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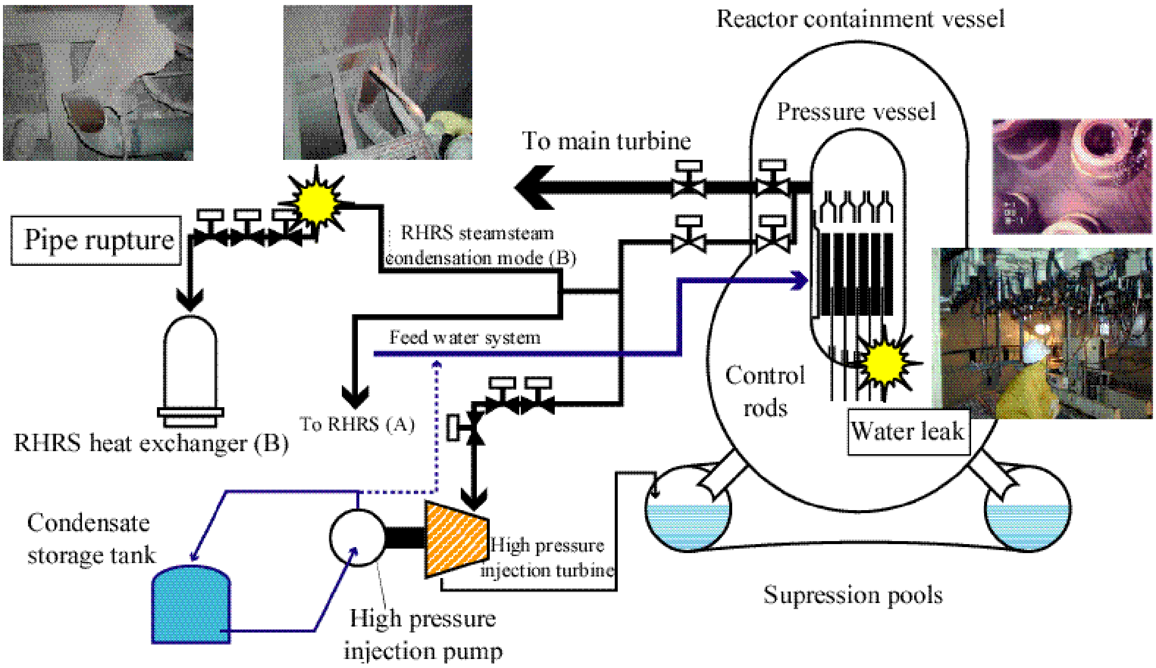
Hamaoka Nuclear Power Reactor 1

-Pipe Rupture and Water Leak from Pressure Vessel



1. Introduction

The two recent incidents at Chubu Electric's Hamaoka Nuclear Reactor 1, in Hamaoka Town, Shizuoka Prefecture, were very serious. Both of the accidents involved equipment of considerable importance for safety control: the Emergency Core Cooling System (ECCS) and the control rod drive mechanism and the pressure vessel. Hamaoka Nuclear Plant Reactor 1, a Boiling Water Reactor (BWR) with rated output 540MW, has been operating since 1976, and is one of Japan's aging plants, with more than 25 years of operation. Below is a summary of the two accidents. We would like to point out that Hamaoka nuclear power plant is located in the middle of an earthquake-prone region, where a gigantic earthquake, referred to as the "Great Tokai Earthquake," has been predicted.

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2. The first incident: RHRS pipe rupture

Around 5 p.m. on 7 November, 2001, a pipe in the Residual Heat Removal System (RHRS) ruptured when the High Pressure Coolant Injection system (HPCI-one of the most important pipes among the three types of pipes in five systems), part of the Emergency Core Cooling System (ECCS), was started up for a manual test operation. The accident happened while a feeding valve was gradually opened.

Ten fire alarms went off as radioactive gas was released from the ruptured pipe and spread from the RHRS heat exchanger room B (see figure 1) where the pipe was located. The radioactive gas also spread in a large area of the reactor building, which set off the inside radiation monitors. Because the HPCI automatically shut off, Chubu Electric decided to shut down the reactor, and the operation was manually stopped at 00:00 a.m. on 8 November, 2001.

The ruptured portion of the pipe was right on an elbow (an L-shaped section) of a pipe close to the valve that cuts off the steam. The pipe is made of carbon steel, 1.1 cm thick and 15 cm inside diameter. The pipe formed an S-shape with joined L-shape portions. When the pipe was ruptured, an upper elbow and its connecting straight portion were blown off.

A monitor in the adjacent room, which is for assemblies and repairs of the control rod drive mechanism, at one point detected 290 microSv/h, eight times the normal level for this area (35microSv/h), and as much as 5000 times the normal radiation level (0.06microSv/h). Chubu Electric quickly released radioactive gas into the environment by turning on the emergency ventilation system.

Leakage of radioactive gas and vapor is of course of much concern. But what made this accident even more serious was that a significant failure happened in actuality as we had concerned, where the ECCS-the crucial safety device- was rendered useless.

3. The incredible damage caused by the rupture

The extent of the damage caused by the rupture can be seen from one glance at the picture released by Chubu Electric (see photo 1). Not only was the pipe damaged, but the surrounding area was badly affected – the metal support structures were torn off, and the grating bent over. The walls in the vicinity of the area had some dents which might have been caused by violent motion of the pipe. The blown-off portion of the pipe was found in four large fragments and another fragment was found on a later day. It is possible that these pieces shot off like missiles and damaged adjacent equipment. No damage from chemical corrosion or stress has been found on the surface of the damaged pipe.

5. Investigation into the causes

During the 13th periodic inspection of the Hamaoka 1 which was carried out during Sep. 1993 ~ Aug. 1994, a series of equipment remodelings and replacements were done to prepare for the sorts of problems that arise from the aging of a reactor. For example, the entrance nozzle of the recirculation system was replaced to prevent stress corrosion, and pipes in the steam condensing system of the RHRS were replaced as well. When this replacement was done, L-shaped pipes were connected to a horizontally-placed pipe, apparently to create a detour for steam coming from the reactor. According to the Agency for Nuclear and Industrial Safety (ANIS) in the Ministry of Economy, Trade and Industry (METI), the material and thickness of the pipes were not altered, so this did not correspond to the government's definition of an "alteration of design" and was not subject to any safety inspection, let alone to any application requirement for construction plans.

According to Chubu Electric, the alteration was supposedly made to prevent any leak of high-temperature steam from the previously mentioned steam cut-off valve located one step ahead of the heat exchanger. They made the alteration to the piping so that the inside of the pipe around the valve would be filled with water to avoid the distortion of the valve. The benefits of this alteration were that the work needed for steam leakage monitoring, prevention, and repair could be drastically reduced. The alteration was made in regard to the valves and heat exchanger, but no sufficient assessment had been made of possible impacts on other parts of the equipment caused by the alteration.

Since attention was drawn to the presence of water in the pipes, the following speculations were made as for a possible direct cause of this accident: heat stress on the pipe caused by the fluctuation of the water-level during normal operation; a sudden change in the pressure level, in which the pressure was increased by dozens of times when water and steam came into contact (including the water hammer phenomenon); or the explosion of non-condensing gas such as hydrogen which had accumulated in the pipe.

It would be an unpleasant irony if the alteration made to the design to reduce the risk of damage had in actuality caused this accident.

5. Measures for other nuclear plants equipped with similar systems

On 20 November 2001, ANIS instructed the operators of 14 BWR plants which have systems similar to the steam condense system which caused the accident at Hamaoka 1 to drain water from those systems. The plants which have such systems, in which steam is collected directly from the reactor to be changed into water, are: Tokai 2 (JAPC), Onagawa 1 (Tohoku Electric), Fukushima I 2~6, Fukushima II 1~4, and Kashiwazaki-Kariwa 1 (Tokyo Electric), and Hamaoka 2~3 (Chubu Electric).

These 14 plants equipped with systems similar to Hamaoka's steam condense system should of course be temporarily shut down. However, regardless of their reactor type, all plants which have parts that could be subject to a pipe rupture similar to that in the Hamaoka incident - such as pipes made of carbon steel, heat exchangers and adjacent equipment, L-shaped pipes, and parts in which water or non-condensing gas collects - should be immediately shut down and inspected.

6. The second incident: reactor water leak from the bottom of the pressure vessel

On 9 November, 2001, at Hamaoka 1, it was found that reactor water was leaking around the Control Rod Drive Mechanism (CRDM) guide pipes situated at the bottom of the reactor pressure vessel. No measures were taken to stop the leakage until 22 November, when a crack detector with a pressurized air feed system was installed. Until then, the water was leaking at the rate of one drop every few seconds.

The CRDM is placed within a guide pipe that penetrates the bottom of the pressure vessel. The guide pipe is made of SUS 304, a material known for frequent ruptures due to stress corrosion. This guide pipe is placed in a stub-tube, a sort of a cover tube, and is welded to the pressure vessel. The stub-tube is made of Inconel 600 (a metal compound containing nickel).

Photo 1

Entering the area of the leakage accident had been impossible because of the high levels of radiation and shielding materials. It was not until 26 November that detailed information on the damage was obtained through a water camera positioned at some distance. The camera detected an approximately five-centimeter crack on the welded part of the stub tube and the pressure vessel.

7. The second water leak from the pressure vessel

More than 13 years ago in September 1988, another water leak from the bottom of the pressure vessel occured at Hamaoka 1. During a pressure application test on the pressure vessel, it was found that water was leaking from a crack on the internal face of one of the thirty pipes placed in the in-core monitor housing (ICMH). The ICMH monitors the rate of output within the reactor, and recent cases of this type of crack were found at Reactors 3 and 4 at Fukushima I in December and October of 1997 respectively, and at Tokai 2 in June 1999.

Chubu Electric should at least have removed parts of the area where water was leaking and conducted a detailed analysis of the causes right after the 1988 accident, but no adequate investigation was done. The company chose instead to repair the pipe in an incredibly sloppy manner by welding a slightly thinner pipe into the damaged pipe. In addition, the lower part of the pipe below the damaged area was pressed from the inside to reinforce its attachment to the pressure vessel (pipe enlarging).

However, it was revealed on 15 November 2001 that the water-leak monitoring equipment placed in the reactor following the 1988 incident, together with other equipment, had been showing signs of water leakage since July 2001. Had Chubu Electric intentionally hidden this information, or was the company completely ignorant of the fact? In either case, there are serious doubts about Chubu Electric's technical ability and qualifications for operating nuclear plants.

9. Interim Report on Rupture Accident

On December 13, 2001, Chubu Electric submitted an interim report regarding the November 7 rupture accident to ANIS in METI.

Commissioned by the plant manufacturer, Toshiba, Nippon Nuclear Fuel Development Co., Ltd., conducted an investigation on the surface of the ruptured pipe by means of an electric microscope . It was found out that the pipe's rupture was probably caused by an explosion. The investigation showed that there was no trace of heat fatigue or abnormal corrosion, but there were a number of dimples in a leprous pattern (so called ductile dimples) on a large area of fractured and remaining piping. Ductile dimples are caused when high pressure swells a pipe before its rupture. Based on this assessment, an investigation of the cause of the accident is now underway, including reproductive experiments, being conducted by Chubu Electric, particularly focusing on a possible hydrogen explosion.

9. The whole picture of the destruction

I would like to pick up some information clarified in the interim report. The surprising thing was, a door of RHRS heat exchange chamber B was blown off. I knew of the destruction of grating, supporting equipment, insulation covers, etc., but the news about the wrecked door had not been revealed before. (I myself observed the accident site in Hamaoka 1 on November 27, but I was not alert enough to notice the door.)

It was also discovered that the ruptured pipe was swollen by 2 to 7 percent over a portion of eight meters. It is estimated that the welded area adjacent to the elbow part was swollen by approximately 23 % immediately before the explosion. This shows that a large area of the pipe was enlarged, which resulted in the rupture.

On the basis of a calculation of the amount of steam flow, Chubu Electric estimated that the steam leakage was approximately two tones while the total radiation leakage was approximately 800 million becquerel judging by the radiation level of the water (main steam condensed water) in the four cycle-pipes under operation.

10. Holdup and residue in the pipe

Chubu Electric and the ANIS mentioned an accumulation of hydrogen in the pipe as a cause of the hydrogen explosion. With a gas chromatograph, they analyzed the concentration of hydrogen and oxygen in the steam condensing system A of Hamaoka 1, the system that was not ruptured. They also analyzed the same concentration in two of the steam condensing system pipes at Hamaoka 2 (BWR with 840MW), which has the same piping system as at Hamaoka 1 (see table 1).

In the condensing system A of Hamaoka 1, the hydrogen concentration was approximately 10,000 times higher than in normal air. According to Chubu Electric, the concentration should have been even higher during the operation, due to the release of vast amounts of gas by the accident. It is highly probable that Hamaoka 2, under the current operating condition, could have an accident in the future if the similar circumstances occurred.

Where, then, did the hydrogen come from? Chubu Electric did not clarify this point, but there are three possible sources (though we cannot clarify the amount from each source). One is the separation of hydrogen and oxygen due to radiolysis, another is hydrogen intentionally injected in coolant for preventing stress corrosion of reactor structures, and another could be hydrogen coming from metal corrosion.

It is also pointed out that platinum and rhodium, which were detected in the residual water, acted as catalysts and could lead to hydrogen explosion. These noble metals, in solution, are also injected into the pressure vessel as one of the preventive measures for stress corrosion. (According to the record of periodical checking, the injection of these material was carried out in September 2000.)

What invited the hydrogen explosion? Why did the hydrogen concentration rise to such a level that it caused an explosion? What was the scale of the explosion? In another words, to what extent was the quantity of hydrogen and oxygen a direct cause of the explosion? How much hydrogen and oxygen was accumulated in the ruptured pipe? These are only a few of the questions that concerns us.

At the same time, if a hydrogen explosion took place in actuality, the preventive measures for stress corrosion inside the pressure vessel could have become the cause of the accident, as we have mentioned. In that case, a comprehensive review of measures for aging reactors would be absolutely essential.

11. Impossible to prevent hydrogen explosion

ANIS basically reached the same conclusion as Chubu Electric, admitting that there is a possibility of the same type of hydrogen occurrence at the other 14 nuclear power plants that have the identical steam condensing systems. As an allopathic measure, ANIS issued an instruction to remove gaseous and liquid residuals from the RHRS pipes before testing a high pressure injection system. This instruction was given to Japan Atomic Power Co., Tohoku Electric, and Chubu Electric. In addition, all the electric companies will install valves on the pipes to remove residual gases.

However, all these measures are far from sufficient and do not relieve our safety concerns. In fact, if another rupture of a small or medium-sized pipe occurred and a high pressure infection system is started up (assuming that the high pressure injection system is properly functioning), there still remains a possibility of another hydrogen explosion.

Accordingly, we call for the decommissioning of Hamaoka 1 and the suspension of the said 14 reactors' operation until the true causes of the pipe rupture accident is located and remedied.

Table 1 Residual gases in RHRS (% of volume)

	H_2	O_2	N_2
Hamaoka 1: steam condensation system A	0.6%	19%	79%
Hamaoka 2: steam condensation system A	46%	23%	33%
Steam condensation system B	27%	23%	53%

12. The interim report regarding water leak

On December 25, 2001, Chubu Electric submitted an interim report on the water leakage accident from the pressure vessel. According to the investigation by Chubu Electric and Toshiba, the plant manufacturer, an approximately 5 cm crack was found on a surface of the welded part of the stub tube. This crack went all the way through the welded material, reaching the washer, which was immediately adjacent to the pressure vessel. Besides all the 89 guiding tubes of the control rods, 30 in-core monitor housings are to be inspected.

Meanwhile, since it is unavoidable that workers go under the pressure vessel to conduct inspections, it is assumed that the individual doses of the workers will be very high. It was reported that the dose rate was 0.4mSv/h at the grating area under the pressure vessel, and much more than 2 mSv near the control rod drive mechanism guiding tubes, which are closer to the pressure vessel. These workers will need to work in these highly radioactive conditions, and the impact on their health is of much concern.

13. Disclosure of information, etc.

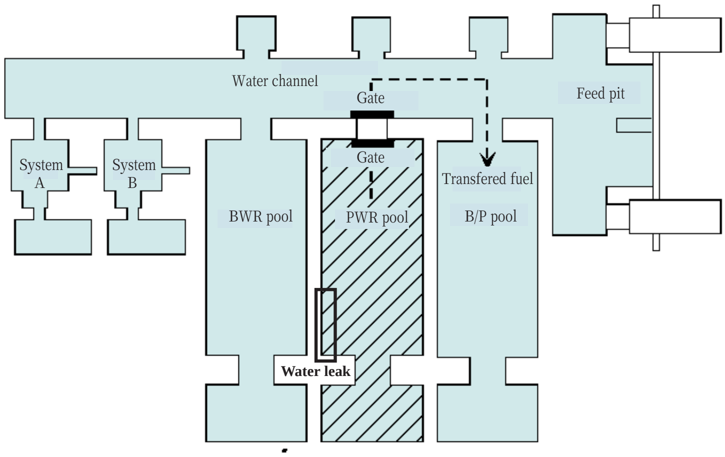
Through study of these two accidents, we can say that neither Chubu Electric nor ANIS disclosed the accurate information about the relevant circumstances and data. Unfortunately, this has been the usual practice. ANIS is trying to ensure the continued operation of nuclear power plants by issuing electricity companies with instructions for superficial remedial measures, when they should really be concentrating on identifying the exact causes of the accidents.

If the "rapid combustion of hydrogen" is the cause, we need to clarify the mechanism to a level at which the cause could be reproduced in scientific and quantitative ways. This should not be determined by Chubu Electric and ANIS. They should disclose all the technical information related to the cause of the accident, and this information should be reviewed independently, with citizens' participation.

By Chihiro Kamisawa

Water Leakage from Spent-Fuel Pool in Rokkasho Reprocessing Plant

Rokkaho spent fuel pool arrangement plan



The first pool leakage accident

According to the announcement made by JNFL, there was a possibility that water was leaking from the Rokkasho spent fuel pool (3000 Heavy Metal tons) which had already began to be used for the storage of spent fuel. A leak detector attached to the pool gave a warning alarm on July 10, 2001, and since then, one liter has been lost each hour. A total of approximately five tons of leakage was confirmed by JNFL during the six months before the day the press conference was held.

JNFL stated that they would start an investigation, since they couldn't exactly judge whether the water was from the pool or from bedewing on the wall of the pool. Then, on January 15, 2002, it was confirmed that water was leaking from the PWR spent fuel pool.

It was the first instance of this kind of water leakage from an operating spent fuel storage pool in a Japanese nuclear facility. The Rokkasho spent fuel storage pool was constructed in rushed work, which had become necessary because a number of Japanese nuclear power plants sites no longer have enough space for spent fuel storage. The construction was finished in 1996, but due to the JCO criticality accident and other mishaps, the conclusion of the agreement with the local municipality was delayed. Thus, the storage of spent fuel was only begun from December 2000. By the time the press conference was held, the pool had been used to store a total of 427 tons of spent fuel: 262 tons of BWR and 165 tons of PWR type.

The unknown safety of the pool

The spent fuel pool has three areas, each of which is for BWR, and/or PWR fuel, with a capacity of 1000 HM tons of respectively. These three areas are connected by approximately 100 meters of water channels leading to a temporary fuel storage pit, a fuel pick-up pit, and a feed pit to the reprocessing plant. The depth of the fuel pool and pits varies between 11 to 13 meters (see the figure). The pool, with 1.5 meter thick walls, has no water outlet, and the inside walls are covered with a stainless metal, SUS 304. Accordingly, the pool has numerous welded parts. The summed length of welded parts in one area reaches 1200 meters and the total of the entire pool reaches 8000 meters.

The photo shows a wall of the pool without any water. This picture was taken when a spot inspection was conducted in haste before the cooling water was injected into the pool. The photography was done by court order in the course of the litigation concerning the admission of the pool and other reprocessing plant facilities. The photography shows welded parts that are not even due to defective grinder finish, other parts where grinder finish was used to hide flaws on the wall or used mistakenly on non-welded parts, etc. It is quite obvious that the construction of the pool was carried out in a sloppy manner.

The accident hidden by JNFL

There is no denying the fact that JNFL concealed the fact that five tons of water was leaked from the pool during a period of more than six month. During that time, JNFL forced itself to continue to receive spent fuel. It is clear that JNFL and utility companies do not consider the safety of the

Rokkasho facility in order to keep it as the "Nuclear Dump Site" by any means. At the same pool, another accident occurred on August 10, 2001. On that occasion, approximately three tons of coolant water was leaked from a valve of a heat exchanger.

To make the problem worse, the Agency for Nuclear and Industrial Safety (ANIS) did not perform its proper function at all. There were two quarterly safety inspections and also an annual regular inspection during the time when the leakage was going on. Yet, the ANIS produced a report which stated, "There were no problems of any concern." Wasn't the ANIS aware of the leakage at all? And still, in spite of the requests of local citizens for a halt in the delivery of spent fuel, another transportation was carried out on February 6.

Estimated cost for reprocessing at Rokkasho

The Rokkasho reprocessing plant is scheduled to start its operation in July 2005, and 80% of the whole construction process was finished as of February 2002. Some completed parts of the plant have started test operations. Meanwhile, the controversy over the cost of nuclear power is growing more and more fierce. This will inevitably lead to a wholesale review of the nuclear fuel cycle.

According to the recent JNFL calculation of the total cost of the Rokkasho nuclear plant, approximately 400 million yen ($3 million) would be needed for reprocessing one ton of spent fuel. This figure amounts to four times the estimated upper limit of the reprocessing cost at the THORP plant in UK, according to the OECD/NEA report.

The calculation was based on figures for approximately 10000 HM tons of spent fuel received from ten major utility companies during the course of 15 years. The processing capacity of the Rokkasho reprocessing plant is 800 tons annually. The total cost of the facility will amount to 3.9 trillion yen ($30 billion). The breakdown of the total cost of is: 80~100 billion yen ($615 million~$770 million) for plant maintenance and personnel cost, 1.8 trillion yen ($13 billion) for additional construction costs after the commencement of the plant operation, including 54 billion yen ($415 million) for constructing the high level vitrified waste storage building, etc., 2140 billion yen ($16 billion) for constructing the reprocessing plant. Since the reprocessing contract is for 10000 HM tons, the cost per ton would be 390 million yen ($3 million). Yet should the cost of decommissioning, disposal of facility waste, and waste management be included, the total cost will surely be much more than this.

Regarding the Rokkasho reprocessing plant, only construction-related fees were revealed and the utility companies repeatedly assured the public, "Nuclear power is cheap." But who would pay such an extravagant reprocessing cost at the Rokkasho plant, and how would it be paid? The utility companies are trying to keep their financial management by applying for a new subsidy from the central government, but it is obvious that the public will not accept such a plan.

Return transportation of vitrified waste

The nuclear transportation ship, "Pacific Sandpiper", which left the French port of Cherbourg on December 5, 2001, arrived in Mutsuogawara port on January 22, 2002. It carried 152 canisters of returned vitrified waste from COGEMA, of which 28 belongs to Tokyo Electric, 28 to Chubu Electric, 62 to Kansai Electric, 10 to Chugoku Electric, 10 to Shikoku Electric, and 14 to Kyushu Electric. As a result of seven times of shipmetns, 616 canisters of vitrified waste are now stored in the Rokkasho storage facility.

By Masako Sawai

KEPCO Gives Up Its Plan to Use French MOX Fuel

On December 26, 2001, Kansai Electric Power Corporation (KEPCO) announced its decision to cancel the use of Mixed-Oxide (MOX) fuel fabricated at the MELLOX plant of COMMOX, for Takahama nuclear power station.

According to KEPCO, they gave up the plan of using MOX at their board meeting after it became clear that the Ministry of Economy, Trade, and Industry (METI) would not allow the import of MOX fuel. KEPCO did its best in negotiating with METI, leaving no stones unturned, yet it could not reach an agreement.

METI was not persuaded by KEPCO because the fuel did not meet the reinforced criteria of the quality assurance system. METI argued: 1) Advance auditing and assessment on the fuel fabrication plant had not been carried out before the startup of the fabrication; 2) There had been insufficient on-site verification of quality assurance activities by KEPCO1s expatriated employees throughout the period of the fabrication.

The reinforced quality assurance system was established after the BNFL data falsification scandal was revealed.Consequently, measures were considered for preventing the recurrence of such an incident. In addition to the above-mentioned measures, the new system includes: 1) Fabrication of MOX fuel must only begin after a license for loading the MOX fuel into the customer's reactor is issued (both KEPCO and TEPCO began MOX fuel fabrication before obtaining the license); 2) Applications for inspection of imported fuel must be submitted before startup of the fuel fabrication; 3) Quality assurance measures and practices must be verified by a third party.

The history of MOX is brief but full of incident. In November 1999, the MELLOX MOX fuel fabrication started on the order of KEPCO immediately after the disclosure of BNFL's data falsification scandal. METI (it was MITI at the time of the incident) established the "Review Committee for BNFL's MOX Fuel Data Problems," in which measures to prevent the recurrence of the same type of incidents were discussed. In July 2000, the Electric Industry Utility Law was revised and the inspection system for imported fuel assemblies was beefed up. Meanwhile, KEPCO had already arranged for the commencement of MOX fuel fabrication at the MELLOX factory. Therefore, in the light of the new inspection system, advance auditing and assessment through the onsite inspection by KEPCO's employees were not carried out. Accordingly, the Agency for Nuclear and Industrial Safety (ANIS) decided that the said fuel did not comply with the quality standards.

The amount of fuel subject to the quality assurance inspection was equivalent to that of 16 fuel assemblies, of which six had already been completed. The remaining fuel was in the form of fuel rods. Eight assemblies were under fabrication and two of them turned out to be unacceptable due to some failure in the assembly process. KEPCO said that it would dismantle the six finished assemblies. The total cost would reach six billion yen ($46 million), including the fabrication, dismantling, and storage.

However, some people point out certain contradictions. In accordance with the common practices of the Japanese government, the revised inspection system has never been applied to the fuel that has already been fabricated. The notice from ANIS said, "regarding the fuel assemblies which have been or are being fabricated, there is no need for advance application." This creates an exception in the rules of the new system. The aforementioned fuel of KEPCO is exempted by this ruling. And yet, in spite of this, the import of the fuel will not be admitted.

Accordingly, we came to suspect the quality of the French MOX fuel. Commissioned by ANIS to investigate, the Nuclear Power Engineering Corporation (NUPEC) reported that considerable deviation was found in the plutonium spot inspections conducted in France. It is reported that uranium and plutonium particles cannot homogenize well in the MIMAS method. There is a suspicion that low standards of this sort may be the cause of the cancellation.

Since the cancellation, KEPCO has not had a MOX fuel fabrication contract. This means that the Pluthermal Plan at Takahama will be delayed significantly. Indeed, it is reported that the Pluthermal Plan will not be put into effect until 2005 at Takahama ﾐ a delay which will, in turn, bog down the schedules at Fukushima and Niigata.

By Hideyuki Ban

Current situation in Japanese nuclear industry

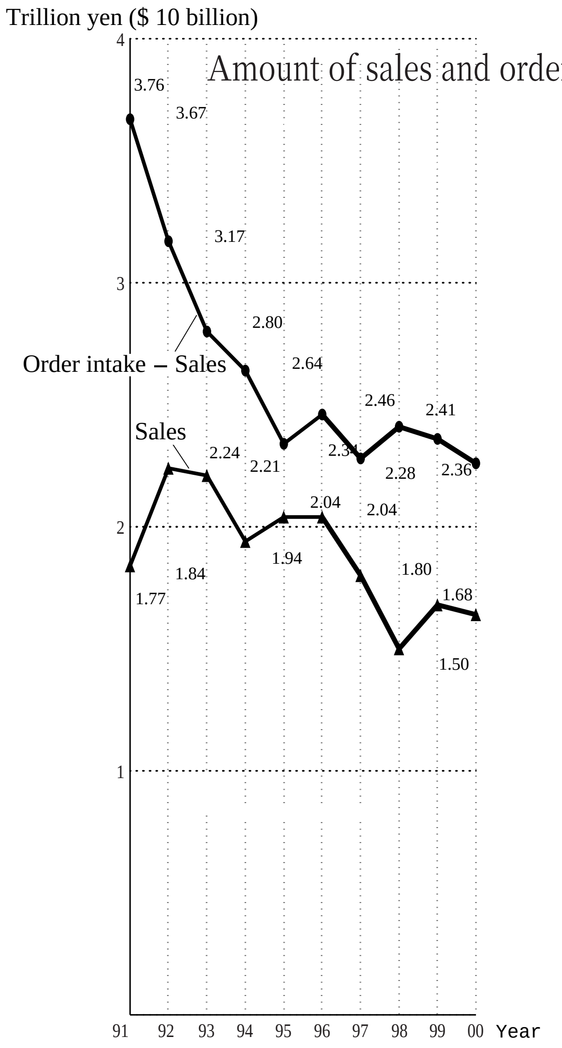
The Japan Atomic Industrial Forum (JAIF) has released the result of its survey carried out in the nuclear industries in fiscal year 2000. This was compiled from the answers to a questionnaire that JAIF sent to 506 companies, including electric utilities, trading, nuclear equipments and construction companies.

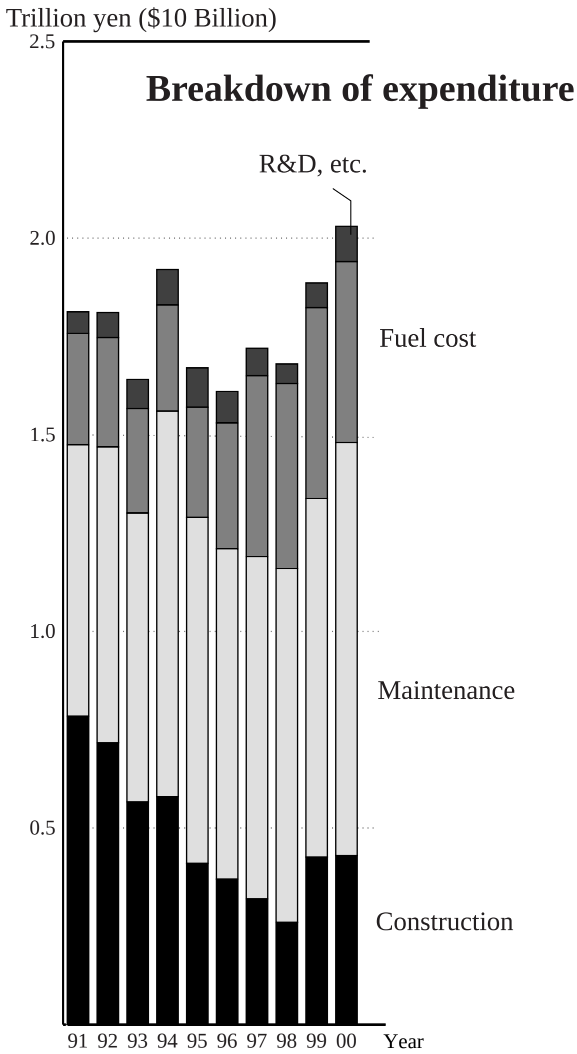
According to the results, sales in nuclear related mining and manufacturing companies were 1,639 billion yen ($14 billion). The balance of orders also hit a low at 2,264 billion yen ($19 billion).

For expenditures of electric utilities, construction costs were 427 billion yen ($3.6 billion), but operation and maintenance costs were 1050 billion yen ($8.8 billion), the highest so far. Nuclear fuel costs were 456 billion yen ($3.8 billion).

It is obvious from the result that nuclear related industries in Japan are desperate to obtain orders and that they are likely to try even harder overseas if the situation is not promising within Japan. It is also revealed that (a) operating and maintaining current reactors and (b) dealing with spent fuel and radioactive waste are now becoming a big burden for the utility companies, and that constructing new reactors is no longer their priority.

by Baku Nishio





Anti-Nuke Whos Who

Minoru Ito

Fighting against Hamaoka nuclear power plants

By Shizuo Yanagisawa

Mr. Minoru Ito (60) has been the representative for the Society of Reviewing Hamaoka Nuclear Power Plants, the first anti-nuclear power plant organization in the Hamaoka area, since 1996. Between 1976 and 1993, four nuclear power plants have been constructed and put into operation one after another.

The most disturbing thing is that the Hamaoka nuclear power plants are built in the middle of an earthquake prone region. An earthquake registering eight on the Richter Scale has been predicted. It is referred to as the "Great Tokai Earthquake." It is reckoned that such a quake would generates as much as eleven times the energy of the Great Hanshin Earthquake of January 1995, which killed more than 6000 people. The Coordination Committee for Earthquake Prediction, a government-affiliated organization, has repeatedly warned of such an event.

Local people's resistance was strong from the beginning against Chubu Electric's application for Hamaoka 5. Prior to this, Chubu Electric used to say, "There is no more space left for siting nuclear power plant and Hamaoka 4 will be the last one." Later, Chubu Electric dismissed its own statement.

The Great Hanshin Earthquake added momentum to the local resistance. The earthquake ruthlessly destroyed the highway and bullet train railway which the government had proudly proclaimed were resistant to any earthquake. The movement against nuclear power plants in Hamaoka spread rapidly. Though Mt. Ito had been unspoken in his opposition to nuclear power plants before the Hanshin Earthquake, the change in the situation made him take a new step.

Thus, "the Society for Reviewing Hamaoka Nuclear Power Plants" was born with Ito as its head. On its establishment, anti-nuclear activists and nuclear scholars gathered to help the Society. They organized a petition campaign pressing for the cancellation of the Hamaoka 5 construction. That petition gathered 3500 signatures, one-fourth of the total voters in Hamaoka.

However, the town mayor and the assembly had no ears to listen for the citizens' voices, and instead, they approved the construction of Hamaoka 5 in a secret meeting excluding members of the public.

"Why did we lose?" Ito asked himself. In Japan, nuclear energy has been the state policy since the time of its introduction. Accepting one nuclear power plant into a municipality brings huge subsidies from the government and property tax from Chubu Electric. Accordingly, the town comes to be controlled by Chubu Electric both politically and economically. Most citizens in the town, even though they have doubts, cannot speak their mind in public.

Since expressing oppositions to nuclear power plants is relatively easy in cities and towns far from a nuclear power plant, Mr. Ito is now putting his effort into communicating with people nationwide. Mr. Ito's endeavor is an ongoing process undertaken with his comrade activists, scholars, and his wife Masako.

NEWS WATCH

Move in the Plan for Mizunami Underground Research Laboratory

An agreement to lease 1.2 hectare of city-owned land was signed on 17 January between Japan Nuclear Cycle Development Institute (JNC) and Mizunami City, Gifu Prefecture. The land is for the "Mizunami Underground Research Laboratory,ť which JNC is planning to build for the purpose of research on the disposal of high-level radioactive waste. The laboratory will conduct surveys and experiments on waste disposal in granites by excavating a shaft and a tunnel 1,000 meters under the ground. An agreement was made at the end of 1995 between Gifu Prefecture, Mizunami City, Toki City (an adjacent city) and the Power Reactor and Nuclear Fuel Development Corporation (PNC, a predecessor of JNC) for the construction, and PNC was going to mine a shaft on private land in Mizunami City. But due to the strong opposition of local residents, the project reached a deadlock. Then, in July last year, the mayor of Mizunami City proposed to use a city-owned piece of land one km away from the original site, which led to the current agreement. JNC plans to start the operation in July this year. However, as Mizunami citizens and neighboring residents have shown opposition, it is doubtful that the construction can proceed without disruption.

Nuclear Subsidies to Be Returned due to an Unlawful Construction Project

On December 2001, the Ministry of Economy, Trade and Industry (METI) reached a decision on the case of the improper use of Regional Development Promotion subsidies which Kariwa village, Niigata Prefecture received in exchange for having introduced nuclear power plants there (See NIT 86 for details.) METI ordered the village to return to the state the unlawfully spent money. It also imposed fines. On 25 December, the village paid 260 million yen (approximately $ 2 million). With regard to the fine, the Village paid after METI made an official calculation. The Village is considering asking the construction company to compensate it for the losses.

The above-mentioned amount is much lower than the actual unlawful expenses, and local residents together with interested Diet members are demanding a more thorough investigation to ascertain the true details.

Voices against the Intergovernmental Conference on ITER

The second intergovernmental conference on the International Thermonuclear Experimental Reactor (ITER) was held in Tokyo on 22 and 23 January. Naka Town, Ibaragi Prefecture and Rokkasho Village, Aomori Prefecture, both of which are campaigning to have ITER established in their region, are said to have set up special booths in the conference hall to advertise themselves. It was a closed meeting, and the subjects discussed in the conference have not been revealed. According to a written statement given by the government on 22 January to a question from Renko Kitagawa, a member of the House of Representatives, about 300 billion yen ($ 2.3 billion) is estimated to be required if Japan only participates in the project, and about 700 billion yen ($ 5.4 billion) if succeeding in having ITER built in this country. Koji Omi, the minister in charge of the science and technology policy, and others claim that even with the huge expenditure, it is worth inviting the reactor to Japan.

On 21 January, around 40 people concerned about the dangers of radioactive exposure and the possible waste of taxpayers' money held a rally against the plan at the Members' Hall of the House of Representatives. The protesters included representatives from Aomori and Ibaragi Prefectures, some Diet members and ordinary citizens.

Tritium, an isotope of hydrogen, which would be used as the fuel for ITER, has a half-life of 12.3 years, and is known to cause damage to DNA.

Radiation Exposure Accident through X-Ray

On 21 December 2001, at the National Okura Hospital in Tokyo, two employees of Toshiba Medical delivered a piece of radio therapy equipment known as "LINAC" which is used in healing cancer. They conducted an adjustment run, and applied X-rays for 5 minutes to the ceiling. However, there was a worker of a subcontracting company above the ceiling adjusting the location of the machine. He was exposed to X-rays. Although he showed no symptoms he was hospitalized in Toshiba Hospital, as he may have been exposed to a maximum of one Sv radiation. He was later transferred to the National Institute of Radiological Sciences (NIRS), where he was examined. NIRS estimated to have been exposed to radiation of 200 mSv or lower.

Onagawa 3 Began Operation

On 30 January, Onagawa 3 (BWR, 825 MW) of Tohoku Electric Power Co. began commercial operation. This brings the number of commercial reactors under operation in Japan to 52, with a total output of 45,742 MW.

Nuclear Budget Decided

The government's draft budget for fiscal year 2002 was compiled at the end of last year, and the nuclear-related component of the budget was reported to the Atomic Energy Commission. The total amount of the nuclear budget is \489 billion (approximately $3.8 billion). The budget for measures designed to build national consensus on nuclear power was increased, as was the budget for education on nuclear power and energy.

Mihama Town Council Adopts Petition for Construction of More Reactors

On 21 December 2001, the Mihama Town Council in Fukui Prefecture adopted, after a majority vote, a request and petitions from the town's chamber of commerce and others calling for the construction of more reactors at Kansai Electric Power Co.'s Mihama Nuclear Power Plant (3 PWRs with a total output of 1,666 MW). Although Kansai Electric officially made a welcoming comment, it has made no further move. The utility, which suffers from excess capacity, has significantly postponed its plans to construct thermal and pumped hydroelectric power plants in its FY2000 and 2001 power plant development program. During these two fiscal years, no less than 20 existing thermal power plants have been suspended.

By Baku Nishio

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