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Citizens' Nuclear Information Center
3F Kotobuki Bldg., 1-58-15, Higashi-nakano, Nakano-ku, Tokyo 164-0003, JAPAN
URL: http://www.jca.apc.org/cnic/ e-mail: cnic-jp@po.iijnet.or.jp

WORST ACCIDENT IN JAPANESE NUCLEAR HISTORY

A girl is tested for radiation at the central public center on 10/1/1999. 1700 people visited the center to be tested. (PHOTO BY KENJI HIGUCHI)

Description of the accident

On September 30, 1999 at 10:30 a.m., there was an accident with radioactive release at a JCO Ltd. owned plant where uranium is reconverted as part of a process to fabricate fuel for nuclear reactors. Initially, the plant workers were not aware of the nature of the accident. However, gradually it became clear that it was one of the worst types of nuclear accidents, a criticality accident. The plant

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workers were slow in realizing this, because the plant operators had never entertained the possibility of a criticality incident occurring. Furthermore, there were no plans or systems for containing criticality. Thus the accident progressed further into a frightening situation.

This criticality accident at the plant was triggered when workers transferred enriched uranium oxide, dissolved into solution by adding nitric acid, into a precipitation basin. An excessive amount of uranium enriched to an extremely high percentage of 18.8% was poured into the precipitation basin against the regulated standard limit. Thus the precipitation basin functioned in the same way as a nuclear reactor and the fission chain-reaction began. It was only at 3 p.m. the same day that researchers of the Japan Atomic Research Institute pointed out to the plant operators that the accident might possibly be a criticality accident and the operators began to take the situation seriously. However, the site of the accident could not be entered because of the strong neutron and gamma radiation, and the fission reaction continued until 6:30 a.m. the next morning.

During that time, altogether forty-nine workers, residents, and firefighters were highly exposed, and the three workers that were at the accident site were exposed to a lethal dose of radiation. One of those three seriously exposed workers was exposed to 8 to 17 Sv of radiation. Although their conditions have not taken a turn for the worse, this worker and one other worker were together exposed to a lethal dose of radiation, and are still in critical condition. In addition, in the early morning of October 1, eighteen workers carried out the extraction of coolant water from the precipitation basin to stop the criticality condition. All of them were exposed to radiation and one of the exposed workers had a radiation count of up to about 100mSv.

Criticality incidents occurred in the early history of nuclear energy in America and in Russia at military facilities and some research institute. However, there have been no such incidents recently. Furthermore, there has never been an incident like this one in which the criticality condition continued for so long. This is the worst accident ever in the history of nuclear power development in Japan. Based on the International Nuclear Event Scale, the Japanese government categorized this accident as a level 4. However CNIC is certain that this accident belongs to category 5. This is because it can be supposed with well-grounded scientific evidence that there were 10E+16 to 10E+17 Bq of rare gas released. Criticality was stopped at 6:30 a.m. on Oct. 1 by extracting cooling water from around the precipitation basin. However, there is still a large amount of fission products in the precipitation basin and the accident site cannot be accessed. (as of Oct./8/99)

The cause of the accident

The direct cause of the accident is that a worker filled 16kg of highly enriched uranium into a precipitation basin that was suppose to be filled with no more than 2.4kg of uranium of this enrichment concentration. This caused the precipitation basin to reach criticality. The media is putting heavy emphasis on the fact that the workers transferred the solution in a stainless steel pail with their bare hands to save time, and that it is this human error that is the main cause of the accident.

It is shocking that uranium solution was transferred with bare hands. This itself is a shameful violation of safety regulations, yet, it is not the direct cause of criticality. Criticality was triggered because the workers and the overseers were not sufficiently aware that they were dealing with uranium enriched to as high as 18.8% enrichment, and an excessive amount of uranium-235 was filled into a tank as if the solution was low-level enriched uranium of 5% or less concentration.

This JCO-owned plant usually deals with low enriched uranium for light water reactors in Japan. However, at the time of the accident, they were handling highly enriched uranium to be used for the fuel for Joyo Fast Breeder Test Reactor. Since there is inherent danger of criticality in such facilities, the form, shape, and size of the container must be designed with limitations to counter criticality even

in the case of human error. This is called "geometrical control" to counter criticality, and the most significant error was that there was no geometrical control at this facility.

Has the accident come to an end?

The criticality condition ceased at 6:30 a.m. Oct.1. At 4:30 p.m. the same day, the request to the residents within a 10km radius of the plant to stay indoors was lifted. At 6:30 p.m. on Oct. 2, the evacuation advice to the residents within a 350m radius of the plant was lifted. This was virtually a safety declaration by the government. However, that did not mean that the situation became free of danger. As already mentioned, there is a precipitation basin full of radiation in the plant and it has been left untouched. Radiation is still being released from this basin, and there is still a possibility of a massive radiation release. As high as 54Bq per kg of Iodine 131 was detected by researchers of the Research Reactor Institute, Kyoto University from the leaves of a mugwort plant from the vicinity of the site. Radioactive materials were produced by activation, and sodium 24 was detected from the soil up to an area 3km away from the plant. According to our assumption, a large amount of activated products were released into the area within the 350m radius of the plant, and there is a possibility that area residents returning to their houses could take radiation into their bodies by eating salt and other foods that was in the house at the time of the accident. Thus it is still too early to issue a "safety declaration." Furthermore, our calculations together with the measurements by the company strongly suggest that residents living within a 600-700m radius had been exposed to neutron doses beyond legal annual limits.

Parties responsible for the accident

It is clear from the above-mentioned facts that the company as an entity holds responsibility for this accident. However, the Science and Technology Agency (STA) and the Nuclear Safety Commission are also deeply responsible in that they allowed this plant to operate despite the fact that it was not designed to counter criticality. In addition, this plant was built in the middle of a residential area, and the possibility of criticality accident was not included when the site location review was done. Both parties as overseeing agencies are deeply responsible for this fact as well.

Lessons learned from this accident

Recently, serious accidents have occurred frequently in Japan, and the fabrication and falsification of inspection data and product data have been made public as well. With each incident and scandal, the STA has set up investigation committees and put out suggested measures for improvement, and in some instances, the responsible parties were fined. However, instead of making improvements with these measures, the situation has become worse, and now it has resulted into a level 5 accident. Nothing can be expected from the "Accident Investigation Committee" set up by STA. There must be a thorough investigation into the accident, and a review of the nuclear industry itself by a third party group that includes citizens. Furthermore, there must be a thorough review of Japan's energy policy - a policy which until now has been heavily reliant on nuclear energy. This is an urgent task. Without this fundamental review, a disaster even worse than this accident is inevitable.

In particular, there are a significant number of nuclear fuel fabrication facilities similar to the JCO plant that likewise lack installations to counter criticality. Considering the seriousness of this accident, all such facilities should immediately stop operating, and go through a full safety inspection conducted by a third party. In addition, since the irresponsibility of the Japanese nuclear industry has been exposed to this extent, and has caused deep fear in Japanese citizens, the "plu-thermal plan," i.e. the plan to utilize MOX fuel in light water reactors, must be frozen since it has never been attempted in a large scale in Japan and has yet to be proven safe. After this accident, MOX fuel utilization is certainly not an option for Japanese citizens.

(By Jinzaburo Takagi)

BNFL Fabricates MOX Fuel Inspection Data

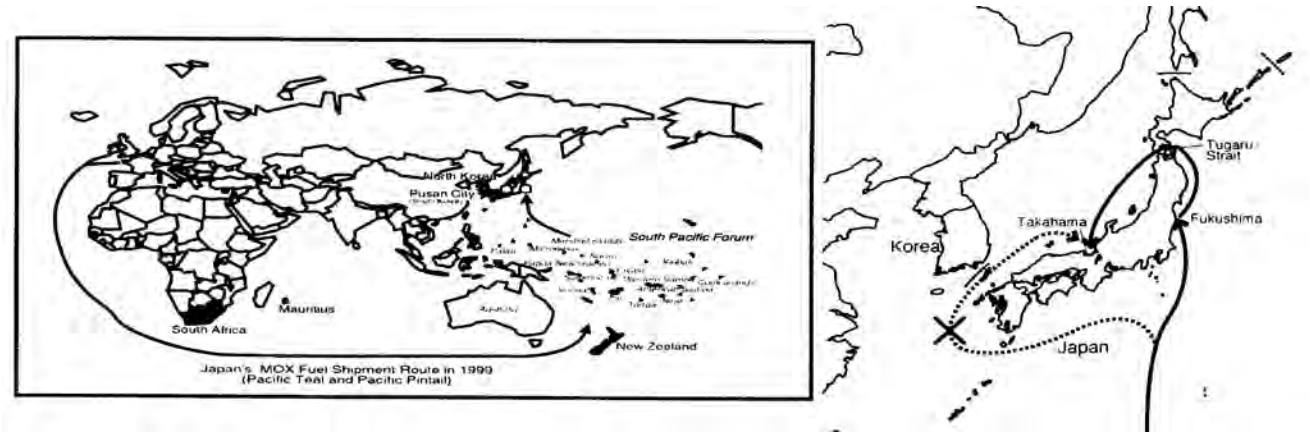
Two armed transport vessels, “Pacific Pintail” and “Pacific Teal” recently arrived in Japan. Docking at the port of Fukushima I was delayed five days because of a typhoon, and the MOX fuel arrived in Fukushima I plant and Takahama plant on the Sep. 27 and Oct. 1 respectively. However, in early-September, the British newspaper The Independent reported the fabrication of the inspection data for MOX fuel to be used at Takahama Plant.

The MOX fuel for Takahama Plant is fabricated by British Nuclear Fuels plc. (BNFL). The MOX fuel on this shipment was for Takahama Unit 4, but the company claims that the fuel with data fabrication was made for Takahama Unit 3. Fuel pellets for Takahama Plant have diameters of about 8.2 millimeter and are about 4 millimeters high. These pellets are vertically filled into fuel rods, and fuel assemblies are made from a collection of such fuel rods.

It is extremely important to adhere to these minute figures. When the pellets are inserted into a hollow fuel rod, there must be a 0.17mm space between the pellets and the edge of the fuel rod. This is indeed a figure less than 1/5 of a millimeter. When the fuel is in the reactor and under operation, the pellets continually alter their shapes by shrinking, expanding, cracking, and deforming. Such movements cannot be absorbed without that exact space. The space can be no more nor less than 0.17mm. In addition, helium gas is filled into that space to prevent the pellet from touching or putting pressure on the delicate fuel rod with a ridge only 0.57mm thick. During operation, if these micro figures are not properly followed, it could lead to the fuel rods either cracking or bending. When fuel rods are bent, they can block the control rods from entering in between the assemblies, which means they are unable to control the fission process by controlling the amount of neutrons.

It is an extremely difficult task to fabricate such fuel to its specifications, and since it contains plutonium, the pellets have to be scraped into size in a globe box. The pellets go through double inspections. The first inspection is done automatically and measures all pellets. Then a selected number of the pellets that passed this inspection are put through a manual inspection. However, to save time, BNFL employees failed to conduct the second inspection and instead fabricated data by using data sheets taken from previous inspections. This fact was leaked by an insider to The Independent, and the scandal was made known to the public. Results from the MELOX plant in France show that of the 145 tons of MOX fuel fabricated in 1998, 30tons (20.7%) failed the inspection. In 1999, of the 63 tons MOX fuel fabricated, 13 tons (20.5%) failed as well. In short, the technology to fabricate MOX fuel has yet to be established. Investigations into this scandal have led to strong belief in the possibility that data for the MOX fuel for Takahama 4 has been fabricated as well. The quality of MOX fuel cannot even be guaranteed at the fabrication stage. There is no practical technology for MOX fuel utilization.

(By Masako Sawai)



MOX Fuel Arrives In Japan

The first ever shipment of MOX (mixed plutonium-uranium oxide) fuel for commercial use has produced enough material to write an entire book. The most shocking news was the admission by BNFL that the MOX fuel bound for Takahama, Fukui prefecture, had not gone through a proper quality check. Readers might recall the previous scandal regarding data falsification for one of the transport casks as well. On top of these shocking revelations, there was an accident onboard one of the ships in which a crew member of one of the transport ships was injured due to a fall caused by bad weather. These incidents have further deepened our concern for the safety of MOX fuel and its transportation. Countries around the world expressed concern over the shipment and the nuclear proliferation threat it posed. Mounting concern from various en-route countries forced the industries to take the matter seriously. Strong protests in Korea were reported to be the reason for the ships taking a round-about route through Tsuruga Strait instead of passing through the Korean Strait. The final blow to this operation was the strong wind and rain, and a threatened typhoon, that prevented the ships from unloading at the Fukushima plant on Sep. 22. We believe that nature had finally spoken, and that its message was very clear.

There were several problems surrounding this operation even before the ships had left. Upon investigation, it was found by CNIC and confirmed by the Ministry of Transport, which regulates the sea transport of nuclear fuel, that the two casks to be used for this transportation were “second-hand” products. They had been used to transport spent nuclear fuel from Japan to England and France. Instead of acquiring new casks to return the MOX fuel, the utilities and transport companies decided to re-use the casks that were already in Europe. The utilities re-submitted the design of their containers and received approval from the Ministry by changing the purpose of the cask’s use. However, the casks in their original form were not suitable for the transportation of MOX fuel and a neutron shield was added to each cask and this shield became the source of the scandal. Material for the shield for KEPCO’s cask (which is filled with the BNFL-made MOX fuel in question now) was provided by Genden Koji, and it was later revealed by an anonymous worker that the data on the quality of the material had been falsified. The analysis of the material was done by a research group which submitted the results to Genden Koji. Genden Koji fabricated the data on the application for the material certificate. Upon investigation of the original data, the cask was re-approved by the Ministry anyway on grounds that the data meets the IAEA standards for casks for MOX fuel transportation. The parties involved certainly failed to convince citizens of

the safety of transport casks that were second-hand products, and with one of them consisting of material that was approved under falsified data and later re-approved by lowering the standards of approval. And now we find that the data on the quality of the MOX fuel itself in the questionable cask was fabricated. In what further way can the parties involved convince us of the poor quality of the fuel and its transport casks?

Safety issues are not limited to materials. The voyage itself is a dangerous operation. To prove this point, there was an accident onboard one of the transport ships. According to the statement issued by British Nuclear Fuel plc (BNFL) on September 1, one of the ship's crew members was injured in a fall in a room during heavy seas in the South Indian Ocean. He suffered a damaged collarbone and a head injury. The medical evacuation of the crew member was carried out by an Australian Maritime Safety Agency (AMSA) long-range helicopter. The injured crew member was taken to a hospital in Perth, Australia. We found out from BNFL officials that there were no doctors onboard the ships. Four medically-trained crew members, one of them being the captain, were on board the ship when the accident occurred. The captain examined the injured crew member, and asked for medical advice and assistance from the AMSA. This incident proved that the transport ships indeed require assistance from en-route countries and that without prior notification, an emergency response will be mounted only with great difficulty in case of severe accidents. The shippers asserted that there will be no accidents and that they had no port of call in mind for emergencies. However, this incident proves that accidents do occur even if the ships meet the International Atomic Energy Agency (IAEA) standards, and that the ships indeed require assistance from en-route countries.

Many countries expressing concern over the transportation pointed out the fact that there was no prior notification or consultation, and that there were no liability regimes set up. The responses from the related parties are that various en-route countries had adequate information, that the right of innocent passage allows the shippers to pass through any country's Exclusive Economic Zone (EEZ) and its territorial waters, and that International Maritime Organization (IMO) regulations do not require shippers to set up a liability regime. However, New Zealand found out that the ships were in their vicinity only because of the accident that required the assistance of Australia. New Zealand, South Africa, and other countries requested the ships not to pass through their EEZs despite their acceptance of the international law that guarantees the right for free passage through their territorial water. The South Pacific Forum and other countries have been trying to enter into discussions on a liability regime with countries involved in the shipping ever since the transportation of nuclear materials began. The environment, economy, and public health of countries en-route would seriously be affected in a case of an accident. Even if there were no radiation leak, the mere fact of an accident involving a ship carrying nuclear material could cause serious economic damage to tourism, marine products and so on. We believe the en-route countries have the right to seek the establishment of an all-inclusive liability regime.

Although the utilities and the governments have continuously stressed their rights to freedom of passage, they have not been able to completely ignore the mounting concern of en-route countries. The report that the ships would pass around Aomori through Tsugaru Strait instead of Korean/Tsushima Strait clearly revealed the concerns of the parties involved in the shipment over the strong opposition in Korea. The round-about route chosen because of overseas protests lengthened the voyage, and it was further delayed when bad weather prevented Pacific Teal, carrying fuel for Fukushima I, to dock at the plant's port. Protesters welcomed the angry wind and rain and the roaring waves that refused the entry of the ship, and chanted anti-nuclear slogans towards the ships that were forced to linger around the Fukushima coast.

Pacific Teal arrived on its second attempt in the early morning of Sep. 27, but was received by protesters who had gathered on the coast near the Fukushima plant from 4:30 a.m. Protesters then met with town officials, and TEPCO officials and handed statements of opposition. Pacific Pintail, carrying the problematic fuel, arrived in Fukui on Oct. 1, one day after a criticality accident at JCO Ltd's Tokai site where fuel for Joyo Fast Breeder Test Reactor was being fabricated.

The Final issue regarding the MOX transportation is the concern of nuclear proliferation. By transporting and stockpiling plutonium in various forms, Japan has alarmed many people overseas and domestically. The latest published information shows that Japan owns roughly 29.3 tons of plutonium. (Table 1) The utilization of plutonium in the form of MOX fuel in Light Water Reactors (LWRs) was planned as a counter-measure for the increasing stock of plutonium that was supposed to be used in Fast Breeder Reactors. The well-known serious accidents at both of the two facilities central to Japan's plutonium program, Monju Fast Breeder Reactor and Tokai Reprocessing Plant, rendered the future of plutonium-related project very uncertain. Thus the plan to use MOX fuel in LWRs was introduced. MOX fuel is more costly than uranium fuel, and is more liable to cause an accident due to its chemical and physical nature. Rather than risk the public health and force the utilities to use uneconomical fuel, we urge the government to review the current plutonium policy and consider various options. CNIC urges the government to immediately cancel all oversea contracts for reprocessing and abandon any future reprocessing. The best way to deal with excess plutonium is to first stop producing it. As for the plutonium already in existence, we recommend mixing it with high-level waste and vitrify the mixture so it would become nearly impossible for anyone to approach the mix. Overseas plutonium owned by Japan should be treated in the same matter and then be sent back to Japan. No further shipment of nuclear materials should take place and we call for an immediate moratorium on plutonium utilization and all utilization of nuclear materials.

(By Gaia Hoerner)

Table: Japan's Separated Plutonium Inventory (as of the end of 1998)

FACILITY		AMOUNT of Pu (total Pu in kg.)	S: stockpile U: in use/ ready for use
Reprocessing plant	Total	537	
	As nitrate	384	S
	Stored as oxide	154	S
Fuel fabrication plant	Total	3,596	
	Stored as oxide	2737	S
	Under test or processing	473	S
	Completed fuel	386	S
Reactor sites	Total	832	
	Joyo	2	U
	Monju	367	S
	Fugen	34	U
	Critical assemblies	429	U
Overseas reprocessors	Total	24,398	
	U.K. (BNFL)	6,109	S
	France (COGEMA)	18,290	S
TOTAL		**29,363**	**S(28,898)+U(465)**

80% of the Public Wary of Nuclear Power

In August 1999, the results of a public opinion poll on nuclear power and energy issues conducted by the Prime Minister's Office were released. Although the level of coverage varied according to the newspaper, it was still widely reported in most dailies. Many articles had headings such as, "Majority Are Concerned About the Safety of Nuclear Power". However, a closer reading of the survey reveals that there is clearly much more concern than that. The majority of respondents stated that nuclear power is no longer needed and the number of those in favor of increasing nuclear power has shrunk to an overwhelming minority. It deserves special mention that in an opinion poll conducted by the government, there was a stark decline in public support for nuclear power, which is itself a government supported policy.

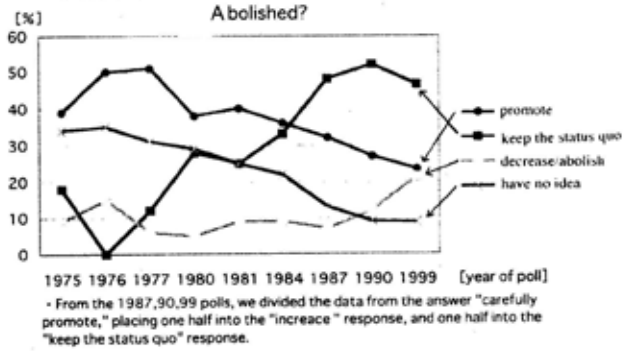
However, upon reading newspaper articles, many people were not made aware of the significance of this finding. The main reason lies in the very way the survey was conducted by the Prime Minister's Office in the past.

From 1975 to 1990, the Prime Minister's Office carried out a public opinion poll on nuclear power once every two years on average. However, after 1991 the poll was abruptly stopped, which means that this year's public opinion poll was the first one to be held in nine years.

During this time there were incidents such as the Monju accident and a referendum by the inhabitants of Makimachi, where the majority voted against the establishment of a new nuclear plant in their town. Also, interest in energy issues rose because of concerns over global warming and other environmental problems. Therefore, it would have been natural for the Prime Minister's Office to have conducted a poll every year. Nevertheless, the government was apparently hesitant to do so, because the two polls conducted in 1987 and 1989 after the Chernobyl accident showed a significant rise in people concerned over and/or opposed to nuclear energy.

Also, there was a subtle change of survey method in each poll in order to induce responses preferred by the government. The 1990 survey on the necessity of nuclear power stations, for example, began with this statement. "Nuclear power generation will become vital since it is expected that the energy demand of our country will rise in the future while the supply of oil may become unstable." This is not an unbiased, neutral introduction. In addition to "agree," a new response category entitled "rather agree" was included to help promote support for nuclear power. The government counted those who answered "Rather Agree" as promoters of nuclear power generation and concluded quite

Tabel 1 : Should Nuclear Power be Promoted or Abolished?



- From the 1987,90,99 polls, we divided the data from the answer "carefully promote," placing one half into the "increace " response, and one half into the "keep the status quo" response.

arbitrarily that more than 60% of the respondents favored nuclear power generation.

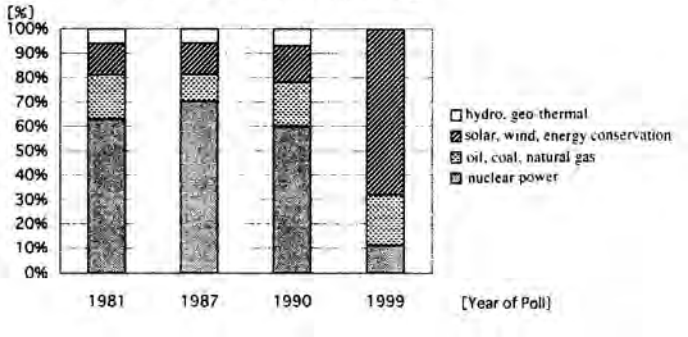
In response to the question, "Should nuclear power generation be increased?", a new response category entitled "It should be carefully increased" was added in an effort to prevent proponents from drifting away. In reality, "It should be carefully increased" has a nuance that suggests the planning of nuclear power should be carried out carefully. Thus it is logical to suppose that those who chose that answer range from people who prefer the status quo, and those who passively favor nuclear power generation, to people who are skeptical.

In surveys conducted in other years as well, there is a notable inconsistency in the way many questions are asked. Taking these inadequacies into consideration, I simplified the data into four categories to try to determine the percentages of pro-nuclear people, those who would like to maintain the status quo, and those who are against nuclear power. The result shown in Table.1 indicates a very clear trend.

The numbers of those who prefer the status quo started to increase in the 80's and in the 90's there was a rapid increase of those who either wanted to reduce nuclear power or were against it. If those who favored the status quo are included, two-thirds of the respondents answered "Nuclear power generation is no longer needed"; rejecting the government policy of increasing it, which was emphatically stated in the survey. As far as public opinion is concerned, it is obvious which side has won.

Let's look at another trend in public opinion. Table 2 shows the answers to "What do you expect as a main future energy source?", after the data was simplified in a similar manner. Here, it is even more obvious that in recent years people have become less supportive of nuclear power and are putting more hope into the development of renewable energy sources.

Table 2: The Main Source of Future Energy



When results like this come out, "authoritative" comments are often published, to claim that public responses are irresponsible since solar energy is in reality not very reliable. However, according to the result of the national public opinion poll on energy issues conducted by Japan Public Opinion Poll Association released in July, 1999, 61% of the respondents replied that they should even consider lowering their standard of living in order to reduce energy consumption. Only 11% indicated that an increase of energy consumption would be inevitable. Thus, many people are now aiming to save energy and stop nuclear power generation and global warming, as well as to change their lifestyles.

In spite of these trends, the government still continues with its nuclear policy because of complacent bureaucrats and incapable political parties that are unable to reprimand them. I would also like to point out that the number of people who chose "I don't know" dropped from 34% in 1975 (when CNIC was founded) to 3.4% in 1999. This shows that people are better informed now and are able to make their own decisions. I would like to think that what we have been doing at CNIC has contributed to this effect. The social milieu today has completely changed from 25 years ago when CNIC was founded. However, instead of indulging ourselves with this poll result, CNIC must always be aware of, and adapt to, social changes and work that responds to the needs of the public.

(By Jinzaburo Takagi)

All MOX Licence Applied for Ohma Reactor

While some Light Water Reactors (LWRs) in Japan will start operating with a one-third core of MOX fuel in the near future, an even more dangerous plan is under way. That is to operate an all-MOX fuel reactor in the Advanced BWR planned in Ohma.

On September 8, Electric Power Development Co.(EPD) submitted to the Ministry of International Trade and Industry an application for reactor installment permission for the Ohma nuclear reactor (1,383 MW) planned in Ohma, Aomori Prefecture. The design of the Ohma reactor - an Advanced Boiling Water Reactor (ABWR) is quite different from the conventional BWR, having, for example, an internal pump. The only ABWR currently in operation in the world is Kashiwazaki-Kariwa 6 & 7 owned by the Tokyo Electric Power Co. Furthermore, Ohma will be the first conventional reactor ever in the world to have a 100% MOX fuel core.

The plan to use 100% MOX fuel is apparently one way to deal with the huge plutonium surplus problem in Japan. If it is fueled with 100% MOX fuel, the amount of plutonium in the reactor will be 5 to 6 tons, making it more than four times as much as the amount scheduled for Fukushima I-3 or Takahama 4.

However, the safety problems of 100% MOX fuel utilization have not been dealt with at all. Issues such as the increased risk of the reactor becoming even more unstable when trouble happens during operation, and the increased risk of contamination in case of accidents, have not been dealt with. Engineers have considered manufacturing control rods with twice as much boron concentration as the ones used at Kashiwazaki-Kariwa 6 & 7 and increasing the capacity of the boric acid tank, but everything is like a trial.

The Atomic Energy Commission (AEC) in June this year released a report, “The loading of 100% MOX fuel in the reactor core of an Advanced Boiling Water Reactor,” taking the safety review of Oma reactor into account. However, the AEC concluded in this report that it would be no problem to use the same safety review criteria used for reactors with uranium fuel or one-third MOX for the 100% MOX loaded reactors as well. The report adds, however, that it will not be desirable to load the reactor with 100% MOX from the beginning and that they should start operation with a one-third load of MOX and then gradually load more. This shows that the MOX utilization in Ohma is actually an experiment.

There are more problems. EPDC has never operated nuclear reactors before. To date, it has only constructed and operated fossil fuel and hydro power plants. Such a company is trying to operate a reactor with all-MOX fuel! We Japanese citizens are really concerned about this whole plan.

(By Masako Sawai)

Resumption of Spent Fuel Shipments to Rokkasho Reprocessing

Shipments of spent nuclear fuel to the Rokkasho reprocessing plant were resumed on September 3. On this occasion 28 fuel assemblies, totaling about 11 tons, from the pressurized water reactor at Shikoku Electric's Ikata Nuclear Power Plant were taken to the reprocessing plant by Rokkasho's own 5,000-ton transport ship Rokuei-maru.

Test fuel shipments to the Rokkasho plant had been halted when, soon after the shipment of fuel from the Fukushima I nuclear plant last October 2, it was revealed that inspection data on the shipping casks' neutron shielding had been forged and manipulated. This showed that the system for assuring nuclear power safety was fundamentally flawed, and attracted strong criticism from citizens. Even Aomori Prefecture's Governor Kimura, under pressure from distrustful prefectural citizens, halted the acceptance of fuel already shipped to the plant, and asked the central government to postpone subsequent shipments.

The Science and Technology Agency (STA) established a "Committee to Investigate Spent Nuclear Fuel Shipping Casks" in order to look into the data manipulation. Many citizens were hopeful that this committee would hold exhaustive discussions on ways to prevent a reoccurrence, including a determination of the causes and a system for safety screening, but the committee concluded that all 43 of the casks for which data had been massaged satisfied the standard for surface dose rate, and therefore presented no problems. STA reapproved the casks. The issue was that the shielding data in the design application contained falsified numerical data, and that such manipulation of safety certification data was happening on a daily basis, but the whole investigation ended without determining anything. What is more, this most recent shipment used the same casks.

This November, Japan Nuclear Fuel Ltd. (JNFL) plans to ship about 13 tons of spent fuel to Rokkasho from the Sendai nuclear plant in Kagoshima Prefecture. And scheduling calls for the Rokkasho reprocessing plant to have received a total of about 1,600 tons of spent fuel by the time it begins operating in July 2005. But in order to carry out full-scale shipments of spent fuel to Rokkasho, the official safety agreement must be signed by Aomori Prefecture and the involved local governments in the prefecture, so this matter will not be easily resolved.

What will happen with the Rokkasho reprocessing plant is anyone's guess. Its scheduled start of operations was moved from 2003 to 2005, the sixth postponement, and no definite plan has been set forth to show exactly how the plutonium to be produced at the plant will be used. The reason that spent fuel shipments are being pushed through despite this situation is that the pro-reprocessing camp already sees the plant as a mere storage facility. Fuel storage at Rokkasho is a way to deal with local governments with nuclear power plants who are asking that spent fuel be removed from their power plant sites, and it is more than evident that this is just a way of buying time until construction of an interim spent fuel storage facility.

(By Masako Sawai)

Tsuruga Accident Report No.2

On August 20, the Japan Atomic Power Co. (JAPCO) released an interim report on the coolant leakage at Tsuruga 2 Reactor on July 12. The report states that there were likely to have been inappropriate quantities of coolant water flowing inside and outside an inner tube within the regenerative heat exchanger. The report speculates that this led to a difference in temperature between the two coolant flows, and that the constant flow of these currents at differing temperatures led to heat fatigue in the regenerative heat exchanger and the resultant crack in the pipe. JAPCO also announced that it would redesign the regenerative heat exchanger into a single internal structure by omitting the inner tube, and replace the current exchanger with a new one.

The regenerative heat exchanger consists of three shells, through which water from the reactor flows, and seventy-two heat-conducting tubes, by way of which water returns to the reactor. At five nuclear reactors in Japan, including Tsuruga 2, inner tubes are installed within the shells to divide the coolant flow into two. The main flow of current, which is the coolant, in these inner tubes passes heat to the water in the heat-conducting tubes (the bypass flow). Thus the temperature of water inside the inner tubes is lower than that of the water immediately outside of them.

The main flow of coolant through the middle pipe of the regenerative heat exchanger, which brought about this accident, was meant to be about 65C cooler than that in the by-pass flow. Even if, for some reason, the coolant water did not mix well, and two streams of water of different temperatures flowed from their joining point to the pipe alternately, it seems unlikely that this could have caused heat fatigue.

According to the interim report, when the first and second of the six cylinder supports for the inner tube in the regenerative heat exchanger were inspected, the space between the shell and the inner tube was one millimeter larger than what was designed. Computer simulation has shown that in these conditions the amount of coolant flowing into the bypass flow was 40% of the amount flowing through the regenerative heat exchanger, rather than the stipulated 23%. This means that the temperature difference between the main and by-pass flows could have been as much as 80C, quite sufficient to cause heat fatigue.

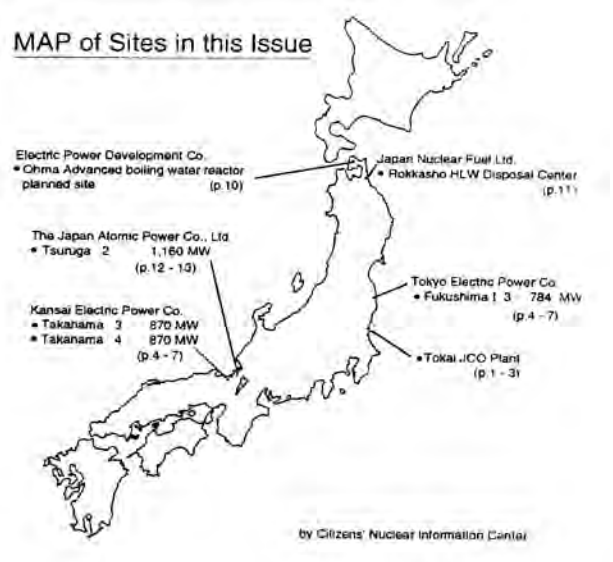
The report presents, the following scenario to account for the appearance of the cracks. If the shell of the heat exchanger underwent continual expansion and shrinkage due to the temperature difference between the respective flows, and if it is assumed in addition that the space between the shell and the inner tube was shrinking and expanding (a condition called switching), the report concludes that heat fatigue caused by such conditions brought about the cracking of the pipe and the shell of the heat exchanger.

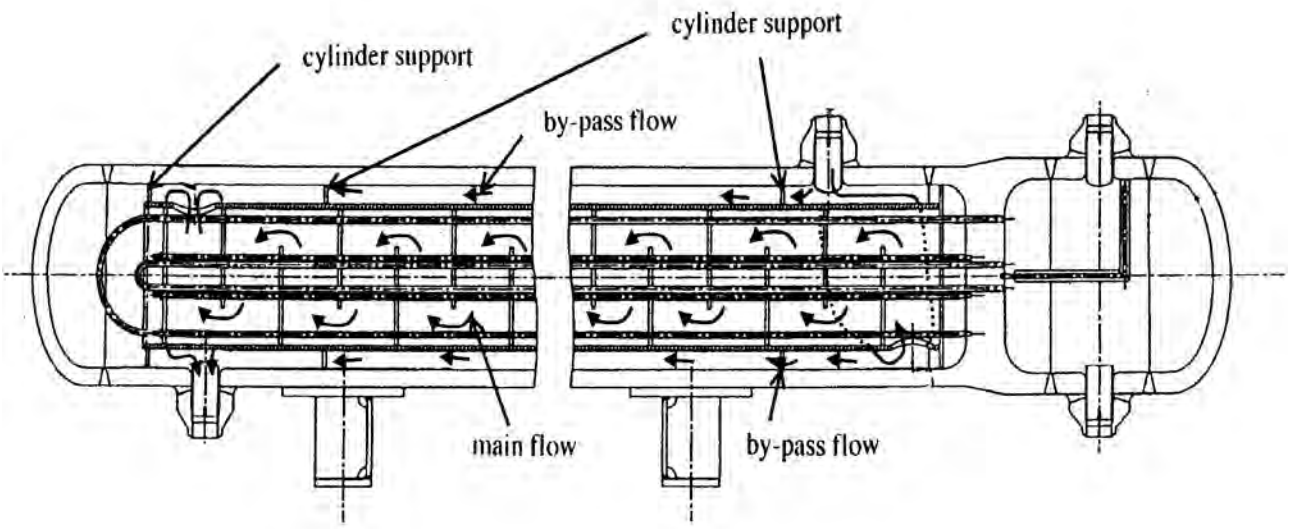
In fact, the report presents only one of several possible scenarios. Contrary to accounts in the media, it does not specify the cause of the accident, but proceeds on a particular assumption. Many important points are yet to be clarified. For example, how large was

the space in the other cylinder supports? Can we be certain that "switching" did occur in the space between the shell and the inner tube? And what is the relation between the repeated cycle and time?

The Agency of Natural Resources and Energy has claimed that other reactors using the same kind of regenerative heat exchanger will not have a similar accident. Yet the interim report does not provide information to prove that point. Since it is perfectly conceivable that the same conditions could occur in the heat exchangers used in other reactors, the authorities' confidence on this crucial point seems unwarranted

(By Chihiro Kamisawa)





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Citizens' Nuclear Information Center
3F Kotobuki Bldg., 1-58-15 Higashi-nakano, Nakano-ku, Tokyo 164-0003 JAPAN
Tel: 81-3-5330-9520; Fax: 81-3-5330-9530

Anti-Nuke Who's Who

GEN
Green Energy "law" Network

The Green Energy "law" Network was established in May 1999, by non-governmental organizations working on issues relating to the environment and energy production. The aim of the Network is to create a law obliging electricity utilities to undertake unrestricted purchases of renewable energy at favorable prices.

As global warming becomes an ever more serious problem, more people are turning their attention to the question of how we produce our energy. Here in Japan, the Third Conference for the Parties to the United Nations Framework Convention on Climate Change (COP3), held in Kyoto in 1997, aroused considerable interest in renewable forms of energy as alternatives to fossil-fuel and nuclear power. Surveys conducted this summer by the Japan Public Opinion Poll Committee and the Prime Minister's Office showed that the most favored solution to the problem of global warming was the introduction of renewable energy forms such as solar power and wind power.

However, Japan lags far behind other countries in its efforts to promote the use of renewable energy. So far, energy produced by the sun or wind has only been purchased by utilities as part of a voluntary program. Moreover, generators of renewable power in Japan are permitted to sell only a portion of the power they produce. As a result, they must use more than 50% of the energy they have generated themselves. In western countries, all the energy produced from renewable sources is guaranteed to be sold, a practice which has enhanced business stability in this developing area and increased the popularity of renewable energies. Wind power is one of the forms of renewable energy expected to benefit from business development. Yet under Japan's current system for the sale of electricity, large-scale expansion in this area will not prevent companies from continuing to purchase wind-generated power on a voluntary basis. In fact, Hokkaido Electric Power Co. announced last spring that, in face of the expansion of the wind-power generation project, they planned to limit their acquisition of electricity and introduce a bid system for power purchases.

The Japanese government's existing policy relating to renewable forms of energy imposes heavy burdens on both power generators and electric utilities. GEN suggests, first or all, that electric power companies should be obliged to purchase power produced from renewable sources. Secondly, the government should clarify its own position on this matter by setting aside revenue from the tax on electricity (0.445 yen per kw) for the purchase of power at favorable prices. Currently, income from the electricity tax is either spent on the development of nuclear power or retained for future use.

The restructuring of the Japanese electricity industry in the coming spring will be a major turning-point for the country's power companies. As the first step towards the "greening" of our electricity industry, we should make every effort to ensure that the new forms of renewable energy production are adequately supported by a system of obligatory purchase.

(Mika Ohbayashi, Vice-Representative of Green Energy "law" Network)

NEWS WATCH

No Renewal Again of the System Peak Load

The peak of electric power demand in Japan comes during the hot summer season. The power companies, therefore, broadcast TV commercials every summer, calling for power saving to the general public and requesting enterprises to suspend plant operation during the peak period. Their real aim is not to reduce power consumption but to shift the consumption to a time period when the power demand is smaller. Moreover, the power companies want to make a new record of power demand during the peak period every summer.

The system peak load was highest in 1995 and it has not renewed since then. As the utilities have built new power stations with a premise that the peak load will be renewed, they have excess capacity. Denki Shimbun (Power News), a trade paper, in its August 3 issue, reported that "the people involved in electric power are watching the demand trend expectantly to see it is renewed," but their expectation was not met again this year. The reasons cited are a recession and the saturation of the market for power consuming appliance models.

A Suit to Demand Stoppage of Construction of Shika 2

A suit was filed on August 31 in Kanazawa District Court to stop construction of Shika 2 (ABWR, 1358 MW) which Hokuriku Electric Power Co. plans to construct in Shika-machi, Ishikawa Prefecture. The suit was filed by 135 people, 73 of whom are residents of the prefecture. This is the first action against the construction of an Advanced Boiling Water Reactor in Japan.

The meaning of "advanced" in ABWR is only "of better economy", and its safety is rather worse. In fact, Kashiwazaki Kariwa 6 and 7 (both 1356 MW), for which Tokyo Electric Power Co. adopted ABWRs, have had a series of troubles. Troubles are also frequent at Shika 1 (BWR, 540 MW), exposing the fact that Hokuriku Electric is short of an adequate accident prevention system. Even under the present condition the company's power generation capacity is excessive, and there is no need to construct another reactor. If it is to be constructed, it will become difficult to balance the demand and supply. The construction of Shika 2 will only increase the amount of radioactive waste, including spent fuels. These are the claims of the plaintiffs in their demand to stop the plan.

There has been a lawsuit also to suspend operation of Shika 1. The plaintiffs lost the case both at the local and high courts, and the case has been brought to the supreme court. Even though the residents' claim was not accepted, the high court in its ruling stated that "nuclear plants bear a form of 'negative legacy.'" (NIT No. 68) The Minister of International Trade and Industry gave the first approval for Shika 2's construction plan on August 27, immediately before the suit was filed. Formally, the construction began that day.

Move Begins toward High-level Radioactive Waste

The Agency of Natural Resources and Energy on August 17 submitted a report to the Atomic Energy Commission on the outline of a proposed concrete system for high-level radioactive waste

disposal.

It is said that a bill for the Law to promote High-Level Radioactive Waste Disposal, in which the contents mentioned below are stipulated, will be placed before the ordinary session of the Diet to be convened in January next year.

* The basic disposal plan will be decided by the Minister of International Trade and Industry, and then decided upon by the Cabinet.
* The body (or bodies) which will carry out the disposal shall be a non-profit corporation approved by the government.
* The electric power companies will contribute all the necessary funds for disposal (to be included in the cost of electricity bills).
* The government will designate an existing corporation as the body to manage the funds.

The body (bodies) to carry out the disposal is (are) planned to be established within next year, with funding to be provided mainly by the power companies. According to the basic plan, these bodies will be managed financially by a separate corporation. With the strengthened government involvement, the responsibility of power companies for their waste generation will be reduced.

Rare Species of Wild Animals Support Anti-Nuke Movement

Again and again it has been confirmed that some rare animal species were living in Kaminoseki-machi in Yamaguchi Prefecture where Chugoku Electric Power Co. is planning to construct Kaminoseki 1 and 2 (ABWR, 1,373 MW each) and Okuma-cho and Futaba-cho in Fukushima Prefecture where Tokyo Electric Power Co. is planning to construct Fukushima I-7 and 8 (ABWR, 1,380 MW each). These animals are holding off the construction projects. They were found after the environmental impact statements were submitted to the Minister of International Trade and Industry, so it is inevitable to have the environmental assessments will be done again.

In the sea off Kaminoseki some finless-back porpoise, a kind of whale, were found swimming, and the scene was broadcast over television. Then, some peregrines and a number of mollusks, such as a new species of snail, and other endangered species were found. With regard to the new species of snail, their eggs were also found, and there is no question that the area is their breeding place. According to the construction plan, the area was planned to be reclaimed. In Fukushima a nesting ground of northern goshawk was found. In spite of the fact that Tokyo Electric had found the nest in March, it failed to include in the environmental impact assessment which it submitted in April.

More Difficulties for the Maki Plant Construction Plan

The mayor of Maki-machi in Niigata Prefecture, where Tohoku Electric Power Co. is planning to construct a nuclear plant, concluded a contract on August 30 with 23 townspeople to sell a piece of town-owned land in the planned construction site. These people are members of "the Association to Implement a Plebiscite," and the contract prohibits any kind of disposal of the land, including transfer and renting.

The town conducted a plebiscite in August 1996, questioning the pros and cons of the plant construction, and 61% of the people voted against the plan. Nevertheless, the pro-nuke faction, ignoring the result of the voting, is claiming that "it will be possible to sell the town-owned land to the power company, if the mayor changes."

The mayoral election is scheduled in January next year. The sale of the land to the residents was done in order to adhere to the will of the no-nuke people in the town regardless of the outcome of the election. The land sold is 743 square meters of the land owned by the town in the planned plant site, which is close to the lot located at the planned core. Without this piece of land, the power company cannot build a nuclear plant.