three-dimensional integrated circuits.

Prof Junichi Nishizawa of Tohoku University has been researching perfect crystal elements, and the Science and Technology Agency in the new system it is projecting for 1981 is considering this subject for inclusion in its project of promoting structural science technology. Many semiconductors are prepared by adding a controlled amount of impurity such as phosphorus to a pure base plate such as silicon. According to Professor Nishizawa's thesis, the occasional substitution of phosphorus of much smaller diameter than the silicon atom is bound to cause some loosening in the crystal structure. This loosening may be one of the factors responsible for degradation in properties of the crystal. Now, the controlled insertion of an element such as tin with a larger atomic diameter than silicon will make up for the loosening caused by the presence of phosphorus.

Fujitsu succeeded in test producing the high degree of electron transfer transistor, and this is an effective element in the research subjects of hte large project "super computer (a high speed science and technology computation unit with speed a thousand times greater than the present computers) development" which the Agency for Industrial Technology is starting in JFY 81. This element uses a base plate of gallium and arsenic compound over which is formed a compound of gallium, aluminum, and arsenic. The flow of electrons at super high speeds at the junction of these two compounds is utilized. This company is aligning a single atom layer per second in vacuum in the relaxed molecular beam single crystal growth (epitaxy) technology it is developing.

## Construction of Clean Room

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 23 Jan 81 p 1

[Text] The large construction companies have started to zero in on obtaining comprehensive orders for design to completion in the construction market involving construction for the leading technologies such as IC (integrated circuit) plants and biochemical research laboratories. These structures have to be provided with dust-free and vibration-free capabilities and require micron-level precision, and a comprehensive array of interior and exterior finishing plus air conditioning must be installed. This is an area which is being called fine building (high add-on value building). As industrial structures are taking on this high level of sophistication, the construction companies are going all-out in the new markets this tide is producing, and they are increasing their development type orders which are pushing technological strengths to the foreground.

Dust Prevention and Vibration Prevention to Extreme Limits

The industrial world is seeing great activity in the electronics area as represented by super LSI (large scale integrated circuitry) and the life sciences area as represented by genetic engineering as the expected leaders in the coming order. The tying together of these activities with the activities of the construction companies is a common practice among these companies. That is to say, where the investment in semiconductor plants has been increasing at the rate of close to 40 percent per year for the past few years, the development of systems to receive orders for construction of these buildings is also accelerating.

Takenaka Komuten has set up a system which will construct a semiconductor plant starting with the siting diagnosis and including design and construction for which it has formed a technology business team of IC plant specialists. Starting with the Oki Electric Industry's Miyazaki plant, this company has to date designed and constructed seven IC plants, and it has used this experience to systematically accululate data on IC plants so that it can design the optimum production environment through the unique capability it has developed.

The main strength of this capability includes the prevention of very fine vibrations and the air cleaning technology. Since the structural environment must assume greater levels of cleanliness the higher the degree of integration of the IC, a super-fine vibration simulation system has been developed which is run by computer while a comprehensive cleaning technology including air conditioning volume, filters, and check of air contaimination sources is being developed.

The Taisei Kensetsu Company recently established an IC construction development team comprised of a technological development department, a design department, and an engineering department. This company has already finished five projects in which only construction was involved and one semiconductor plant in which both design and construction were involved, but it has already reorganized the technological system it had been operating in anticipation of the oncoming super LSI era in which more precise dust and vibration control can be exercised together with a more advantageous design system.

In addition, Shimizu Kensetsu has also developed about 15 years' experience (including seven design and construction projects) on semiconductor parts production plants centered on LI and has acquired a "fine vibrations diagnostic system" using a mobile measurement vehicle as part of its arsenal to fight for orders. Kashima Kensetsu has in its background the design and construction of the pioneer plant devoted solely to IC production, the Kofu Business, and is actively operating in the semiconductor-related market.

Clean technology is the base of the "IC strategy" of all of these companies. This is a technology which was developed in line with medical and pharmaceutical products production and hospital construction. Because the production of precise machinery and precise chemicals now requires a degree of cleanliness on a par with that of the medical area, the construction has been changed to one in which not only the items which "enter" but the whole plant is provided with a unified high performance which must always be assured.

At the head of this present flow in the market area is an item which the various companies are keeping their eyes fastened on, and that is the so-called bioclean room as represented by those used in an animal experimental laboratory. The Ministry of Health and Welfare will introduce the GLP (appropriate standards for experimental facilities) in the area of the medical and pharmaceutical industry where an experimental facility for preparing data necessary for permit applications on medical and pharmaceutical products will set up appropriate standards, and the various medical and pharmaceutical companies are hurrying to fall in line.

At the same time, chemical companies and food companies are looking toward the growth of biochemical technology and are directing their research and development activities in that direction, and the entry of new construction groups into this area can be anticipated. Should genetic engineering research become very popular, there may develop a need for a superfine sealed type laboratory to guard against biohazards (formation of abnormal life).

When the activities of the different companies are reviewed, Shimizu Kensetsu has entered into construction of biochemical laboratories for Showa Denko and Toyo Kozo, while Kashima Kensetsu has started design and construction of safe laboratories for Taisho Pharmaceutical and Yamanouchi Pharmaceuticals Company. Taisei Kensetsu has already designed and constructed 15 buildings housing animal laboratories at a total cost of 7.2 billion yen, and it is eyeing a capability for the construction of higher order experimental facilities which will conform to the GLP.

One of the reasons the large construction companies have put so much effort in this area is that "more than 60 percent of the fund assigned to a clean room is for equipment, and the add-on value is high as a result," (Hiromu Kitamura, head of the design department of Taisei Kensetsu). In addition, where there is a trend for the general type of construction contracts to end up as a discounting contest, there is an area where the competition is based on technological strength, and the various companies are eyeing "escape from an honest poverty industry" by developing this new market capability.



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SCIENCE AND TECHNOLOGY

# AIRCRAFT INDUSTRY AIMS AT MAJOR EXPANSION

## MITI's Policy

Tokyo MAINICHI SHIMBUN in Japanese 8 Feb 81 p 7

[Article: "Development of MTX (Intermediate Jet Trainer) as Leverage; Aiming at Independence of Aircraft Industry; MITI; Technological Development in the 1990's"]

[Text] The new domestic development of the intermediate jet trainer (MTX) for the next generation is scheduled to be undertaken by civilian aircraft makers in fiscal 1981 commissioned by the Defense Agency. The Defense Agency is said to be procuring 200 of them. In view of this move the Ministry of International Trade and Industry (MITI) has decided on a policy of promoting the technical development of Japan's aircraft industry in the 1980's by using as a leverage the development of defense aircraft led by MTX. The ministry is planning to make the aircraft industry as a vanguard technology industry self-dependent in the 1990's. Thus, the ministry intends to work on the Defense Agency so as to also shift to domestic production the large transport planes which are scheduled to be imported from the United States following MTX. Given the situation where the increased defence spending is being strongly criticized, resistance is expected from the opposition parties against the ministry's policy for developing aircraft by taking advantage of this defense demand.

It is accepted by the industry as standard that the development of a new aircraft can be undertaken once every 10 years, because it requires huge sums. The current orders by the Defense Agency for a new development of MTX have been placed after about 10 years since research and development of the F1 support fighter were undertaken in fiscal 1972. As for civilian aircraft, no surely domestic development has taken place since the last domestic transport plane, YS11 (its first flight was in 1963). On the grounds that the development and production of the next generation, and the next generation after that, civilian transport planes (YX and YXX) are too risky for a single nation to undertake, it is now being shifted to joint international development.

Also, as for the F15, the latest jet fighter of the United States, and P3C, the anti-submarine reconnaissance plane whose introduction has already been decided, only licensed production (that is, domestic production after receiving designs and technical know-how from U.S. makers) is being carried out.

The ministry assesses that in order to make the aircraft industry self-dependent it is important not to have disruption between the two projects for the development of YX and YXX and the plans for the development of defense aircraft, thus avoiding interruption in the demands for aircraft. Especially since the design and development of YX have passed the peak, the ministry views that the significance of the research and development of MTX as an underpinning of the demands for aircraft is great.

The Defense Agency has decided to develop MTX because T1 and T33 used as intermediate trainers have become obsolete. MTX is expected to be developed as a two-seater plane with a speed of 0.9 mach, equipped with two domestically built engines. The research and development of MTX will begin in fiscal 1981 and its procurement will be started in 1989. The costs for its research and development and for its mass production (about 200 planes) are estimated to be from 230 billion to 290 billion yen. The Defense Agency plans to decide on who will receive the order by this summer or so.

Following MTX, the ministry intends to demand the domestic development of a large transport plane for defense as well. The Defense Agency is planning to purchase 12 C130-type large transport planes from the United States, according to the "Medium Term Defense Program" (The Defense Agency plans for procurement for the 1980-1984 period). But the ministry's thinking is that it should be shifted to domestic development sooner or later. At the defense conference held last December which decided on the procurement of C130's, MITI Minister Tanaka demanded the domestic development of transport planes by stating "We will soon need a large number of large transport planes, and the development of a new plane will require 7 to 8 years. Therefore, we should start making preparations now."

MITI judges that "the demands for defense aircraft offer the last chance for achieving the independent development of domestic planes" because as of now the complete domestic development of civilian aircraft is difficult. Therefore, it is the policy of the ministry to strongly work on the Defense Agency for shifting its policy to the domestic development of large transport planes for defense in order to bring about the self-dependence of the aircraft industry in the medium to long-future.



Future of Industry

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 10 Feb 81 p 8

[Article: "This Year's Prospect of Aircraft Industry; Not To Be Hasty in YXX Negotiations; Efforts To Build Up Technological and Managerial Capability"]

[Text] In the aircraft industry, the licensed domestic production of the F15 combat fighter and P3C anti-submarine reconnaissance plane and then the large government and civilian projects for large planes such as YX (Boeing 767) have been put on a right track. The plans for the development of new YX (YXX, the next-generation civilian plane) and MTX (the next-generation intermediate

trainer) will be put into effect in fiscal 1981. As large-scale projects which will determine the direction of Japan's aircraft industry in the 1980's have now been all lined up, this will be an important year for building a foundation for the aircraft industry. In view of this, Chairman Ohara Eiichi (chairman of Fuji Heavy Industries) of the Japan Aerospace Industries Association has been asked to make comments on the prospects for this year's aircraft industry. (The questions were asked by the writer of this column.)

Question: As large-scale government and civilian projects have been well lined up, some are saying that it is finally the aircraft industry's turn to get started....

Answer: As in the 1981 government budget expenditures related to YXX and MTX have been appropriated, we will see this year the concrete development of various projects. Now that the money has been appropriated, we can no longer remain idle. Because the industry is required to utilize civilian vitality with responsibility, now is the time when we can demonstrate how well the industry manages it. Works related to the Defense Agency cannot be allowed to make exhorbitant profit, but they should bring moderate profit. However, a large risk is involved in the civilian aircraft industry. Moreover, there is little technological and managerial capability in the aircraft industry in Japan. It is necessary for us to rapidly build an independent set up in the aircraft industry looking ahead into the future.

Question: Negotiations for YXX seem to have made considerable progress. When do you think it will finally be settled?

Answer: In this period when we need to develop civilian demands, it is timely that negotiations for international cooperation are being concretely advanced. But since YXX planes are to be presented to the market from 1985 to 1990, we need not be so hasty about it. Now we are in the stage in which we must decide what kind of agreement we should have with the Boeing Company of the United States and Vocker Company of Holland. It is only natural that it will take longer as we proceed with negotiations for details. Thus, it is not that we must absolutely conclude negotiations before the deadline of March.

Question: Some report that Boeing is careful about YXX, even though it is interested in it, because it wants to avoid a conflict with the existing development plans.

Answer: Boeing is certainly cautious, and its business plans are scrupulous. Our industry is not hasty about it either. With the management and technology lessons obtained in connection with the YXX plans, we must conduct rational negotiations. For it we must have our own plans as to what kind of market we can expect, what kinds of aircraft we need, and what kind of technology we require for it. Then we must endeavor to fully utilize our own expertise.

Question: Those who are involved in the Anglo-Japanese joint development of jet engines are naturally interested in the progress of the YXX plans. Is there coordination between the two?

Answer: If we change the number of seats in the aircraft, we must change engines too. It may not be immediate, but I believe the coordination will be carried out sooner or later.

Question: In relation to the Defense Agency, they are ready to proceed with the development of MTX, following F15 and P3C.

Answer: The significance of the domestic development of MTX is great. The reason is that it has been more than 10 years since Japan developed the entirety of an aircraft domestically. This will encourage the technological development of not only the body manufacturers but also parts manufacturers.

Question: "Arms export" is being vigorously discussed. Don't you believe that there will be stronger restrictions placed on the export of parts by the aircraft industry?

Answer: Arms export is not something that the industry can decide one way or the other. We can move only within bounds defined by laws. In European nations the defense industry forms the base of other industries. But Japan is in a totally different situation. We cannot help the restrictions placed on the joint development of weapons either. I think the only thing for the aircraft industry to do is to develop civilian demands from now on.



## Japan-Sweden MTX Cooperation

Tokyo NIHON KEIZAI SHIMBUN in Japanese 17 Feb 81 p 1

[Article: "MTX Jet Engines; Volvo Inquired About a Joint Development With Ishikawajima-Harima"]

[Text] Executives of Volvo, an influential entrepreneur group of Sweden with its automobile manufacturing at the center, have revealed that they are proposing a joint development of a jet engine for military aircraft to Ishikawajima-Harima Heavy Industries, Kawasaki Heavy Industries and Mitsubishi Heavy Industries. The Volvo group is developing a jet engine jointly with Garret Corporation of the United States. On the basis of this engine the Volvo group is proposing the joint development of a jet engine for MTX (the next-generation intermediate trainer) whose research and development the Defense Agency is scheduled to undertake in 1981. As in the case of the fuselage, the independent development of the engine for MTX by domestic manufacturers is hoped for. Research for its test fabrication is already under way. But the Defense Agency has also been confidentially scrutunizing the adoption of the engine developed by Volvo-Garret. Because the Volvo group has proposed a joint development which has a tremendous advantage in terms of development costs, amidst this attention is currently being focused on how the Defense Agency and related industries would respond to the proposals.

Volvo-Frigg Motor Company, the jet engine division of the Volvo group, has joined since 1978 with Garret Corporation of the United States in promoting

the development of a jet engine for military aircraft. They have achieved the development of a jet engine with about 2-ton propulsion, or 4-ton propulsion with an afterburner device attached. They are reportedly getting ready to supply such engines to the users in as early as 3 years.

MTX which the Volvo group is interested in is a large project that Japan attempts to develop with its independent technology. Its development is scheduled to be completed by fiscal 1987 for mass production. Thus, since fiscal 1980 the Defense Agency has appropriated the budget for the domestic development of a small F3 military aircraft engine for possible adoption of this engine on MTX. Ishikawajima-Harima Heavy Industries and other makers have been conducting its research and test fabrication.

The proposals of the Volva group are to join these two sets of plans. The Defense Agency and the industry are strongly inclined to the adoption of a domestically built engine. However, according to related sources, there has been a persistent view in the government from the beginning that the development and production of MTX by introducing foreign technology would cost less. The final conclusion as to which plan to be adopted will be reached in 1982. Therefore, there has emerged a possibility of exchanging views with the Volvo group until then.

As for the Volvo group, G.L. Johanson of Volvo-Frigg Motor Company stated: "We have merely presented our ideas in our recent contact with the Japanese Government and industry." He has refrained from revealing the details of the proposed development plan. However, he plans to continue working on the Japanese Government and industry by emphasizing the fact that the development and production of such an engine will cost about $500 million, and that efficient development can be achieved by joining hands.

However, if Japan's industry is to undertake in earnest joint development and production, there is a fear that the supplying of parts may violate the government policy on banning arms export. For this reason, therefore, a neagtive view on joint development is held in Japan's industry circles (such as Ishikawajima-Harima Heavy Industries) that "we are already moving toward the direction that the F3 engine will be adopted as the MTX engine, and a joint development is one-sided wishful thinking on the part of the Volvo group."

However, others consider that although Japan has established a policy for the domestic production of the engine, proposals from a powerful northern European enterprise cannot be ignored in view of the increased international trade conflict, centering on the automobile. Thus the progress in future negotiations will attract the attention of those who are concerned.

Statement by T. G. Gyllenhammar, president of Volvo: "In the future we want to continue open negotiations with three jet engine makers of Japan. I think there is a possibility of setting a joint company."

## Development of STOL

Tokyo NIHON KEIZAI SHIMBUN in Japanese 2 Mar 81 p 11

[Article: "Can STOL Development Take Off? The First Large Jet Transport Aircraft To Be Domestically Produced; A Successor of YS11; Great Concern Is Its Reliability and Economy"]

[Text] Amid the talks about YX (the next-generation civilian jet passenger plane), the development of the first large jet transport plane, to be domestically produced in Japan, is quietly making steady progress. It is the "fan-jet STOL (short takeoff and landing) plane." It is being tackled by the concerted efforts of Japan's aircraft manufacturers with the Science and Technology Agency and Aerospace Technology Institute at the center. This jet plane requires a short runway. The noise level is low, and it best fits the conditions of Japan's airports. Its design was begun in 1977. The manufacturing of the domestically built engine to be installed is currently in progress, and its completion is expected in 2 years, in 1983. The Science and Technology Agency has been promoting this development project and is elated to offer this plane as a replacement for YS11 which has been the mainstay of domestic air transportation but is becoming obsolete now.

### Short-Distance Takeoff and Landing

The volume of air transportation in Japan is increasing year after year. Yet, the expansion and new construction of airports have proved difficult due to environmental and noise problems. Also night time takeoff and landing are stringently controlled. This fan-jet transport plane is suitable to such stringent aviation environment. It is a new type of plane which has been developed with strictly domestic technology.

Characteristically, the fan-jet engines are installed in the upper front side of the main wings. When the large flaps are dropped, exhaust gas flows downward along the surface of the wings and flaps. Thus, even at a low speed, large lifting power is generated. Because of this lifting power, the plane is able to take off and land in a short distance.

Current medium and short distance jet transport planes require 1,500 to 2,000-meter runways. But in the case of the fan-jet STOL it can take off and land with about half the distance, that is, about 800 meters. Also because the engines are mounted on the upper side of the main wings, and it takes off and lands at a sharper angle (the approaching angle for regular planes is three degrees, but that for STOL, it is double, or six degrees), it can reduce the area in the vicinity of the airport which is affected by noise to one-tenth of that by current jet planes.

For this reason, this jet plane with a large transport capacity can be introduced to local airports of the 1,200-meter runway class which only YS11 has been using. Consequently, also the airport maintenance costs are expected to be drastically reduced.

According to the designs recently consolidated, the full length of STOL is 29 meters and it weighs 45 tons. For its fuselage, a remodeled fuselage of domestically built jet transport C-1 (twine engines) which the Defense Agency has been using will be adopted. As for the engines, four sets of domestically built fan-jet engine FJR 710 developed by the large project of the Agency of Industrial Science and Technology of the Ministry of International Trade and Industry (6-ton propulsion class) will be used. Except for importing very small portions, including titanium alloy, all domestic materials and equipment will be used for STOL.

Development Costs Are Low

Because STOL under development is an experimental plane, the fuselage of the cargo transport C-1 will be used as it is. It is not designed as a passenger plane. But Takeda, a science research officer of the National Aerospace Laboratory, who is the leader of this development project explains: "If its body is made long and slender, it can be changed into a 100-150 seat passenger plane which can become competitive with the currently used B737 and DC9."

The manufacturers of the fuselage are the same five as those of C-1. They are: Kawasaki Heavy Industries, Mitsubishi Heavy Industries, Fuji Heavy Industries, Shin Meiwa Industry and Japan Aircraft Industries. Three companies, Ishikawajima-Harima Heavy Industries, Mitsubishi Heavy Industries and Kawasaki Heavy Industries, are participating in the development of the engine. Thus, most all domestic aircraft manufacturers are involved in the development.

The last production of C-1 was completed with the No 30 plane 2 or 3 years ago. But jigs used in the manufacturing are still maintained at the manufacturers. Such tools will be put to a fullest use for the current development. Therefore, the development of the first large domestic jet plane entails comparatively low costs at the level of about 20 billion yen.

Among the developments of postwar aircraft, only the trainer T-1 (which carries J-3 engines with 1.4 ton propulsion made by Japan Jet Engine, a government-controlled company) used by the Self-Defense Forces has both domestically built engines and fuselage. It will be the first time that the development of a large civilian jet engine will be undertaken in Japan. The significance of the development of STOL is enormous because it will serve as a springboard for Japan's aircraft industry which lagged during the blank period after the war.

Its development was started in fiscal 1977. The basic designs for determining the overall structures were completed by the end of 1978. Beginning in fiscal 1979 the development of a high lifting power system characteristic of STOL was undertaken. Following this, the manufacturing of jigs for the manufacturing of the fuselage will begin this year. The building of engines also has already begun. All assembly will be completed during fiscal 1983, and the first flight is expected by the end of fiscal 1983.

Now, a short runway distance, low noise, increased transport capacity, the promotion of the domestic aircraft industry--with all these, STOL seems to be loaded with positive things. But following the development of this experimental plane, can this mass-produced purely domestically made passenger plane compete in the international market?

There are only five large STOL's in the world now. The United States Air Force owns two military transport planes. NASA of the United States has developed a civilian experimental plane. Another test plane has been developed jointly by NASA and the Canadian Government. Then another plane is reported to be in the Soviet Union.

Some Risky Elements Too

NASA's experimental civilian plane was developed in the early 1970's. But they concluded that there were several technological difficulties, and accordingly no successor planes have been developed.

In the background of the Agency of Science and Technology having promoted this project, there was consideration for airport conditions and environmental problems in Japan. At the same time, there was an understanding that the possibility for Japan to cut into the world aircraft market lies with 100-seat jet passenger planes equipped with engines of about 5-ton propulsion.

For this reason, the current development of STOL undoubtedly contains considerably risky elements. One of them is maneuverability.

The landing speed of a jumbo jet plane is about 140 knots. But that of STOL under development is one-half of that, 72 knots. It is by far slower compared to 103 knots of C-1, and 130 knots of B737. For this reason, STOL is to be equipped with automatic maneuvering devices which extensively uses computer technology, but it leaves many elements for technological development.

Also STOL lands at an approaching angle twice as large compared to that of ordinary aircraft. Thus, a pilot from an aircraft maker who tested maneuvering the plane with a simulator acknowledged its difficulty as: "It was rather like dropping down than sliding in."

Reliability is one of the points to consider. For a newly developed engine to become practical, its reliability must be fully confirmed after testing it for 10,000 hours on the ground and over 10,000 hours in the air. Actually, the FJR 710 engine to be installed in STOL has a record of only 2,000 hours of test on the ground.

Another point is economy. The National Aerospace Laboratory has calculated that when this plane is mass produced, per plane costs will be 3 to 4 billion yen. It is relatively expensive for that class of plane. It also has the weakness in that its fuel costs will be high.

Whether or not STOL as the first large domestic jet plane will become a successor to YS11 depends on the success of the test plane, and on the future technological development.



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SCIENCE AND TECHNOLOGY

## NUCLEAR POWER GENERATION TECHNOLOGY STRESSED

### Fusion Test Reactor Project

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 26 Dec 80 p 1

[Text] Kyoto University's Heliotron Nuclear Fusion Research Center (Gokasho, Uji, Kyoto; Director: Professor Mitsuharu Ubi), has, with the development of nuclear fusion technology using the method of locking helical magnetic field, finally decided to place its target on "Heliotron F Plan," to achieve the Lawson criterion needed trigger nuclear fusion. Since the Heliotron E [Plan], which was carried out by the joint efforts of industry, academia, and government to establish Japan's autonomy in fusion technology, resulted in plasma [formation] in excess of the Center's expectation, the next stage will be the implementation of the F Plan. The F Plan aims at establishing the Lawson criterion of 100 million degree ion temperature, 100 trillion particles per 1 $cm^3$ ion density, and 1 second lock-up time, and at generation of electric power by utilizing the heat on the blanket. The plan is expected to be completed in 5 years from 1982, at a cost of 70-100 billion yuan. If this plan is materialized, it will become the world's first testing reactor; however, to conduct power generation tests would mean that an attempt will be made to move a step further in the creation of a prototype reactor.

Construction Will Start in 1982 at a Cost of 70-100 Billion Yen

The goal of the Heliotron E, which began its experiments last August, was to arrive at a stage just prior to that of nuclear fusion, i.e., 100 trillion particles per 1 $cm^3$ plasma density, 10 million degree plasma temperature, and 0.01 second energy lock-up time; the goal was also to obtain some positive sign regarding the construction of a testing reactor. Within 3 months, however, the various goals were achieved at maximum values, and the lock-up time is increasing nearly fivefold--all in all an extraordinary feat. Ordinarily, [the results of] a nuclear fusion test are expressed in terms of nt, the product of plasma density and lock-up time; the values of E were recorded at $10^{18}$-$10^{19}$, the target values.

In comparison to the large-scale Tokamak-type, E is capable of producing joule plasma which is nearly equal to those produced by the U.S.'s "PLT" and USSR's "T-10," both of which are now under operation. The Tokamak-type is extremely involved, as it requires five coils, for the toroidal, magnetic surface restoration, joule heat, current position control, and diverter; and heliotron-type is more compact, since it is capable of adding heat to the plasma by neutron incidence and by high frequency (electronic cyclotron resonance) heating; thus, plasma can be controlled

by one helical coil. The beta value (obtained by dividing plasma pressure by magnetic pressure; the greater the value, the better) indicates the stability of the plasma, which is related to the lock-up time. While the Tokamak's [beta value] is 2-4 percent, [that of heliotron] shows a minimum of 7 percent, according to a theoretical computation based on the three dimensional code of Mr Galahedian [?] at the Plant Institute of Mathematics, N.Y., U.S.A.; [Heliotron's] superiority is thus recognized. In addition, while the Tokamak type can only operate intermittently, the Hiliotron can operate continuously; because of this, the latter requires less plasma heating cost, and is therefore equipped with conditions better suited for practical reactors.

The Heliotron F measures 8 m in large torus radius; the helical coil is 1.2 m in small radius, 0.8 m in thickness, and 40-50 kilo gauss in magnetic field intensity. Its hydrogen discharge is 15,000 times, heavy hydrogen discharge, 5,000; its goal is to burn for 100 seconds at an extremely high D-T combustion ratio of 50 percent, a process which produces helium through nuclear fusion of heavy hydrogen and tritium. The heat added to the plasma is 30-50 megawatt; the toroidal coil is not used, a power generator is attached to the blanket locally. The helical coil uses a super conductive material, niobium titanium; its development and the engineering development of the energy extracting method are the problems for the future.

The targeted plasma ion temperature is 100-150 million degrees; ion density, 100-200 trillion particles per 1 $cm^3$; average beta value, over 5 percent; and lock-up time, over 1 second.

For the construction of the reactor, Hitachi, Ltd. has developed high precision thick discharge tubes, helical coils, power sources, and neutron incidence system, all of which represent the world's highest technological standards. Mitsubishi Electric and Tokyo Shibaura Electric are responsible for microwave heat addition system and laser Thomson scattering measuring system; since manufacturing technologies of these systems are almost complete, the construction period is expected to last 5 years. However, since the project will cost 70-100 billion yen and there is no space at the Uji Campus of Kyoto University, it appears that the project cannot be executed unless a national research organ is created.

Beginning next year, the researchers from Kyoto University, including Toshio Sawada, president of the University, and professor Ubi, and the interested industries will try to persuade Prime Minister Suzuki and Minister of Education Tanaka to have the construction started in 1982. Also, with a thought of improving the E plasma's various individual performances on a comprehensive level, Toshio Doko, honorary chairman of Japan Federation of Economic Organizations, visited the Heliotron [Center]; it is said that he showed a strong interest and support toward the F Plan, in its effort to establish domestic technologies. The dream of nuclear fusion has progressed a step further toward realization.

## Money For Light Water Reactor

Tokyo DENKI SHIMBUN in Japanese 24 Dec 80 p 3

[Text] In order to enhance the reliability of light water reactor by independent technology, improve the rate of operation, and radically reduce the level of contamination by employees, MITI has been promoting the improvement standardization program since 1980; the program is now entering its final stage. As a result of MITI's repeated negotiations, which lasted until the 26th, on the drafting of the budget of the Ministry of Finance for the next fiscal year, the budget requested for the third improvement standardization program was almost totally approved; the MITI feels that, "With this, the autonomy of Japanese-made light water reactors will be established, and that Japan can engage actively in surveys for the third plan and in proving tests during the coming fiscal year."

The amount that MITI asked for to achieve the third improvement standardization program is 1.25 billion yen for the Electric Power Special Association [?] and 200 million yen for general accounts; total, 1.45 billion yen. Of these the Ministry of Finance approved almost the entire amount of development consignment expenses for internal pumps and high performance fuels (total, 750 million yen), requested by the Special Association. As for the development consignment of the automatic inspection system (500 million yen), 2/3 of it was approved as subsidy. A request for survey expenses under general accounts was also approved almost in its entirety.

The third plan, which seeks to complete a Japanese light water reactor by 1990, will conduct large-scale proving tests and, simultaneously, develop long-lasting fuels, etc. In particular, the focus is on domestic production of the reactor core, and it is forecasted that a light water reactor suitable for operation by the Japanese will be constructed, i.e., its (1) capacity will be 1.3-1.4 billion kw; (2) it will be easily loaded and followed up, and (3) it will further reduce the amount of contamination by employees.

On the other hand, the light water reactor multi-purpose utilization survey consignment expenses (70 million yen), which had been newly incorporated into the budget for the next fiscal year and requested under MITI's nuclear energy development and utilization promotion policy, were almost totally (62 million yen) approved, but on condition that they will be applied to development survey of small and medium light water reactors principally for power generation. It was also decided that, as of next fiscal year, the planning subcommittees, newly established under MITI's advisory Committees on Comprehensive Energy Investigation and Nuclear Energy, will discuss the significance of the development of small and medium light water reactors, their prospects, and their development schedules.

## Budget For New Plant Sites

Tokyo NIHON KOGYO SHIMBUN in Japanese 29 Dec 80 p 3

[Text] At the resumption of budget negotiations for the next fiscal year, MITI received approval of its "power plant sites countermeasures subsidy" system, designed to promote acquisition of land for nuclear power generation and other sources of electricity. The system, in its approved form, consists of two parts ("Regional promotion countermeasures subsidy for power plant sites" and "City-town-village subsidy for hydroelectric power generation facilities") and not four, as it was originally requested. A summary of the system was revealed on the 28th.

The subsidy for regional promotion is comprised of those given to "areas surrounding nuclear power generation facilities" and to "prefectures exporting electric power." The former applies to prefectures wherein are found nuclear reactors, test reactors, and processing facilities or whose cities, towns, and villages are located near them.

The breakdown of the first subsidy is as follows: (1) Depending on the capacity of the facilities, the unit cost for private citizens will be 300-900 yen per contract kilowatt, for enterprises, 75-225 yen. The total amount of subsidy is derived from multiplying the unit cost by the contract kilowatt hours of the households and the enterprises; (2) a 50 percent increment will be added to subsidies applicable to new facilities; (3) the applicable facilities include those now under operation, under construction, and those which will be completed by 1985. The recipient prefecture will distribute its subsidy among residents and enterprises as "cooperation funds," but it can be used for regional promotion as well. The subsidy program will begin on October 1, with a budget of 3.027 billion yen.

The second subsidy, given to "prefectures exporting electricity," applies to those whose volume of power generated exceeds consumption by more than 1.5 and more than half of whose land is comprised of "[industrial] inducement areas" and areas conjoining them, as determined by the Law to Promoto Redistribution of Industry. (1) Depending on the volume of electricity exported, subsidy will range from 50 million to 400 million yen; (2) subsidy will be given for large-scale creation of employment in cities, towns, and villages where power generation facilities are located, and for modernization of regional industries. The budget calls for 2.3 billion yen.

As for hydroelectric subsidies, a sum equal to 0.05 yen per annual kilowatt hour generated will be given to cities, towns, and villages within which are located hydroelectric plants (output exceeding 100 kilowatts; electric power output, over 5 million kilowatt hours) that are 15 years or older. The minimum amount of guaranteed subsidy is 3 million yen, the maximum, 30 million yen. The applicable period is seven years, but it will be extended to eight years for cities, towns, and villages that are willing to cooperate in new constructions. The budget calls for 3.538 billion yen.

The subsidy to cover the expenses for the upkeep and management of public facilities was not approved; in its place, the application of the existing "power plant sites countermeasures subsidy" will be expanded, and the upkeep expenses will be met by operating profits derived from a reserve fund equal to maximum of 10 percent of the allowed subsidy.

Furthermore, it was revealed that the Power Plant Site Procurement Special Committee's surplus of 10 billion yen will be applied to the establishment of these new subsidies, and the increase in power generation tax will be postponed until fiscal 1982.



Constructing Underground Plants

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 18 Dec 80 p 1

[Text] Due to crude oil price hikes, expectation toward nuclear power generation as an alternate energy source has intensified; in the meantime, major construction companies have all at once embarked on studies of underground nuclear power plants.

This is because, since construction of nuclear power plants continues to be delayed greatly due to difficult site conditions and anti-nuclear movements, such locations as formerly considered impossible to construct plants, as along the slopes leading to the sea and national parks, are now, thanks to the underground method, considered possibilities. The [underground] construction method has drawn much attention as a breakthrough in coping with difficult site conditions, and the companies are seriously committing themselves to underground projects by organizing project teams, etc. The underground nuclear power plant in particular requires comparably greater amount of construction work than surface plants, and also needs comprehensive technologies, as in earthquake-proof designs and digging of large underground caves; therefore it constitutes a new market for the comprehensive construction companies which are suffering from shortage of large-scale construction works. Already they have started preliminary battles to obtain orders.

Resolving Difficult Site Conditions

According to the "Long-term Energy Supply and Demand Tentative Prospect" compiled last September by the Comprehensive Energy Survey Committee of the Ministry of International Trade and Industry, Japan plans to increase nuclear power generation from the present output of about 15 million kw to 53 million kw by 1990. It means that four nuclear power plants of 1 million kw capacity must be built each year during the next 10 years; however, due to difficult site conditions and public opposition, the increase in output is in danger.

For this reason, MITI has had an eye on underground nuclear power plants whose research is most advanced in the U.S. and in Europe. In 1977, [MITI] established the "Underground Nuclear Power Plant Study Committee," comprised of nuclear power equipment makers and general construction companies, and has been promoting a study of overseas examples and conducting earthquake-proof experiments. As a result, it concluded that such plants are "technologically feasible" in Japan. This fiscal year [MITI] has consigned Electric Power Development Co. to conduct a feasibility study of a 1 million kw-class underground power plant; it expects to finish a conceptual design by next March; it is also studying the construction of an experimental plant.

Under these circumstances, the major construction companies are seriously conducting studies of underground power plants. Kajima Corporation, Taisei Corporation, Ohbayashi-Gumi, Ltd., and Hazama-Gumi, Ltd.--all with experiences in nuclear and underground power generations--have been participating in the enterprise research of power development from the very beginning. In addition, the Shimizu Construction Co., Ltd. will handle the earthquake-proof design of underground spaces. So the battle for bids for underground generation plants has already begun.

The major construction companies are interested in underground power generation, because, in comparison to surface construction, the volume of construction work is far greater and because the added values are higher. For example, for an underground plant with power output of a million kilowatt, a turbine will require a large space, measuring 31 m in width, 80 m in height, and 230 m in width; additionally, seven or eight large tunnels and side tunnels are needed for the reactor and related facilities. In sum, about 2 million square meters of earth must be removed. As a result the proportion of plant related expenses to construction expenses would increase from 10:1 on the surface to 7:3 or, depending on the condition of the land, 6:4 below the surface.

Since domestic demand for large-scale construction works like dams and railroad tunnels is declining, the underground plants are very attractive to these companies. Kajima Corporation, which holds the greatest performance record for construction of boiling water reactors, has set up an underground nuclear power generation project group, comprised of specialists from all areas under the leadership of its Atomic Energy Room; it is also engaged in joint research with Tokyo Electric Power Co., Ltd., as one of its new on-the-spot measures. Hazama-Gumi, which is fast catching up with its competitions in pressurized water reactors, has assigned 15 full-time specialists to the underground project at its research center, indicating, thereby, the great expectations it harbors.

In the West, small-scale underground generators are in operation. On account of the Three Mile Island incident and for reasons of defense, western countries are actively engaged in developing underground facilities. It is expected that in Japan too research will be quickened. In a new field such as this, the enterprise that succeeds in winning the contract first will lead others by a great margin. For this reason, competition is fierce among the major construction companies.



## Plutonium Reprocessing Methods Examined

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 26 Dec 80 p 4

[Text] The Japan Nuclear Fuel Service (2-2-2 Uchisaiwai-cho, Chiyoda-ku, Tokyo; president, Kiyoshi Goto), which has been making preparations for the building of the [world's] first privately owned plutonium reprocessing plant, has established a committee to examine the various reprocessing methods; the committee will begin the process of selecting the method to be used in the plant. It will examine the method used in the Tokai Reprocessing Plant operated by the Power Reactor and Nuclear Fuel Development Corporation; it will also examine the methods used in West Germany, the U.S., and other countries. Based on their examination, the committee will select a method which is most appropriate for commercial operation of a reprocessing plant; this will be completed by next May. Already, the company has received offers of technical assistance from France, West Germany, and the U.S.; its final decision is expected to draw much attention.

The company was formed in March with the aim to reprocess spent nuclear fuels from nuclear power plants; it was established with investments from ten electric power companies and ninety firms from various industries. According to its plan, the company will invest about 700 billion yen and construct a plant with an annual capacity of 1,200 tons; it is expected to be completed by 1990. In addition to reprocessing, it will also engage in transportation of spent fuels, safeguarding of nuclear wastes, and related services. It will be the first privately owned reprocessing company in the world.

To reprocess spent nuclear fuel is to recover uranium that remains after nuclear fuel is burnt inside a light water reactor and to recover the new substance, plutonium, produced when uranium is burning. This process is an important part of the nuclear fuel cycle in terms of securing nuclear fuel and in terms of efficient use of uranium, the fuel for nuclear power generation. The first reprocessing plant in Japan was built in Tokaimura (Ibaragi prefecture) by the Power Reactor and Nuclear Fuel Development Corporation; the proposed commercial plant will be Japan's second. At present, the company is searching for a plant site, but has decided to go ahead with the selection process of the reprocessing method.

Basically, the company will follow the method now being used in the Tokai plant. Because the company will be operating a "commercial plant," the electric power industry is looking at the cost aspect of the new plant and will study as many candidates as possible. Recently, president Goto and top executives of the company visited Great Britain, France, West Germany and the U.S., where they held talks with leaders in reprocessing technology. It was at these talks that offers of technical cooperation were made.

The reprocessing examination committee will select the method from among domestic and foreign sources that is best suited for the new plant. The committee is comprised of specialists on reprocessing from MITI, Science and Technology Agency, and the electric power industry. The examination is expected to end next May.



## Tokai Plutonium Reprocessing Facility Capacity

Tokyo DENKI SHIMBUN in Japanese 26 Dec 80 p 1

[Text] On the 25th, Director Nakagawa of the Science and Technology Agency issued the Power Reactor and Nuclear Fuel Development Corporation a certificate for operation of the Tokai plutonium reprocessing plant. The certificate allows the Corporation to manage the facilities under the name of "Tokai Reprocessing Plant" and to operate it at full capacity beginning January 1981. The approval comes after nine years of construction work that began in 1971. The policy of the Corporation is to operate the plant through two "compaigns" a year during which it will handle 100-140 tons (daily reprocessing capacity = 0.7 tons) of spent nuclear fuels. The capacity of the Tokai plant, however, has been lifted to 99 tons by the 1977 U.S.-Japan joint statement, and the present period of operation will terminate at the end of next April. For this reason, the policy [of the Corporation] is to strongly request the U.S. to allow for continued operation of the plant. Because of the transition to Reagan administration, it is expected that the agreement between the two countries will be a tentative one.

### Japan-U.S. Conference, the Possibility of a Tentative Agreement

As he handed the certificate, Director Nakagawa said, "I wish to express my respect for a decade of hard work which finally brought the plant to full operating capacity. In the future, all precautions must be made to ensure the safe operation of the plant." Chairman Segawa of the Corporation responded that, "the world is watching Japan's reprocessing method. We will do our best to establish Japan's own reprocessing technology."

The construction of the Tokai plant was begun in June 1971; chemical tests started in 1974; uranium tests in 1975; hot tests, since July 1977. The operation of the plant was halted at one point for a year and several months, when the acid recovery evaporation canister broke down. This January a comprehensive test was conducted for spent fuels of the BWR type, and hot tests were also concluded. The present certificate was issued as a result of two compaigns to check the performance of the plant, as required by the amendment to the Nuclear Reactor Regulatory Law passed toward the end of 1979. Before the certificate was issued, the Atomic Energy Safety Commission had already studied the results of hot tests and given its approval.

With the upcoming full-scale operation of the plant, the Corporation has decided to rename it from Tokai Business Office Reprocessing Construction Office to Tokai Reprocessing Plant. The reprocessing cost will also change from the present tentative rates to more permanent [i.e., official] rates, which have "99 percent certainty of being approved, requiring only the signature." (director Nakajima) The daily reprocessing capacity at Tokai is 0.7 ton; the annual capacity was originally set at 200 tons, but at present "the goal is set at 100-140 tons, and will be raised as performance increases gradually." (chairman Segawa) This is because if the number of days spent on annual inspection, on clearing procedures for [nuclear] material accountancy needed as safeguards for plutonium production, and on resuming the once-halted operation are subtracted, the total number of operating days, at present, stands at "200 on average." (director Nakajima) The policy of the Corporation is to increase this number as technology is upgraded. The plant will operate twice a year, before and after the Bon Festival [i.e., July 15]. The shearing process will begin on or about January 17.

Although full-scale operation is thus expected, the 1977 Japan-U.S. joint statement limits the reprocessing volume to 99 tons. Although the applicable period was extended, it will still terminate at the end of next April. For this reason, in order to prevent the shut-down of the operation in mid course, non-official negotiations with the U.S. are already taking place through diplomatic channels. Japan would like to conclude a complete agreement instead of a tentative one, but for practical reasons it is considered difficult in light of the transitional state of the Reagan administration. To achieve an agreement by next spring, it is strongly felt that what can be obtained will be a tentative and partial agreement. At present, the three reprocessing plants in operation are located at Karlsruhe (W. Germany), La Hague (France), and Tokai.

## Metal-Cutting Techniques for Decommissioning Reactors

Tokyo NIHON KOGYO SHIMBUN in Japanese 27 Dec 80 p 5

[Text] Fourteen years have elapsed since commercial reactors began operation in Japan. In general, a life-span of a reactor is 30-40 years, so that in another 20 years the reactors in Japan will face retirement. The Atomic Energy Commission and MITI, in preparation for the future, have been working on a policy to deal with "used" reactors. Accompanying this is the development of [metal-] cutting techniques for decommissioning nuclear reactors.

There are three ways in which reactors can be decommissioned.

One of these is called the "Lock and Perpetual Care Method," whereby plutonium, coolants, and nuclear wastes, and all other radioactive materials are removed from the site, the facility locked up and radioactivity monitored perpetually. A number of reactors, principally experimental and test reactors, throughout the world has been decommissioned by this method,. In 1970, the Japan Atomic Energy Research Institute [JAERI] decommissioned its experimental reactor, the "JRR-1" (thermal output: 50 kw), using this method.

The second is called the "Seal and Isolate Method," whereby, after removing radioactive materials, the facility, containing highly contaminated reactor and steam generator, is sealed with concrete or asphalt. This is the method used in the U.S. and Sweden.

The third is known as the "Disassembly and Removal Method." The reactor facility is literally disassembled completely and removed from the site.

This method is also used in the U.S., the most well-known being the decommissioning of the experimental BWR (Boiling Water Reactor) "Elk River" (thermal output: 80,000 kw), completed in two years from 1972. Another, though not official, is the decommissioning of DOE's (U.S. Department of Energy) commercial PWR (Pressurized Water Reactor) "Shippingport" (electric output: 50,000 kw). "NRC (U.S. Nuclear Regulatory Commission) feels that it has the technology to decommission it safely." (Saburo Yamada, chief researcher, Nuclear Energy Development Research Institute, The Tokyo Electric Power Company, Inc.)

It is uncertain which of the three methods Japan would use, until the results of a study recently began by the Atomic Energy Commission's Reactor Decommissioning Committee are in. It is, however, strongly felt that "methods other than disassembly would create reactor 'graves.' Considering the difficulty of locating new nuclear generation sites, the two methods are inadequate. The principle method for Japan, would be that of disassembly and removal." (Takao Hirakawa, vice-director, Nuclear Energy Development Headquarters, The Tokyo Electric Power Company, Inc.; Kiyoshi Kagimoto, chief, Technology Promotion Section, Atomic Energy Bureau, Science and Technology Agency).

For this reason, as a test case, the Science and Technology Agency is planning a project to disassemble and remove by 1985 the JAERI's power test reactor "JPDR" (thermal output: 90,000 kw; Tokaimura, Ibaragi prefecture). The above furnishes the background for the development of metal-cutting techniques for decommissioning nuclear reactors. Four techniques are under study now.

A nuclear reactor is constructed of concrete and metal. Since concrete is used in a way that is less susceptible to radioactive contamination [than metal], it can be removed almost like an ordinary concrete building. The problem is the metal. In order to disassemble and remove contaminated pressurized containers, steam generators, and piping for primary coolants, remote control underwater-cutting technique is needed. In particular, since stainless steel, which is difficult to cut, is used throughout, a new cutter becomes indispensable. One cutter, an arc-saw, is being developed now.

The arc-saw technique, developed in the U.S., has not been seriously studied in Japan. A metal is cut by the energy generated by an arc, which is created when a cathodic disk made of soft metal or copper is rotated near the anodic metal at high speed. Although it requires a large amount of electricity to rotate the disk underwater, and this is its drawback, the technique is said to be appropriate for cutting pipes.

Recently Ishikawajima-Harima Heavy Industries succeeded in actual application of an underwater plasma cutting technique. This technique is similar to the one described above in its use of the arc heat.

[Under the Ishikawajima-Harima technique,] easily ionizable gases like helium, hydrogen, nitrogen, and argon are turned into plasmas (a condition in which electrons and nuclei are dispersed) by the arc heat created between the material to be cut and the electrodes. The plasma, extracted through a nozzle, is spouted against the

material, melting it and dispersing the melted portion. "The temperature of the plasma reaches 10,000-30,000 C°." (Uhachiro Nakamura, Ishikawajima-Harima Welding Research Center) Accordingly, any heat-resisting metal can be cut.

Ishikawajima-Harima has sold its first model [Model 1] to the Power Reactor and Nuclear Fuel Development Corporation. The Corporation will use it for decommissioning the facility for testing materials used in the new-type convertor reactor. This facility, which is attached to the JAERI's Material Test Reactor (JMTR; Oarai, Ibaragi Prefecture), has already undergone intra-reactor irradiation testing.

Model 1 is still weak in power, and so would require power-up research before it can be used for decommissioning nuclear reactors. Still, it has been reported that a similar plasma cutting technique was used to decommission the Elk River Reactor. With the eventual goal of establishing a reactor decommissioning business, Ishikawajima-Harima plans to emphasize the research in improving the plasma cutter.

The third technique is called the "Melt-poles waterjet cutting technique," which is being developed by the Shikoku Experiment Station of the Agency of Industrial Science and Technology.

Their technique also uses arc heat to cut the metals, but its special feature is the use of soft wire. To cut through a sheet of metal, an arc, generated between the wire and the sheet, is moved up and down the sheet, while applying a jet of water to the portion being cut to disperse the molten metals.

This cutting-technique is a Japanese invention, developed by the Shikoku Industrial [Science and Technology] Experiment [Station]. The Sankyo Engineering, which holds the commercial rights, is moving toward its actual application, and has entered into joint research with Kawasaki Heavy Industries.

"Because of the nature of electric power source, there is a limit to the thickness of the sheet to be cut. It may not cut sheets exceeding 10 cm in thickness," says Masanobu Hamazaki, Department of Machinery and Metals, Shikoku Station. The specialists, however, evaluate it highly.

The fourth technique, using gas, is divided into two methods, being developed also by the Shikoku Station. One is called the "wire-cutting method," based on the powder-cutting technique that is used for cutting stainless steels in atmosphere.

The powder-cutting method uses metal powder which is mixed into the oxygen blasting against the metal. The metal is cut by the heat generated by this mixing and by the energy resulting from the bombarding of the iron oxide against the metal. This, however, cannot be done underwater, since the powder is wet. To avoid this, the first of the two gas-cutting techniques uses wire. The thickness of the metal is limited to 10-15 cm, but this disadvantage is overcome by the fact that "when hydrogen is burned, excess oxygen contaminated during cutting combines with hydrogen to produce water. Since radioactive gas returns to the water, contamination is held down to a considerable extent." (Hamazaki)

The second gas-cutting technique, the development of which is being pushed by the Shikoku Station, tries to cut thicker metals than the wire-cutting method. Because of patent, the details are not available, but testings thus far have shown that it is capable of cutting a stainless sheet, 15 cm thick, at a speed of 7-10 cm per minute. Mr Hamazaki feels that "the tests show that the technique can be applied to metals more than 20 cm thick."

A pressurized container of a 1.1 million-kw-class nuclear reactor (BWR) is huge; it is over 6 m in circumference, 23 m high, and weighs 750 ton. The maximum thickness of the metal, the interior of which is crudded with stainless steel, is about 20 cm (the flange sections, etc.) The second gas-cutting method is then fully capable of cutting through the metal. Due to these various developments, MITI will begin testing several of these cutting-techniques for actual use. It plans to begin testing in 1981 and summarize the results by 1983.



## Radioactive Waste Disposal Technology

Tokyo DENKI SHIMBUN in Japanese 20 Dec 80 p 1

[Text] At the extraordinary meeting of the Atomic Energy Commission on the 19th, the Special Committee on Radioactive Wastes Policy [hereafter, Special Committee] (chairman: Fumio Yamazaki, director, Japan Radioisotope Association) submitted a report, "On the Promotion of Research and Development of High-level Radioactive Wastes Processing and Disposal." The Power Reactor and Nuclear Fuel Development Corporation [hereafter, Power & Fuel Corporation] and the Japan Atomic Energy Institute have been conducting on-the-spot surveys in accordance with the provisions of the "Research and Development Plans for Radioactive Wastes," compiled in 1976. The present report, based on reviews of the past plans, sets new guidelines for processing and disposal of high-level radioactive wastes. These differ from the past plans in three major respects: (1) the emphasis is on the use of borosilicic acid glass for solidifying and disposing high-level radioactive liquid waste; (2) the five-stage research and development of ground disposal technology; and (3) in ground disposal, the basic policy to be followed will be to combine natural and man-made "barriers."

### A Report by the Special Committee of the Atomic Energy Commission

In October 1976, the Atomic Energy Commission revealed its basic policy for radioactive wastes. In June of the same year, the then "Special Technical Committee for Radioactive Wastes Policy" compiled a plan (in the form of interim report) for research and development of technology for processing and disposal of these wastes. The Power and Fuel Corporation and the Japan Atomic Energy Research Institute have been engaging in research based on this [interim] plan. But since the plan was no more than an outline, the Special Committee compiled a new R&D program for high-level wastes, based on studies of developments that have since emerged after the establishment of the first plan. The new plan is compiled on "the premise that matters close to completion in terms of R&D will be described in detail, while those requiring future work will be viewed from the perspective of the entire project." For all practical purposes, however, the plan provides concrete guidance for all future R&D.

The high-level wastes refer to contaminated liquids containing large quantities of radioactive substances that remain when spent nuclear fuels are reprocessed. They are disposed of after being turned to stable solid states and temporarily stored.

The report first emphasizes the use of borosilicic acid glass in the disposal technique employing the solidification process; this particular glass is the most widely used material in the world. Cold and hot tests on the engineering and experimental room scale, respectively, will be conducted. Already, for the purpose of hot test in an experimental room where solidification of actual liquid waste is to take place, a high-level radioactive substance research facility (CPF) is being constructed; the test will begin in 1981. Engineering hot test, which will be based on the results [of the cold test], is expected to begin in 1987. With the latter in mind, the design and construction of a pilot plant for solidification and storage will be promoted; glass solidification disposal and temporary storage technologies will be verified; and safety evaluation test will also be promoted.

As for R & D of waste ground disposal, the present report recommends the introduction of grout and buffer materials, and other forms of engineering barriers. "Based on the principle that by combining natural, i.e. earth's strata, and engineering barriers, [the wastes] must be separated from the human environment," the report specifies five stages for developing the ground disposal technology: (1) a study of the earth's strata which hold possibilities as barriers for disposed wastes; (2) a study of strata which can be used effectively; (3) a simulated on-the-spot solidification test; (4) an actual on-the-spot solidification test; and, (5) experimental disposal. In the first stage, research will center on ground disposal, engineering barrier, and ground disposal system. The selection of "effective" strata will be concluded by the end of 1984; the selection of a test site will begin in 1991, and by the end of 1994 an appropriate site should be decided upon. The simulated test will be conducted during 1995-2005; the "actual" test, during 2005-2015; the experimental disposal will begin from 2015 and continue for about five years.

The report also cites the need for R & D in new solidification technology like the metal matrix method, group separation of nuclides with long half-lives, and "extinction process" for converting transuranic elements to nuclides with short half-lives.

It is said that from a ton of spent nuclear fuel, high-level radioactive substances equal to 100 liters of glass solid state can be obtained; from a million kw [reactor], about 30 solid states. At present power generation level, it is calculated that a thousand states will be produced in 1990, four thousand in 1995.

The establishment of processing and disposal technology is being pushed from the viewpoint of securing a nuclear fuel cycle. France leads the world in R & D of this technology.

The following is a summary of the report, "On the Promotion of Research and Development of High-level Radioactive Wastes Processing and Disposal." (A report prepared by the Special Committee).

1. Basic Approach: The high-level radioactive substances are produced in small quantities, but their half-lives are long and they possess radioactivity. From the viewpoint of preventing environmental and human contamination, the wastes must be isolated and controlled.

For this reason, high-level radioactive wastes are to be put into stable solid forms, stored temporarily, and disposed.

The R & D of high-level waste processing and disposal has been conducted by the Power & Fuel Corporation and by the Japan Atomic Energy Research Institute. This was done in accordance with the "Research and Development Plans for Radioactive Wastes." (interim report of the Special Committee, June 1976).

This report presents new R & D plans, based on the premise that matters nearer to completion in terms of research and development will be detailed, while those requiring future work will be viewed from the perspective of the entire project.

2. Development of glass solidification processing technology: This technology will emphasize the use of borosilicic acid glass, the application of which is expected to be realized soon and which now represents the most widely used technology in the world. The following R & D will be pursued:

(1) Engineering-scale cold test (solidification using simulated liquid waste): The development of technologies related to glass solidification using uncontaminated simulated wastes; these include technologies for liquid waste processing, melting, off-glass processing canister handling, temporary storage, etc.

(2) Test-scale hot test (solidification using actual liquid waste): The development of technologies related to glass solidification using contaminated liquid in the "high-level radioactive substance research facility (CPF)" now being built.

(3) Engineering-scale hot test (verification test): Based on the results of above tests, design and construction of "solidification and storage pilot plant" will be promoted, with the goal of opening the plant by 1987. The plant will be used to verify the glass solidification and temporary storage technologies.

(4) Safety Evaluation Test: At the "Wastes Safety Testing Facility" (WASTEF), special characteristics such as leakage, heat transmission, and heat expansion rates will be measured, using the glass solidification of contaminated liquid wastes.

3. Ground Disposal R & D: As a rule, ground disposal will be based on "combination of natural, i.e. earth's strata, and engineering barriers;" by this method, high-level radioactive wastes will be removed from human environment. The long-term R & D of ground disposal technology will be divided into the following five stages; running parallel to these will be research on safety evaluation: 〈First stage: A survey of possibly effective strata〉 = Conduct research based on the available literature on strata (rock), natural, and social factors. Select a number of "possible strata" for ground disposal research. The results of examination of the special features of each stratum and of the research on engineering barrier will be combined for the purpose of selecting "effective strata."

〈Second stage: Examination of effective strata〉 = On-the-spot survey of selected sites, including drilling, extensive land surveys, and on-the-spot testing of engineering barriers. After comprehensive reviews, a final test site will be selected.

〈Third stage: On-the-spot testing of simulated solids〉 = At the selected testing site, the cold disposal system will be established by testing the simulated solids.

〈Fourth stage: On-the-spot testing of actual solids〉 = Conduct a test using the actual solids and establish the hot disposal system.

〈Fifth stage: Experimental disposal〉 = The solids will be carried into the testing site, and experimental disposal will be conducted.

Of the five stages, the emphasis now is on the "Survey of Possibly effective Strata," found under the first stage; for this, the following R & D will be promoted:

〈First stage: Survey of possibly effective strata〉

(1) Survey and research on strata = In order to clarify the stratification of the possibly effective strata, various surveys, water permeability tests, and nuclide suction tests, etc. will be conducted. The strata's ability to contain wastes will be examined also.

(2) R & D on engineering barriers = Along with the development of buffer technology for engineering barriers, a test will be conducted to evaluate its soundness.

(3) Research on Ground Disposal System = Along with the clarification of the general concept regarding the ground disposal system appropriate to conditions in Japan, the efficiency of the ground and engineering barriers will be evaluated.

(4) Research on Safety Evaluation = In order to evaluate the effects on human beings of disposing high-level radioactive wastes, an environment mobile model will be developed.

(4) Others = In addition to those which are now under research and development, there is a need to promote R & D of new solidification technologies like the metal matrix method, of group separation of nuclides with long half-lives, and of "extinction processing" that converts transuranic elements to nuclides with short half-lives.

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PLANS FOR OFF-SHORE NUCLEAR ENERGY PLANT STUDIED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 7 Feb 81 p 4

[Article: "Location of Nuclear Power Sources; Off-shore if not on Hand; Feasibility Study for Realization; MITI To Set Up an Investigation Committee Soon"]

[Text] Under a 4-year project from 1981, the Ministry of International Trade and Industry (MITI) will pursue the possibility of actualization of a method of locating nuclear power stations at sea, so as to be helpful, even in a small way, in the elimination of difficulties in locating nuclear plants through constructing nuclear power stations at sea. Off-shore nuclear plants are to be constructed by the dock method at water depths of 20-150 meters. They are much expected as medium and small dispersion-type power sources that can be constructed near electric power consumer areas. For this purpose, the MITI decided to set up a Commission for Studying Nuclear Reactors Located at Sea in the near future and to run an investigation and study of the economics, safety, and power transmission systems, and flexibility in terms of selecting the location of the plants per four methods: 1) Float-type, 2) anchoring to the bottom-type, 3) man-made island type, and 4) caisson-type.

The Four Methods: Float-Type, Etc.

Nuclear reactors are considered as oil-alternative energy sources. But, there is a bit of uncertainty as to their safety; and electric power companies are experiencing difficulties in procuring plant sites. According to the MITI, the sites for nuclear power plants which are to commence their operation by 1990 are secured. But, the MITI says that other than those, it will be very difficult to secure sites. Thus, they have conceived an idea of underground and marine-type nuclear plants designed for effective utilization of the land and for environmental safety. Studies of underground nuclear plants have already been progressing under a 4-year project from 1977. From next year, they will be in the stage of establishing a guideline aimed at actual plant construction.

Meanwhile, starting from next year, there will be more and more research on locating nuclear plants at sea. Under the Float-Method, a nuclear plant will be built on a steel box at the dockyard, taken by tugboat into the

breakwater of an intended location, and will be anchored. Under the anchoring to the Bottom Method, a steel box will be constructed, taken by tugboat to a scheduled spot, and fixed in such a way that the space between the ocean floor base and the steel box is little.

Under the man-made island method, the intended sea area for a generating station will be enclosed in a breakwater sea wall and enclosed area will be filled in, hedged off from the open sea. Then, a nuclear plant will be constructed on the man-made island in the same way as those constructed on shore. Under the Caisson-Method, the foundation of the power station facility will be made of concrete or steel caissons with nuclear power plants set on them. The advantages of locating nuclear reactors at sea are: 1) Offshore locating at water depths of 20-150 meters is possible, and a flexibility in location selectivity is increased. 2) It is possible to construct the most part of a plant in a factory, and a large-scale reduction in manufacturing time can be achieved. On the other hand, the disadvantages are pointed out as: 1) The greater the distance from the coast will be, the more difficult the method of transmitting electricity will become. 2) There is a problem in guaranteeing plant safety in withstanding natural conditions such as wind and waves.

There will be a study and investigation, by a commission to be set up in the near future by MITI, of the four methods, the Float-Method, etc., concerning economics, safety; and the possibility of their realization will be pursued. At present, since the difficulties in locating nuclear reactors are being felt, great interest is being concentrated on this unique research of locating nuclear plants at sea.



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## SMALLER LIGHT WATER REACTOR UNDER DEVELOPMENT

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 23 Feb 81 p 1

[Article: "Towards Development of Medium and Small Light-Water Reactors; Committee To Be Formed by Industry, Government and Academic World Starting April: Model Reactor in 1983"]

[Text] The Ministry of International Trade and Industry (MITI) which is newly tackling the issue of medium and small light-water reactors to diversity and to supplement light-water reactors which are in the process of expanding will inaugurate a "Medium and Small Light-Water Nuclear Reactor Research and Development Commission" (temporary name) composed of experts from business, government and the academic world, at the end of April. At first, they will start in fiscal 1981, a feasibility study (FS = Development and Industrialization Research) on medium and small reactors capable of having multi-purpose utilization including generating electricity in response to actual regional conditions. They intend to do their planning and general conceptualization of medium and small reactors in fiscal year 1982, based on the FS, and to proceed to a trial production of their model reactor in fiscal 1983. Construction of a small nuclear reactor of the sub-metropolitan (underground) type has recently been planned also in Grenoble, France. The MITI [Ministry of International Trade and Industry] plans to inject more energy into promotion of this medium and small reactor research project.

The reason why the MITI has tackled this development plan is that the MITI has judged that reactor manufacturers have brought about sufficient maturation of light-water reactor technology by having built many light-water reactors, and therefore have acquired enough ability to deal with the new research of new medium and small reactor development. At the same time, the development of medium and small nuclear reactors will make it possible to establish new power sources close to such sites as Osaka and Tokyo where there is a great demand for electric power, and will provide an effective means of distributing a large number of power sources as principal sources of energy for various regions throughout the entire nation.

There is also the appeal of their being able to be set up in the midst of industrial zones and complexes as energy reactors for industry not only as a general source of electricity but also as a nuclear heat source.

Thus, through the diversification of nuclear reactors which are the most important alternative energy sources, the MITI aims at preparing for future society which no longer depends on oil.

In addition, there is also the aim of developing medium and small type reactors for export purposes because the developing countries have started to want them. These are truly multi-purpose reactors. They are designed to have an output of 50,000-300,000 kilowatts. As a result, these medium and small reactors will give variety to the present light-water reactor whose output exceeds 1 million kilowatts.

In 1981, the ministry will stimulate the needs of various medium and small reactors, will conduct the FS in relation to their utilization, and will consolidate the concept of reactors to be developed. The commission will be composed of nuclear reactor manufacturers and the electric power industry as well as government and academic experts. It is intended that the chairman will be selected among those who take a "neutral" attitude.

They intend to set up a working group of specialists under the aegis of the commission and also to entrust a part of the FS to think tanks.



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SCIENCE AND TECHNOLOGY

## POLICY TO SPEED UP PLANT SITE PROCUREMENT

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 18 Feb 81 p 1

[Article: "Speeding Up the Location of Power Sources; Rationalization of Regulations and Procedures; MITI To Set Up a Study Meeting; To Review the Review System; Outline by June"]

[Text] As there is an urgent need for hastening the development of large power sources including plants, the Ministry of International Trade and Industry (MITI) has set up a "Study Meeting for Facilitating the Acquisition of Nuclear Plant Sites" (Chairman Teiichi Yamamoto, Chief, Development Branch, Public Utility Department, the Agency of Natural Resources and Energy) within the ministry in order to rationalize the legal and procedural aspects that are the bottleneck for facilitating power source development. And, it has begun reviewing a series of inspection systems, procedures, and laws. They intend to study by June a plan, for rationalization of nuclear reactor safety inspection systems and a reasonable combination of procedures and laws, and to reflect this on a policy for promoting the development of power sources to be implemented in 1982 and thereafter. On the 17th, the Liberal Democratic Party (LDP) also convened the first meeting of the "Headquarters for the Promotion of Nuclear Power Plant Site Acquisition," which is the LDP's organ to promote the development of power sources. Thus, the development of new power sources has come to be a national issue and the MITI's recent moves is a part of it.

It is the general opinion that the laws and procedures associated with the establishment of power plants resemble jungle branches which spread in a complicated manner. Generally, it is said that there are 33 laws and 66 procedures. First, there are those laws that have a principal relationship, such as: The Territorial Utilization Law, The Rivers Law, The Cultural Assets Protection Law, The Natural Parks Law, The Forests Law, The Agricultural Lands Law, laws concerned with the consolidation of agricultural promotion areas, The Land Expropriation Law, The Public Waters Reclamation Law, The Nuclear Reactor Regulation Law, The Power Source Promotion and Development Law, and The Electric Utilities Law. And there are other related laws too numerous to mention.

In the case of a large nuclear plant, especially which, it is anticipated at present would serve as the greatest source of power, tremendous numbers of laws and regulations are controlling it from selection of the site where the plant will be located to commencement of its operation. Safety inspections as well are being designed very strictly.

The strictness of successive legal and procedural investigations is for the purpose of eliminating anxiety and the victimization of local self-governing bodies and the local population. On the other hand, it is a reality that it takes a lot of time and man-power to develop and secure power source that is urgently needed nationally.

In the case of locating a nuclear plant, it is said to take 10-20 years. The cause for this is that it takes a lot of time to dispel the anxiety of the local population and to implement local compensation and indemnities such as the fishing industry. However, the fact that legal and procedural investigations are complex and are strict cannot be overlooked as a cause for the delay.

The Study Meeting established within the ministry is founded on this pressing task of the promotion of power source development, and will insert the scalpel of rationalization to the laws, procedures and investigative systems that are becoming one of the bottlenecks. But a difficult problem is that the MITI does not have exclusive jurisdiction over these laws, procedures and examinations. It is a fact that almost all ministries and agencies have a connection with power source development in some form or other. For this reason, the study meeting will, for the present, concentrate on those laws under the MITI's jurisdiction, and intends to seek for a series of rational combinations of laws and procedures.

To start with, while maintaining the strictness of laws and procedures, they will look for a way to eliminate a waste of time by rationalizing their combinations and, by reconstructing the entire legal and procedural systems, will pursue the possibility of locating power plants in a shorter period of time than heretofore.

Also, in relation to the system of nuclear reactor safety, investigation through studying rational combinations of investigative systems such as simultaneous execution of environmental investigations and safety investigations that are not being done at present, they intend to search out the way to speed up the process without losing the strictness of their investigations and procedures.

The LDP's Headquarters for promoting the locating of power sources which was inaugurated on the 17th, also held up a slogan of smooth and speedy licensing for procedures for the location of power sources. The commencement of the MITI's study may develop into a situation in which all ministries and agencies are involved.

Strengthening of the Support System for Areas Experiencing Difficulties in Locating Nuclear Plants: Course of Action of the LDP's Promotion Headquarters

The LDP opened the first meeting of its "Power Source Locating Promotional Headquarters" (Headquarters Chief: Yoshitake Sasaki, formerly MITI minister) at its party headquarters, Nagato-cho, Tokyo, on the 17th, and decided upon its course of action for the next 2 years. The course of action adopted that day (agreement on the establishment of the promotional headquarters) stated that in order to rapidly promote the location of power sources the whole party must grapple with solutions to such problems as compensation to the fishing industry, and also expressed the importance of developing strong support activities in those areas in which difficulties in locating nuclear plant and drawing local cooperation have been experienced.

Among the concrete activities of this headquarters are:

1) Development of a national movement; holding a study and training meeting of party members in those areas in which power sources are to be located; and holding round table discussions with consumer organizations, city heads, governors and organizing power source location caravans.

2) Support activities in those areas where the location of a plant is facing difficulty by means of providing the Headquarters' support and investigatory activities, organizing people who are promoting nuclear plant location, and providing support to local leaders who are promoting plant education.

3) Promotion of various policies for propelling power source location procedures; efficient enforcement of nuclear reactor safety investigation; strengthening and consolidating the three power source laws; and the luring of plants into areas where power sources are to be located.



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