

# NUKE INFO TOKYO

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## Plutonium Policy Stalled



POOL PHOTO

Two officials of PNC inside the piping room of Monju on 12 Dec.

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In ground-breaking news it appears there are signs that Japan's plutonium program is already being forced to change. On January 23, the governors of Fukui, Niigata and Fukushima prefectures jointly visited the Prime Minister's Office and the Ministry of International trade and Industry (MITI) to urge the government to review the entire Long Term Nuclear Energy Program. In particular, they expressed their concern over the plan to burn MOX fuel in LWRs and I stressed

that the prefectures will not permit the relicensing of reactors sited in their prefectures to burn MOX. Not, at least, until the investigation of the Monju accident, in which over two tonnes of sodium leaked from the secondary cooling system of the fast breeder reactor (FBR) on 8 December '95, has finished. 60% of Japan's 48 operational reactors are situated in these three prefectures alone and among them are the first two reactors for which relicensing applications are likely to be made. It is now widely believed that the opposition of these three governors has postponed the MOX program indefinitely.

On the same day, Japan Nuclear Fuel Ltd.(JNFL) held a press conference and made an announcement that dealt a second blow to Japan's plutonium policy. It said that the Rokkasho reprocessing plants projected final cost was in 1.6 trillion yen, twice the initial estimate and that in response the plant would be scaled down and redesigned among the items to be trimmed will be part of the plutonium separation system but JNFL asserted that this will not affect the purity of the plutonium produced. The company did concede that the scaling down would reduce the plant's output. JNFL estimated that the obtaining a license for the redesigned plant will put the start of operations back three years to 2003, but many observers believe that the plant will not be operational before 2007-8. This makes the government's target of producing and burning 4.8 tonnes of plutonium per annum by the year 2000 unattainable.

The Asahi Shimbun newspaper of 24 January stated that STA officials are now admitting that a complete review of the plutonium supply and demand program is now a necessity if Japan is to avoid a plutonium surplus.

## The Monju Accident

The sodium leak accident at Monju, Japan's first power generating FBR was far more serious

than first thought. The government-owned PNC (Power Reactor and Nuclear Fuel Development Corporation), owner/operator of Monju, has lost the public trust utterly, not only because PNC's technology for handling sodium safely has proven to be far from adequate but because it has been revealed that the corporation attempted more than once to cover up the seriousness of the leakage. The government is being forced to review Japan's FBR program and hence the whole plutonium program which now stands at a crossroads.

## Worst Sodium Leakage

Though the leakage took place in the piping of the secondary cooling system and did not involve a major radiation release, the accident at Monju was one of the most serious sodium leakage incidents in the history of FBR development. In terms of the amount of sodium leaked it is second only to the leakage of sodium from a storage tank at France's Superphenix in 1987. The 2-3 m<sup>3</sup> sodium leakage was the largest ever to occur in the piping of an operating reactor and also the worst in terms of the leakage rate.

PNC and affiliated experts asserted that the leakage was far below the amount considered dangerous for a maximum credible accident. Indeed a leak of up to 150 m<sup>3</sup> from a secondary pipe was approved in the licensing safety review of the plant and it was concluded that most of the leaked sodium would pour onto the steel-lined floor and be recovered by a drain system without causing any serious problem. Even though the spill was, in reality, only about 1% of the maximum credible accident's value all of the 2-3 m<sup>3</sup> of leaked sodium reacted violently with the air, causing a spray-fire and filling the secondary coolant piping room C with fumes of reaction products such as sodium oxide and peroxides. A ventilation duct that was located just under the leaked pipe, prevented the sodium from simply pouring onto the floor. Most of the

sodium burned in the air, or fell on the duct and the steel walkways, burned, reaching temperatures of 1500C and melted the duct. Some fumes even found their way into neighboring rooms and to the outside through the ventilation duct which was not shut off, in violation of the licensed operational procedure, and through openings around piping and cables. Part of the steel liner and other metal structures were seriously damaged due partly to heat and possibly, reactions with reaction products like  $\text{Na}_2\text{O}_2$  (sodium peroxide) which is an effective melting agent (known as a "flux" in chemistry). It has been pointed out by the Fukui Prefecture that the sodium storage tank which was used in this accident for draining the secondary sodium in the damaged loop C could not withstand the thermal stress caused by an emergency drain at high temperatures. According to the nuclear safety division of Fukui, the tank is not designed to withstand the thermal stress caused by a rapid drain of hot sodium at the operating temperature of around 500 C and it was actually used during the accident only after the sodium temperature fell below 330 C. If a more rapid drain had been necessary, the storage tank would have been destroyed. Further damage may have occurred when some sodium spread to one of the concrete walls, and could well have eroded part of it. If the 150 m<sup>3</sup> approved by the licensing review had leaked, the consequences of the fire and sodium compound reactions would have been catastrophic.

## PNC was not Prepared to Handle Sodium

Safe handling of sodium is vital for the safety of FBRs. Although PNC repeatedly claimed it had overcome the difficulties of sodium handling experienced in European FBR development, the accident showed that this is not the case. The operations manual was very ambiguous about the circumstances in which the reactor should be closed down. Due mainly to

this deficiency, it took 90 minutes for the reactor operators in the control room to decide to manually shut down the reactor, even though they knew the leak had occurred because of the sodium leak detectors and smoke detectors going off. The operators also violated the manual in not shutting down the reactor as soon as they observed white fumes in the room.

Due to the delayed reactor shutdown, the draining of the sodium from the leaking secondary sodium loop C did not start until 22:40, three hours after the start of leakage and was only completed at 00:15 the next day. There were no other means by which the leakage could be stopped.

In addition, as previously mentioned, the ventilation system had been left running for a long period (about 3 hours), which fanned the fire and helped spread the reaction products to a wide area through the ventilation ducting. As a matter of fact, nowhere in the manual does it specify that the ventilation system should be shutdown in the event of a sodium leakage. Even though the fire could have been extinguished by the "suffocation" technique. An option that is mentioned in both the reactor operation manual and PNC documents.

## Sensor Casing Ruptured

Although detailed investigation of the cause of the leakage is still to be conducted, the PNC-STA tentative investigation using X-ray photography shows (see Figure 2 on the page 8) that a thermocouple inserted in the main secondary flow broke at its base, suggesting that sodium flowed from there to the top of the side tube used for taking temperature measurement and leaked there. Already experts point out that the so-called "von Karman's vortex street" which is caused by the interaction of the sodium flow and the thermometer made the thermometer vibrate until it was broken due to metal fatigue. If this is the case, the leakage was caused by a very basic design failure and this should

being regarded as another example of PNC technical incompetence as well as a flaw of STA safety regulations.

## A Cover Up, Another Cover Up and a Suicide

On December 20, 12 days after the accident, it was revealed that the 1 min. videotape released to the public through the media as the first record of the accident site taken by PNC at 10 am. December 8, was a largely edited version of the two original videotapes of Monju plant, Isao

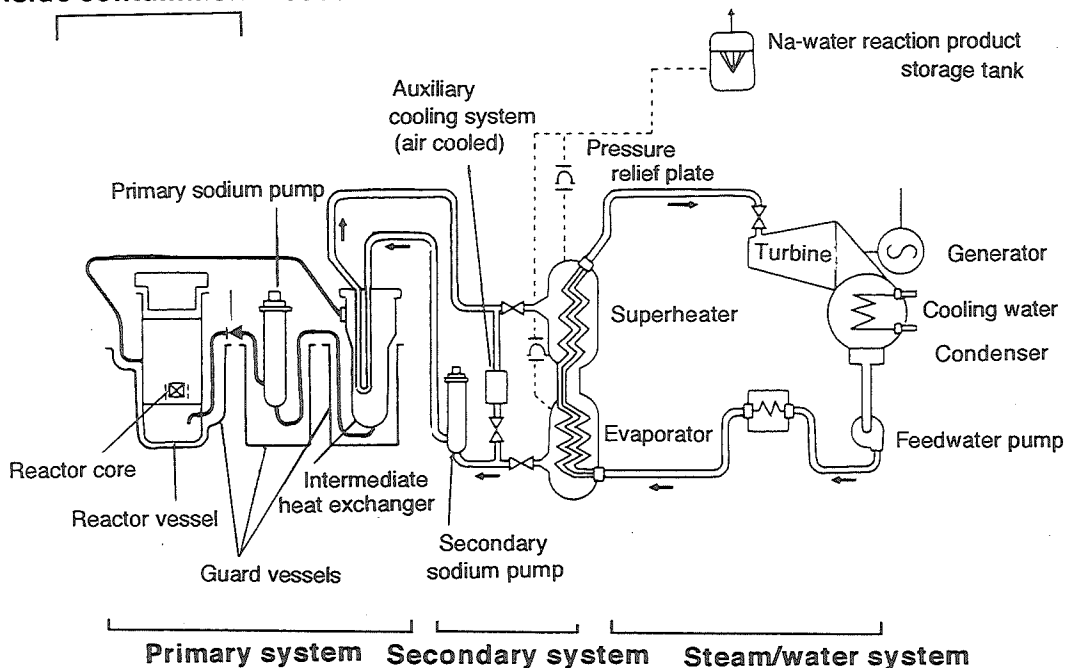
Sato admitted at a press conference that it was he and not the plant head

who ordered the editing because the original videotape was too shocking, showing as it did the serious damage to the pipes and ducts and the large amounts of sodium product spread all around. The edited 1 minute tape only showed a lump of sodium product in a corner of the room, all other pipes and structures appeared to be intact.

A few hours after the press conference, however, Yasutami Ohmori, head of the plant,

Figure 1 **The Fast Breeder Reactor MONJU**

Inside containment vessel



admitted when asked by the press, that he himself ordered the editing of the original films. On the following day, the compulsory investigation by the Science and Technology Agency (STA) revealed that PNC had lied about the time they entered the room where the leak occurred. They actually entered the room at 2 am on December 8, just a few hours after the leakage stopped, to find the room full of fumes and the ruin caused by the fire. The 10 minute videotape they took was kept secret. All these attempts at a cover up were made organizationally in order to make the accident appear to be a minor leakage incident.

This farcical chain of events that have followed in the wake of the Monju accident took on a far more grim and ominous tone with the tragic news that Shigeo Nishimura, deputy general manager of PNC's general affairs department and a leading member of the in house investigation team looking into the coverup, jumped to his death on January 13 from a hotel in Tokyo. His suicide came just one day after it was revealed that the PNC Tokyo headquarters which had been believed until then to be innocent in and ignorant of, the coverups was in fact directly involved from the very beginning. Although the details of the three letters (to PNC head, PNC colleagues and his wife) that he left in his hotel room are not publicly known, it is easy to infer that he must have been under intense pressure that tested his loyalty to PNC against his responsibility to the truth because the probe in to the coverup has, for the most part, been mainly conducted by PNC itself. Nishimura had been required to investigate his colleagues and even his bosses. As such it is fair to say that Nishimura was a victim of this curiously Japanese way of dealing with everything internally rather than opening it up to public scrutiny. Suicide is rather common in political corruption affairs and there have been a couple of suicides in other nuclear accident cases in Japan.

At any rate, a likely consequence of the

suicide is we may never truly know what Nishimura's investigation uncovered.

## STA is Also Responsible

Although STA is harshly accusing PNC of inadequate operational procedures and of covering up, its own inadequacies and failures in this fiasco are quite obvious. There were four STA staffers at the site at the time of the accident, of whom two were operation control specialists. But according to the official statements of STA, they did practically nothing to investigate what happened inside the plant or what PNC did in response to the accident. If they could not even conduct STA's own investigation, it shows that the STA officials were not considered to be a source of trouble by PNC and that the STA was completely incompetent in handling the situation, although there are reasonable suspicions that STA knew what was going on but feigned ignorance. At any rate, the developments after the accident demonstrate STA's irresponsibility and inadequacies and as a result it has lost the public's confidence.

## Restart is Impossible?

It will still take years to return the plant to operational condition. First, the secondary piping room C and neighboring rooms have to be cleaned up. Then an investigation of the cause of the leakage needs to be conducted and necessary repairs have to be made. The repair work and post-work inspection will take a long time, because a large number of pipes, valves, cables and sensors have to be replaced due to contamination with the corrosive sodium products and all the thermocouples will need to be replaced.

Even if all the technical difficulties are corrected, it would be extremely difficult politically to restart the plant. As stated previously the Governors of Fukui, Niigata and Fukushima have already protested to the prime

Minister and to MITI. PNC and STA's handling of the accident means they will not be able to restore the confidence of the local people. An opinion poll by telephone conducted by Fukui TV station showed that 75 % of those questioned were against restarting the plant.

## True Cause of Accident is Pu Program

STA and PNC had been arguing, without offering any evidence, that Japan was technically well prepared to build and operate FBRs and that the ambitious and reckless plutonium program was justified in a country with few natural resources, even though their claim flew in the face of the evidence and mounting international and domestic criticism. At the time of the plutonium shipment from France to Japan on board Akatsuki-maru (1992-1993), they claimed that the shipment was urgent because the plutonium was needed to fuel Monju. They then carried out the shipment with all the necessary information relevant to safety and security of the shipment kept secret.

All these claims, however, proved to be false. It is now evident that Japan's undemocratic and reckless plutonium policy is the very cause of the accident and subsequent cover ups. All the arguments STA and PNC gave to justify their program are collapsing and now is the time for a drastic change. As even the STA itself concedes.

## Plutonium Surplus

For the moment, even the most optimistic observation predicts that it would take no less than three to four years for Monju to restart. In addition, there is now no prospect at all for the construction of the 600 MW demonstration fast breeder (DFBR) that is to follow Monju, which means the whole FBR program is dying. With the Ohma ATR project already canceled, there is no alternative for the Japanese government and

utilities other than to consume separated plutonium by burning it in LWRs. But this would also not be easy in view of the wide spread distrust of Japan's plutonium program. The last issue of NIT carried the plutonium inventory as of the end of 1994. Our assessment indicates that there was already 11.6 ton surplus in the beginning of 1995 and the surplus was expected to exceed 14 tons by the end of 1995. The accident at Monju will surely contribute to a further increase of surplus, not only in the short term but in the long term, if the reprocessing policy is maintained, since the whole plutonium demand plan will be far behind schedule.

## CNIC Urges, Scrap Monju and Review Pu Program

On December 25, Dr. Takagi and other CNIC staffers met with S. Izumi, Director of Nuclear Fuel Department and other STA officials. There they demanded the following of Yasuoki Urano, Minister of STA (replaced recently in a cabinet reshuffle).

1. Scrap Monju.
2. Review Japan's plutonium program completely with the participation of the public.
3. Make clear the responsibility of PNC and of STA, for the flawed safety control which caused the accident, the inadequate management of the accident and the cover ups that followed, and above all the undemocratic manner in which the plutonium policy is promoted.
4. Set up a truly independent investigation into the cause of the accident, not only from the technical point of view but also with regard to societal aspects, because the accident was the result of the undemocratic self-righteous R & D policy.
5. Set up an independent advisory body for facilitating public access to information. STA & PNC have had until now, carte blanche in judging what information is or is not to be released. This autocratic system should now be altered.

**PNC's Reported Time Sequence on the Monju Accident**

*\*Italic text is CNIC 's comment.*

**December 8**

- 19:47 Alarm of "High sodium temperature at exit of IHX (Intermediate Heat Exchanger) in C-loop of SHTS" sounded. Fire alarm sounded.
- 19:48 Alarm of "Sodium leak from C-loop" sounded.
- 19:52 Visual investigation of locations near alarm sensors. White fumes confirmed by crew
- 19:58 No change observed in Sodium Level Meters reading in Steam Generator C and Overflow Tank. --Crews reported the above results as a small leakage to the shift supervisor.
- 20:00 Start to decrease reactor power. --But only by a small amount.
- 20:10 PNC contacted with the director of Monju by ringing his Pocket Pager.
- 20:40 First notification of the accident to STA and Fukui Prefectural Government.
- 20:50 Second visual investigation conducted by the crews. More dense white fumes seen.
- 20:54 First notification of the accident to Tsuruga City Authority.
- 21:10 Two Na leakage alarms sounded. Decision made to shut down the reactor immediately.
- 21:20 Manual trip of reactor.
- 21:25 PNC Informed Mr. Kurita, the Governor of Fukui. of the accident.
- 21:30 Fukui Prefectural Government informed media that "The reactor was shutdown by hand. It seems to be due to a leakage of Na from the second cooling system. No radioactivity was released into the atmosphere."
- 21:55 PNC informed the media of the accident by fax.
- 22:40 Sodium drain of C Loop of SHTS started.
- 23:05 PNC held an emergency press conference at the Tsuruga city office.
- 23:13 Air blowers to intake and exhaust outside air to/from the steam generator room and the piping room for SHTS of C Loop were turned off.

**December 9**

- 0:15 Completed the draining of C Loop in the SHTS.
- 2:05 Operators with Oxygen masks entered the piping room.--The existence of the video footage shot by them was only revealed afterwards.
- 10:00 Five engineers with Oxygen masks entered the piping room--It was revealed on 22 Dec. that this report was false.
- 16:10 Nine engineers entered the piping room, and shot video footage. They disclose the 1 min. and 4 min. videos edited by themselves.
- 21:00 2 representatives of the Nuclear Safety Committee arrived at the Monju.

**December 10**

- 15:00 Nuclear Safety Committee held an emergency meeting .

**December 11**

- STA formed the "Taskforce of investigation on the accident of Na leakage at Monju". It consisted of STA nuclear safety advisors and officials of STA etc.
- 3:25 4 officials of Fukui Prefectural Government and Tsuruga City entered Monju, in accordance with the Safety Agreement, shot video footage, and disclose it.

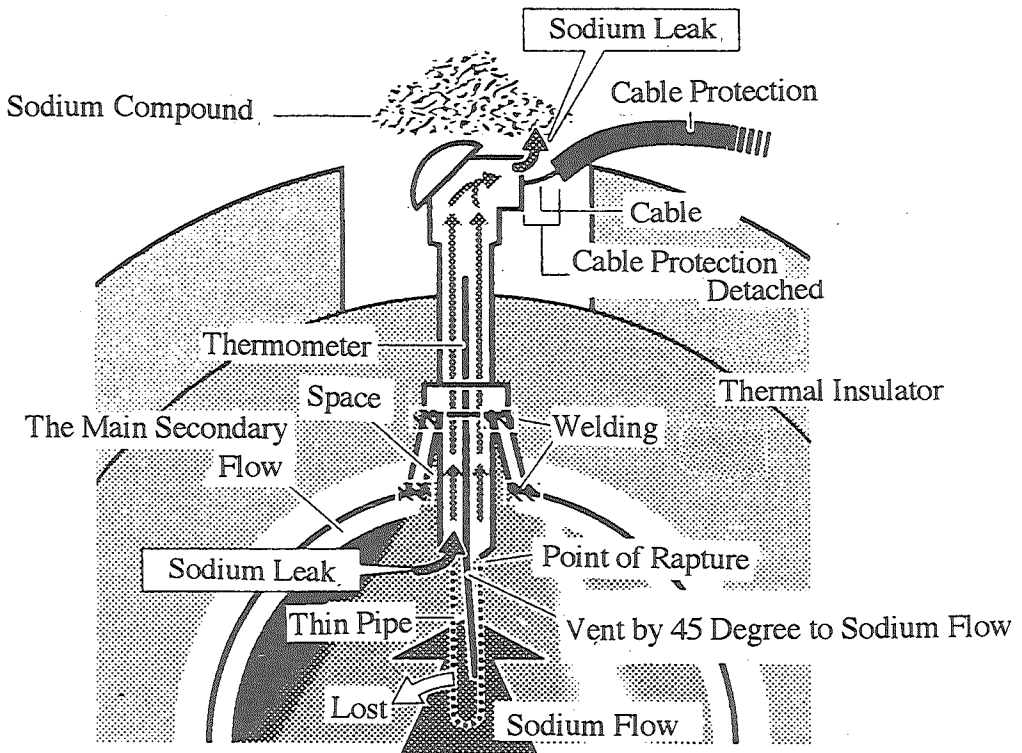


Figure 2: Gauge at the Intermediate Heat Exchange Outlet in the Second Heat Transport System of Monju

### PNC's Comment

X-Ray transparency tests were performed to gain a detailed understanding of the sodium compound near the temperature gauge. The gauge vicinity is presumed to be the direct reason for the sodium leak that resulted in the accident on December 8, 1995. The tests were ran from 8:30 p.m. on January 7 until 7:10 a.m. on January 8.

#### (1) Adhesion of the Sodium Compound

The X-rays showed that substances similar to sodium compounds had accumulated around had gauge's well located at the signal outlet. No variable-density images of sodium compounds were observed in the thermal insulation on the outside of the temperature gauge's well.

#### (2) Temperature Gauge

The thin pipe portion of the temperature gauge's well that was inserted into the piping could not be seen on the X-ray films. Furthermore, the thermocouple (3mm diameter) that is incorporated into the well's thin pipe was turned at a 45° angle in the downstream side. The presence of irregularities in other parts of the temperature gauge could not be detected from the X-ray films taken.



## NEWS WATCH

### **Anti-nuclear Mayor Elected**

In Maki-machi, Nii-gata Prefecture, Takaaki Sasaguchi won a landslide victory to become the town's mayor on an anti-nuclear stance.

An ordinance on a referendum questioning the Tohoku Electric Power Co.'s planned construction of a nuclear power plant was established there, but the pro-nuclear lobby, including the previous mayor had put off the voting (see NIT No. 50). Angry citizens who were campaigning to recall him, submitted a request to the election management commission along with a petition of 10,231 people or 44% of the constituents, on December 8. To avoid being recalled the mayor, on December 15, resigned from his post. Due to his resignation an mayoral election was held on January 21. Those calling for an enforcement of a referendum decided to put up Mr. Sasaguchi, of the Association to Promote the Referendum, as candidate. The pro-nuclear lobby could not decide on a nominee.

### **PNC & Related Local Gov.s Agree on Geo Research Lab.**

The Power Reactor and Nuclear Fuel Development Corporation (PNC), which plans to build a deep, geologic layer research laboratory in Mizunami City, Gifu Prefecture to study the area's feasibility for a high-level radioactive waste disposal site, on December 28, 1995 signed a construction agreement with the prefectural and city governments. The agreement stipulates that radioactive waste will not be brought into the laboratory, but there is no guarantee that the surrounding area will not be used as a waste disposal site.

Citizens had demanded that the mayor

establish an ordinance that a referendum be held to decide if signing the agreement be temporarily suspended. The mayor, however, signed the agreement without putting the citizens' demand to deliberation in the city council, as legally required.

The people of the Tsukiyoshi district, where the proposed construction site is, are opposed to the plan, and held a night rally before the scheduled signing and reconfirmed their opposition to the plan.

As briefly outlined in News Watch/ NIT 49 PNC's plan is to build the laboratory on a site it already owns. But they still need to acquire some new land for the construction access roads. The opposition of the people in the Tsukiyoshi district has prevented the plan from being implemented even after the agreement has been signed.

### **The Kushima Nuclear Power Plan Brought to an End**

NIT reported in its last issue that Kyushu Electric Power Co. stated its intention to freeze its plan to construct a nuclear power plant in Kushima City, Miyazaki Prefecture. On December 21, 1995 the city council withdrew its resolution of October '93 requesting that Kyushu Electric investigate a suitable site, putting the end to the plan.

The current mayor often said that he considered the issue "with an open mind" but recently he stated before the city council that he opposed the plan. This, however, may have had more to do with mayoral elections scheduled for November. In the election the former mayor who was convicted of bribery, intends to run "in favor of nuclear promotion."

## New Referendum Ordinance Adopted

At Kisei town council in Mie Prefecture, on December 14, an ordinance on a referendum to question the planned construction of a nuclear plant was passed. This is the fifth such ordinance so far in Japan (in 1 city and 4 towns).

Chubu Electric Power Co. plans to construct the Ashihama nuclear plant in Kisei-machi and adjacent Nanto-cho. The ordinance has already been established at Nanto-cho, and in order for the utility to proceed, the referenda must be carried out in both towns. The Kisei-cho ordinance requires only a majority of the voters but Nanto-cho's ordinance requires two-thirds of the votes.

The Nanto-cho town council has passed a resolution opposing the nuclear power, while the council of Kisei-cho had decided to invite the nuclear plant. It is interesting that in the town whose people seemed not to be so negative about a nuclear plant, a majority of the constituents signed the petition for an ordinance on a referendum, and had made the council pass the ordinance.

## The Mayoral Election at Suzu City Ruled Invalid

The mayoral election held in April 1993 at Suzu City, Ishikawa Prefecture, through which the current pro-nuclear mayor was elected, was ruled invalid on December 11, 1995 by

Branch of Nagoya High Court. Since fraud was rife during this election (see NIT No. 35), the citizens filed a complaint with the election administration committee. The committee, however, rejected the complaint, and the case was taken to the court. The judge ruled the election invalid, stating that the election result may well have been different but for the fraud.

The Ishikawa prefectural election administration committee, who lost the case, submitted an appeal to the Supreme Court on December 21, 1995.

## Move to Invite ITER, Strong

The Council of the International Thermo-nuclear Experimental Reactor passed the reactor's interim draft design at its meeting of December 12-13, 1995 in Germany, and decided to set up a special working group which would be in charge of site selection. The movement to invite the reactor to Japan has become very active.

The Congress to Promote ITER to Be Brought in Japan set up within the Federation of Economic Organizations met on December 5 for the first time. They began a concerted effort to bring the project to Rokkasho, Aomori Prefecture. Naka town council of Ibaragi Prefecture on December 14 passed a resolution campaign to host the ITER. On December 18 an inaugural meeting of the Aomori ITER Invitation Promotion Congress was held. In addition Hokkaido has expressed its intention to invite the project to Tomakomai City.

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