NUKE INFO TOKYO

May / June
1996
No. 53

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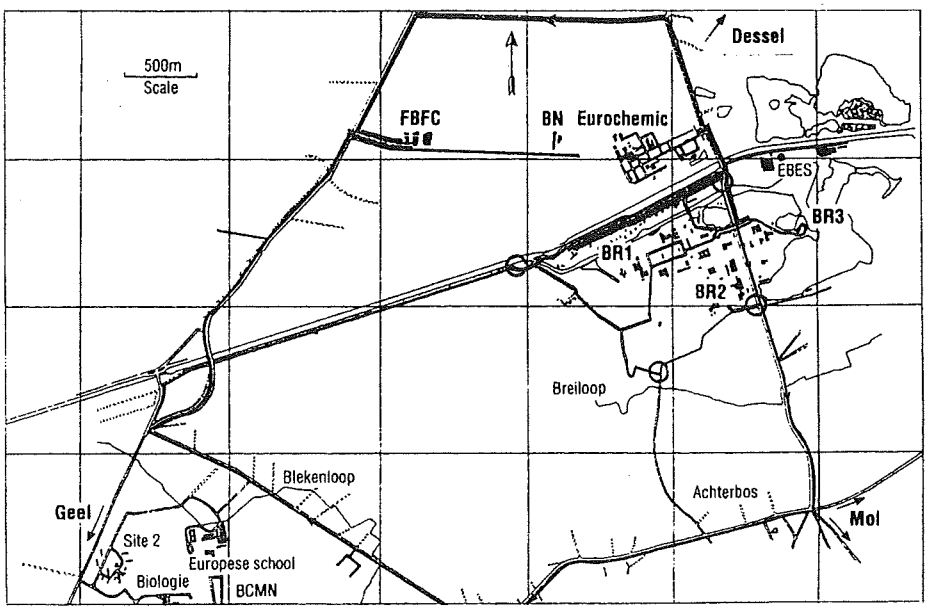
TEPCO Plans to Use Dessel for its MOX Fabrication



The Mol/Dessel site -source:"Nuclear Engineering International, Feb. 1994"

IN THIS ISSUE

Last year, the Tokyo and Kansai Electric Power Co.s (TEPCO and KEPCO, respectively) secretly entered into MOX fuel fabrication contracts (see NIT 52). This news prompted a discussion between CNIC and TEPCO and a meeting, on 24 April, between TEPCO and some Tokyo based NGOs. TEPCO stated its position and answered questions about its contract. TEPCO confirmed our belief that the fabrication would be carried out at the Dessel plant in Belgium using about 400kg of plutonium. It also supplied the fuel's basic design specifications (see meeting summary).

Due to new transport container standards being formulated bythe International Atomic Energy Agency (IAEA) TEPCO is considering both air and sea transport.

These contracts mean that new nuclear power agreements between Japan and Belgium would have to be signed and that the power cooperation agreements that Japan has with France, Britain and the US need to be revised.

TEPCO revealed that it is unconcerned with the refusal of the local governments to relicense reactors for MOX use and sees no problem continuing with the contract either on the grounds of security or the democratic process. Nor does TEPCO expect problems with having the U.S. Department of Energy add the Dessel plant to the Japan-US Nuclear Cooperation Agreement's Annex of approved facilities. On 10 May, CNIC sent a letter to U.S. Energy Secretary Hazel O'Leary asking that she not permit this addition to the Annex as Japan has neither a national consensus nor legal procedures for MOX use.

On 28 May, encouraged by CNIC and Kyoto's Green Action, 9 Diet members wrote to the DOE asking it to reserve judgement.

Memo of TEPCO MOX fabrication contract meeting, 24 April, between TEPCO and Tokyo-based NGOs

1. TEPCO agreed a MOX fabrication contract with Toshiba who simultaneously agreed one with Commox, on 28 April 1995. No other Japanese utilities are involved in this contract.

2. Initially, the contract is for 60 BWR fuel assemblies using about 400 kg Pu (tot) which will be part of the MOX fuel used in reactors from 1998. The contract can be extended to meet extra demand.

3. From 1998, TEPCO plans to load MOX at its Fukushima and Kashiwazaki-Kariwa sites in accordance with the AEC's Long Term Program. This states that a few PWRs and BWRs are to be loaded with MOX in the late '90s.

4. The fabrication plant is Dessel's P0, no other plant is a possibility. Our understanding is that Belgonucleaire will reserve P0's capacity to ensure fuel for the reactor(s) by the end of FY 1998.

5. TEPCO has already presented the basic design specifications to Toshiba (to Commox) and the average plutonium enrichment is slightly less than 3% by weight. But we have not presented detailed specifications because we have not yet specified the first reactor to be loaded with MOX. The fuel quality specifications should follow Japanese standards which are stricter than European ones.

6. TEPCO plans to load up to a third of the BWRs' cores and are not involved in any plans for full core MOX loading.

7. For shipment of fabricated MOX fuel, TEPCO is considering both options, by sea or by airlift.

8. TEPCO has not talked with the local governments of the sites of reactors to be fueled with MOX nor has it any concrete timetable for the talks. Of course, TEPCO needs advanced approval from the local governments before proceeding with MOX relicensing procedures, but TEPCO understands that the MOX fabrication can be done separately from the relicensing procedures in Japan.

9. TEPCO does not think this is a security problem. If the relicensing application is not, at first, accepted (not approved by the MITI-NSC (Nuclear Safety Commission) safety review process) the MOX can remain in Dessel. The fabricated MOX fuel can be stored there or at COGEMA ("We have discussed the possibility and consider this as an option.") TEPCO does not think plutonium transportation and fabrication in Europe without reactor load licensing in Japan will concern the U.S. government. Including the Dessel plant in the Annex of the Japan-U.S. Nuclear Cooperation Agreement would also not be a problem.

10. Americium-241 can be re-extracted from old, separated plutonium in La Hague before being sent to Dessel for MOX fabrication.

(Memo and translation by: J. Takagi, CNIC)

AEC Starts N-Energy Roundtable Amid Distrust and Uncertainty

By Jinzaburo Takagi

Responding to public opinion and in particular the January 23rd proposal of the three prefectural governors (see NIT 52), the Atomic Energy Commission (AEC) of Japan decided to organize a series of "Roundtable" talks on nuclear energy policy inviting people from various groups and varying opinions. These talks are the first of their kind in the history of Japanese nuclear development and this very fact shows that the political situation in the aftermath of Monju accident is causing an unprecedented amount of difficulty for the government to push forward its nuclear program.

The first Roundtable was held in Tokyo on April 25, just one day before the 10th anniversary of the Chernobyl accident, and I was invited with 11 other persons including the governor of Niigata, vice governor of Shizuoka, representatives of utilities, trade unions and think tank institutes, university scholars, a journalist and a lawyer. They are mostly pro-nuclear and pro-government, but some voiced opinions very critical of the government's nuclear and energy policy.

When invited, it was a difficult question for me whether to accept the invitation or not, because these kinds of the government-sponsored meetings could easily be used by the government to show that they are now becoming more open and democratic. They pretend to be eager to listen to the opinions of critics, but after having heard, they would most probably stay unchanged in their nuclear policy, saying that we have got a "consensus". My fear is partly based on my experiences on having been invited to the AEC-sponsored public hearing on the revision of the Nuclear Energy Long Term Policy two years ago. At that time, there were many critical views on the undemocratic way the government is carrying out its nuclear policy and these were particularly critical of the plutonium utilization program. I proposed a 5 year moratorium of Japan's plutonium program so that a thorough review could be guaranteed and there was much support for the idea of a moratorium from the participants of the hearing. But when the government concluded the current long term program, we found that basically nothing had changed with regard to the plutonium program.

In spite of this negative experience, I decided to take part in the roundtable in order to urge that the roundtable which was started in response to widespread public distrust and concern over the government's self-righteous nuclear policy, not end as a formality but truly serve as a system which reflects the public feeling in favor of nuclear phase out and strongly against the plutonium program. At the roundtable, I also stressed the need for freer access to information on which the public can base its decision.

At the first roundtable talk, some speakers also criticized the government's all-too pro-nuclear energy policy, while pro-nuclear "experts" from government and industry institutions made hopelessly stereotyped comments. The first series of roundtable talks is planned to continue by June, each time with different speakers. That may not be a bad start, but nobody knows what the AEC plans to do beyond talking round a table.

The Importation and Storage of VHLW at Rokkasho: Safety Concerns

-- A summary of Dr. Lyman's report

The following article is a summary of a lecture given in Aomori, Japan on 16 April 1996 to a Public Forum on VHLW (Vitirified High-Level Waste) and Reprocessing, by an expert on vitrification, Dr. Edwin Lyman (Science Director at the Nuclear Control Institute in Washington).

Safe Containment of VHLW

The importance of the containment canister cannot be overestimated because the glass inside it is **not** a solid block but is cracked extensively and has many tiny fragments called "fines." It is the canister that contains these fragments and the radioactive gases which escape from the glass. In the event of an accident it is the canister that is the last line of defense. During filling, the canisters are placed under a great stress due to the fact that steel cools more quickly than glass. The stress can reach values as high as 200 megapascals. In high carbon content steels a phenomenon called **sensitization** is observed. Sensitization in conjunction with unfavorable ambient conditions and the stress that the steel is under produces a phenomenon called **stress-corrosion** which weakens dangerously the canisters' resistance to corrosion and mechanical impacts. Strangely, the Japanese authorities did not seem to know about sensitization before an earlier report by Dr. Lyman on the contamination of a returned VHLW canister in August last year. The Expert Advisory Committee (EAC) to the Aomori Government, which is set up to answer the many queries raised by the VHLW issue, tacitly acknowledges that the VHLW canisters are probably sensitized.

Sensitization occurs when austenitic stainless steel is held at temperatures of 400-850 C for a period of time. The higher the steel's carbon content the less the time required to become sensitized. Type SUH 309, the steel used in the canisters which has a carbon content of 0.15% by weight, takes less than thirty minutes to become sensitized. If the steel is stressed then even less time is needed. During filling, VHLW canisters at COGEMA stay at sensitization temperatures for up to **seven hours** and are almost certainly sensitized. Sensitization resistant materials exist, e.g. high-nickel alloys are completely resistant and Type 304L steel is much more resistant than Type 309. Why COGEMA chose and is still using steel susceptible to sensitization, is unknown.

Canister Sensitization and Safety

It is important to understand the safety implications of sensitization for storage and handling. The Science and Technology Agency (STA) did not consider the issue at all when certifying the Rokkasho VHLW storage facility. In fact, the data in the facility application reference documents were for VHLW encased in the more resistant Type 304L steel, not 309. The EAC does not consider sensitization to be important to the safety of VHLW storage. This view is flawed for the following reasons.

Austenitic steel, while resistant to uniform corrosion occurring over a surface, is vulnerable to localized corrosion, in some thermal and chemical environments. For example, where the steel is under stress intergranular stress corrosion cracking (IGSCC) can occur. This can be two or three orders of magnitude more severe than uniform corrosion. In water some chemicals like chloride salts and hydroxyl (OH^-) ions can cause localized corrosion even at very low concentrations. These conditions are found in marine environments, where sea air has high concentrations of these compounds. All of Japan's nuclear

facilities are near the coast. It is not clear that precautions are being taken to counter these conditions. Because localized corrosion is an unpredictable phenomenon that is susceptible to tiny changes in environmental conditions, reliable safety analyses of how sensitized canisters will perform are virtually impossible.

Given these problems, canisters storage becomes very important. The EAC claims that during storage the maximum salt concentration on the canisters will not exceed 1mg per square meter because of high-efficiency air filtration. But with high initial salt concentrations from the sea air (50mg/day/m^2 is a conservative value) the salt concentration would reach 2mg/m^2 in 35 years, twice the maximum salt concentration claimed by the EAC, even if the air filtration system is 99.99% efficient.

During storage there are two periods of great concern. Early on when the canisters are hot they are vulnerable to the action of molten salts such as boron and cesium oxide released from the VHLW. These are major constituents of VHLW and they leach out of the glass due to their relatively low melting points (450 C). In molten form they are known to corrode stainless steel. And later, when the canisters are cool enough for water to condense on them. The water could act as an electrolyte for contaminant salts that allows stress-corrosion to occur. The EAC's claim that the canisters' temperature will never fall below 100 C during their 50 years of interim storage is based on the premise that each canister produces 2kW of heat. But in the first batch each canister produced only 1.6kW of heat. Consequently the canisters could be as much as 40 C cooler and could fall below 100 C after as little as 20 years in storage. Any loss of canister integrity while in interim storage would make the task of moving them to the final disposal site very difficult.

Based on a non peer-reviewed study of stress-corrosion cracking in sensitized Type 309 steel from the Central Research Institute of the Electrical Power Industry (CRIEPI), the EAC argues that condensation will not result in stress-corrosion cracking as chloride concentrations on the canisters will never become high enough. This fails to take into account the effects of high gamma radiation in promoting stress-corrosion cracking in sensitized steel. Nor does it examine the effect of moisture-absorbing contaminants in increasing the corroding effects of moisture.

At no point does the EAC report discuss which contaminants the canisters have been exposed to before arriving at Rokkasho-mura. La Hague is on the coast and the air in the canister storage facility is coarsely filtered. Though the canisters are too hot for water to condense it is still possible for salts to do so.

Another corrosion source not considered by the EAC is the moisture inside the canisters. Although only a small amount (about 0.01-0.1 % by weight), the water present would be very corrosive, under the action of heat and radiation.

Canister Drop Accidents

As a primary radiation barrier it is important that the canisters are accident resistant. For example, if one is dropped to the bottom of a storage tube or is in a plane crash, or an earthquake, the evidence is that sensitized steel will fracture more easily than unsensitized steel.

Flooding of Storage Facility

If a storage facility is flooded with sea water (for example, after a tidal wave) sensitized canisters will corrode many times faster than unsensitized ones. If the water recedes slowly stress-corrosion cracking will occur in a matter of weeks with a significant release of radioactivity into the environment.

Conclusion

VHLW canister sensitization is undesirable and avoidable. It increases the risks of VHLW storage. No more potentially sensitized canisters should be allowed into Japan and the authorities should request that COGEMA change to a sensitization resistant material like the high-nickel Alloy 825.

Monju Accident Update, Sheath at Last Found

On April 24 1996, after an 138 day search, Monju technicians finally recovered the sheath (a tube protecting a thermocouple) missing since the sodium leak and fire accident of December 8 1995. The sheath was found in the superheater's distributor 160m downstream from the thermocouple. On January 8, x-ray photographs revealed that the sheath's tip was missing. Technicians conjectured that sodium leaked out through the broken, open tube. Despite its efforts, the Power Reactor and Nuclear Fuel Development Corporation (PNC) had not been able to find the missing sheath. It was finally discovered on March 28 by cutting the piping in several places near the superheater's entrance and searching with a fiberscope.

"Committee for General Evaluation of the Monju Accident" Formed

Investigators are beginning to understand the technical cause of the accident: the mechanism by which the sheath's tip broke. Considered most likely is the theory that the symmetrical eddy formed around the sheath by the sodium current and the vibration of the sheath in the direction of the current produced resonance that in turn caused metal fatigue. But CNIC believes that the true cause of the accident is the high-handed way in which the Science and Technology Agency and PNC have worked hand-in-hand to further this project. As long as project developers collaborate with the authorities who are supposed to control them, checks become ineffectual. The inability to spot the thermocouple's design fault is an example of this. It's highly irregular for an accident investigation to be conducted by those in charge of the project.

CNIC formed the "Committee for General Evaluation of the Monju Accident" to investigate and evaluate the accident independently of the nuclear power industry. Not only scientists, engineers and former nuclear engineers, but also sociologists, legal scholars, lawyers, and others are participating in the Committee. It intends to evaluate the accident from a social scientific as well as a technical perspective. Participants are divided into three working groups which are responsible for the technical aspects, the legal and social aspects, and the plutonium policy decision-making methods. This fall the Committee will release an interim report and in about a year, will release its findings in proposal form.

On 23 May, the STA published a new report on Monju. CNIC will review in NIT 54.

Recent Events Relating to the Monju Accident. (8 January 1995 to 23 May 1996)

December 8	Sodium leak and fire accident at Monju.
January 8	X-rays show that thermocouple sheath is broken and missing.
January 23	Governors of Fukui, Fukushima and Niigata prefectures propose a review of the Long-Term Program for Nuclear Energy Development to the Prime Minister (please see, "Proposal Concerning Future Nuclear Power Policy Implementation," in NIT 52).
March 26	"Committee for General Evaluation of the Monju Accident" formed.
March 28	Broken sheath found in superheater.
March 29	Nuclear Power White Paper issued four months late due to Monju accident. Little mention is made of the Nuclear Safety Commission's own views on the accident.
April 24	Sheath recovered.
May 14	1 million signatures from people demanding that the operation of Monju be suspended, delivered to Science and Technology Agency.
May 23	STA published a new report on the Monju accident.

Anti-Nuke Who's Who:
The People in Front of the French Embassy

Almost five months have passed since the French government ended its last series of nuclear tests. After President Jacques Chirac announced the start of nuclear testing the first protest in front of the embassy was by an anti-nuclear group, "Peace Chain Reaction", on 26th June. After that, the number of people in front of the embassy increased. Between September and January 1996, 30 to 50 people were usually gathered there, sitting. People were very kind to new participants, offering small places to sit down--the walkway in front of the embassy, is 50 meters long by 0.5 wide.

The people gathered in front of the French embassy, held several series of protests. A 24 hour relay marathon was held on 18th and 19th November. They made 169 rounds of the embassy. On 24th December, they dressed like Saint Claus in black and held a party, "a Black Christmas Party", in protest. They blew out 208 candles simultaneously in hope of cleaning up all France's nuclear tests. To date France has conducted 208 nuclear tests. Then the protesters presented a Christmas tree with strip of fancy papers bearing their wishes, "Stop nuclear testing" and miniatures of FBR Monju, to the embassy. Finally, on 28th January 1996, the day French government conducted the 6th nuclear test, the people held a funeral entitled "the Ceremony of Bidding Farewell to N-tests" in the hope that it would be the last nuclear test. They presented a coffin included a dummy of a nuclear weapon with 210 (the total number of the nuclear tests by French government) chrysanthemums. In Japan, the chrysanthemum is the flower that is traditionally offered to the dead.

On 30th January, the French government declared an end to N-testing. The people held their last rally, "a Bye Bye Rally in Front of the French Embassy", and demonstrated there on 1st February. Even after the last rally they did not stop their protests. They held a photo exhibition, "the People in Front of the French Embassy", from 15th to 21st March at a gallery in Tokyo. It was held to keep fresh in peoples' minds this series of French N-tests. About 600 people attended.

Some of "the People" had never taken part in protests or in activities related with citizens' movements, but they came to know each other and learned a lot from the activists who gathered there at the French Embassy. Before the N-tests began, some of them were mainly interested in human rights, some were involved in peace and war issues, and others were in the environmental movement. These activists with such varied concerns got together and created a new perspective. The People in Front of the French Embassy, are still active and are continuing their protests in as many ways as possible. **(by Ichiro Murakami)**

DATA Significant Incidents at Nuclear Plants

(January to June 1995)

Date	Plant	Short description of event
Jan. 3	Takahama 2	Steam leaked through a side tube attached to the main feedwater piping; reactor manually stopped.
Jan. 5	Kashiwazaki 4	Reactor scrammed when transformer struck by lightning.
Jan. 27	Takahama 2	Secondary coolant leaked due to rupture of feedwater heater tube; power dropped and restored after plugging the ruptured and 6 surroundingtubes.
Jan. 30	Shimane 2	Reactor scrammed due to high water level in the scram discharge volume.
Jan. 31	Fukushima I-1	Fire broke out in front of administration building, caused by welding work.
Feb. 2	Mihama 3	Neutron monitor failed during rated power operation.
Feb. 21	Monju	Pressure in flash tank fell below design value resulting in heat-water imbalance right after start of nuclear heating test.
Feb. 22	Tokai Repro. Plant	Junction between glass melter and HLW canister clogged with 40 kg high level waste glass.
Feb. 25	Ohi 2	Reactor manually stopped due to leak of radioactive coolant from steam generator tube; failure switching to external power line led to power loss to condensate water pump, causing secondary coolant release from main steam relief valve for 48 hours.
Mar. 3	Tokai Repro. Plant	Three workers exposed during transfer of waste solvent.
Mar. 6	JMTR	Reactor scrammed due to overly fast withdrawal of control rod.
Mar. 24	Tomari 1	Four workers burned due to fire followed by small explosion in condensate tank of low level waste bituminizer.
Mar. 24	Fukushima I-3	Power reduced due to circulating water pump axis vibration.
Mar. 26	Tokai Repro. Plant	Spent fuel feeder shearing device failed.
Apr. 18	Tokai I	Generator 1 stopped due to sea water leakage into main condenser
Apr. 21	Tokai I	Generator 2 stopped due to sea water leakage into main condenser.
Apr. 24	Fugen	Turbine automatically tripped due to rotation anomaly.
May 11	Takahama 4	Fuel assembly support plate damaged during inspection.
May 12	Ohi 2	188 steam generator tubes found to be damaged during inspection.
May 12	Mihama 3	488 steam generator tubes found to be damaged during periodic inspection.
May 22	Monju	Reactor scrammed due to anomalous flow in main feedwater pump.
May 29	Ikata 1	89 steam generator tubes found to be damaged during periodic inspection.
Jun. 6	Tokai I	Graphite sleeve damaged during fuel transfer.

NEWS WATCH

Graphites to Be Exported to China

China and Japan exchanged a memorandum, on Apr. 29, concerning a plan to expand cooperation in the Japan-China Nuclear Power Cooperation Agreement and to add to equipment included in the agreement. The areas of cooperation to be expanded are design, construction, operation and safety of high-temperature gas reactors. Concretely, Japan will cooperate in China's project for an experimental, 10-MW high temperature reactor (HTR), and export graphites (who the major cooperator is, is unknown). Primary coolant pumps will be added to the agreement. MHI plans to export them to Qinshan 2 and 3. The Ministry of International Trade and Industry (MITI) approved the plan on May 2.

There is grave concern that graphites could be used for a military purpose. Nevertheless, by exchanging memoranda and bypassing Diet debate the government virtually revised the agreement. Financing for the export of primary coolant pumps is being discussed by Japan Export-Import Bank and other banks. It will a first for such financing of nuclear equipment in Japan.

Nuclear Industry Trying to "Denuclearize"

With little prospect of new orders for nuclear power plants the nuclear industry is reorganizing itself. In Oct. '89 Toshiba and the Nippon Atomic Industry Group Co., Ltd. (NAIG) merged. In Jan. '95 Mitsubishi Heavy Industries (MHI) absorbed its affiliate Mitsubishi Atomic Power Industries, Inc. (MAPI). These companies also have reorganized, for instance, by transferring their nuclear technicians to other sectors.

On Apr. 1 MHI transferred about 200 of its 600 technicians at the Nuclear Technology Center in Yokohama to Kobe Shipyard in Kobe City. Kobe Shipyard is a production base thermal power plants as well as for nuclear reactors. These technicians will be involved in designing thermal power plants. Toshiba plans to transfer about 100 technicians to thermal power or industrial machinery divisions. Hitachi also will relocate about 50 nuclear technicians to a semiconductor plant as design personnel. Ishikawajima Harima Heavy Industries has begun moving about 200 nuclear technicians to different divisions such as boiler and cement plants.

An Asian EURATOM

On Apr. 18, the second day of the annual convention of the Japan Atomic Industrial Forum, Inc., an Asian version of EURATOM was discussed in a session entitled "Expanding Nuclear Power Generation Development Plan in Asia." Citing (1)safety, (2)nuclear non-proliferation, (3)backend policy measures, (4) public understanding and confidence, and (5) economic feasibility as issues to be considered for nuclear power development in Asia, vice president Sumi Sadahiko of Kansai Electric Power Co. stated that "a framework for multilateral cooperation such as ASIATOM or PACIFICATOM, an Asian version of EURATOM, may be effective" as a solution to these issues. There was support for his idea but others questioned its effectiveness. At last year's annual convention Tokyo Electric Power Co.'s director Kano Tokio proposed a similar idea.

At the "Nuclear Safety Summit" held in Moscow on April 19-20, Japan's Prime Minister Hashimoto Ryutaro proposed holding an "Asian Conference on Nuclear Safety" in Japan. The STA regards this proposed conference as a step toward "ASIATOM."

Public Hearing on Higashidori 1

A public hearing on Higashidori 1 (BWR, 1100MW), Tohoku Electric Power Co.'s planned reactor in Higashidori Village, Aomori Prefecture, was held in the village, on April 17. MITI organized the hearing and Tohoku Electric explained its construction plan. The power company also responded to the opinions and questions raised by 24 local people. The hearing was more like an "explanation meeting." There will be another hearing after MITI's safety inspection is done and the Nuclear Safety Commission begins its reinspection. It will be organized by the Safety Commission and MITI will explain. The hearings are only a day each and are being criticized as a formality.

It has been ten years since the last construction plan hearing, held in 1986 about Shiga 1. As for other plans, the one on Onagawa 3, whose construction was granted recently (See other news), was held in 1993. When a first public hearing is held, there is usually not much interest, as the power company has already obtained land for the site and paid public compensation for damage to fishing. Despite this tendency, the people at Higashidori presented various views and since in this plan the final number and types of reactor to be constructed has not been made clear and because the area is prone to earthquakes and tidal waves, they asked many questions. The recent hearing was concerned with only one of Tohoku Electric's planned reactors, but both Tohoku Electric and KEPCO have revealed their plans to build two reactors each. It is said that enough land has been secured to build a total of 20 reactors. Tohoku Electric repeated its response to the people's concern, claiming that "at this point it is sticking to the plan, and future plans would depend on power demands and the understanding of local people," and "safety measures are absolutely sure." Local people appeared skeptical of these "explanations."

Onagawa 3 is Granted Construction Permit

Minister of International Trade Industry, on Apr. 12, granted Tohoku Electric Power Co. permission for the construction of Onagawa 3 in Onagawa-cho, Miyagi Prefecture, as planned. Once built it will be the 53rd commercial reactor in Japan. The last time permits were granted they were for Kashiwazaki 6 and 7 in May 1991.

The Supreme Court rejected Suzu mayoral election

On 31st May, the Supreme Court handed down its final judgement ordering Suzu-city, Ishikawa Prefecture, to rehold the city's mayoral election. The court upheld the Kanazawa Branch of the Nagoya High Court's judgement (NIT 51) that there had been many irregularities during the election of April '93 in which the present pro-nuclear mayor was elected (NIT 35). The Supreme court also rejected an appeal by the Ishikawa prefectural election committee. This momentous decision will produce a new election in the next few months.

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