NUKE INFO TOKYO

May/June 2001
No. 83

Citizens' Nuclear Information Center
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MOX Loading Postponed at Fukushima and Niigata Prefecture

About 300 citizens gathered on 24 March to protest the arrival of Belgian MOX manufactured for Kashiwazaki-Kariwa 3.

On 23 March 2001, the day before the Belgian-manufactured MOX fuel transported from France arrived at Kashiwazaki-Kariwa plant in Niigata Prefecture, the Fukushima District Court dismissed the plaintiffs' appeal for an injunction on the use of MOX fuel. The deliberations about this case, which was lodged on 9 August 2000, had finished on 1 March 2001.

We, the plaintiffs, argued in our final preparatory documents the following two points: 1) There is a strong possibility that data falsification took place during the quality control inspection of the outer diameters of the MOX pellets manufactured for Fukushima I-3 by the Belgian company Belgonucleaire; 2) If such MOX fuel was used at a nuclear power plant, there would be risks of major fuel dam-

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ages that would bring about large scale radioactive disasters not only involving Fukushima residents but also citizens of a wider area.

To the very end, the defendant, Tokyo Electric Power Company (TEPCO), could not demonstrate scientifically or logically that no falsification took place with the data. Moreover, despite the repeated requests from the court for its disclosure, TEPCO kept refusing to release any data beyond the previously-released insufficient data presented in graphs.

However, the Fukushima District Court adopted most of what TEPCO had to say, and in addition to dismissing the appeal for an injunction on grounds that "it has not been proven that the data for random inspection was tampered with," the Court completely avoided commenting on the safety debate by arguing that since data falsification hasn't been proven, there is no reason to review the safety of using the MOX fuel in question.

The court defended its ruling by explaining that it cannot be simply concluded that Belgonucleaire tampered with the quality control data just because TEPCO is refusing to release Belgonucleaire's data as proof. This is a serious misjudgement of the significance of quality control data, and is a distorted understanding of the contents of the plaintiffs' data analysis on the limited available data released as graphs.

However, though it amounts to a mere two pages of the 53-page-long ruling document, there is an important argument which calls for attention. In that section, the judge calls for a disclosure of the data arguing that "The attitude (of TEPCO) is insufficient as an operator of nuclear power plants which have intrinsic risks. Despite the fact that the plaintiffs argued for the release of specific data of the random inspection, in this specific application for an injunction, on grounds that it is extremely important to release data which directly relates to the safety of nuclear energy, no attempts were seen (by TEPCO), as a customer, to repeatedly make special requests to urge Belgonucleaire to change its policy and release the data involved in this case for the random inspection (of the MOX fuel pellets)." We would love to have the data released by TEPCO, Toshiba, COMOX, and Belgonucleaire, and disclose that falsification took place.

Though we lost the case, the loading of MOX fuel at Fukushima I-3 has been postponed. This is because the Fukushima Governor publicly expressed his dissatisfaction with the central government and utilities forcing energy policies for their own convenience on to the prefecture. This expression of dissatisfaction followed an announcement by TEPCO that it would temporarily freeze plans for construction of all new power plants including the thermal power plant that was under construction in Fukushima. On 26 February 2001, Governor Eisaku Sato replied in the Fukushima Prefectural Assembly that he will not permit the burning of MOX fuel at Fukushima I-3 for the time being. He also stated that "there is an intrinsic risk with the plu-thermal program*." Problems of fuel damage, such as pellet-cladding mechanical interaction, which were explicitly argued in the court case, are finally catching serious attention. In early April, TEPCO also had to make a decision to postpone the loading of MOX fuel at Kashiwazaki-Kariwa in Niigata Prefecture which had been planned to take place that month. Furthermore, at Kariwa Village, a proposal to hold a referendum on MOX fuel use — once vetoed by the Mayor — was once again passed in the Village Assembly, and the referendum will be held on 27 May 2001.

On 9 April, the Fukushima governor revealed that he will set up in May a committee to comprehensively review the prefecture's energy policy. Information on the members and review items has not been made public yet, but the governor has mentioned that he would like to make an economic comparison of the reprocessing/plu-thermal option and the once-through option (where spent fuel is directly disposed of), and depending on the situation, would like to make suggestions to the central government. By Chihiro Kamisawa

*Plu-thermal program - A program in which plutonium is burned as MOX fuel in commercial nuclear power plants (i.e. thermal reactors).

Embrittlement Forecast of Light Water Reactors' Pressure Vessel Steels

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Radiation embrittlement of BWR more than expected

Although steel is a strong and tough material, it also becomes brittle under certain conditions. Some readers might recall the cases when iron poles of buildings suffered simultaneous brittle fractures at the time of the Great Hanshin Earthquake in 1995. The steel has a ductile-brittle transition temperature (DBTT), when the brittle property appears like that of ceramics. Although this transition temperature is normally lower than room temperature, it rises when the material is exposed to neutrons in a reactor, rising above room temperature. This phenomenon is called radiation embrittlement.

Radiation embrittlement of steel used in LWR pressure vessels has mainly been discussed as a problem related to PWRs. This is because for PWRs the distance between the core and the vessel wall is shorter than in the case of BWRs, thereby causing a higher neutron irradiation of the wall. However, examination of “trepan,” the material cut from the pressure vessel, of Germany’s Gundremmingen BWR which was decommissioned in 1977, revealed that embrittlement had proceeded more than expected, a result shocking to those involved in the nuclear industry and its regulation.

Figure 1 shows the inspection results. The study, called a Charpy impact test, was one in which the steel material was fractured by impact created by single strikes of a hammer at different temperatures. In each case, a measurement of absorption energy was taken. The absorption energy is low at lower temperatures and high at higher temperatures. Unirradiated material went through the ductile-brittle transition at around 0 degree centigrade. After neutron irradiation, the DBTT rose and the absorp-

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tion energy in the ductile region (upper shelf energy) remarkably decreased too. It should be noted that the material cut from the actual reactor exposed to 2.4 x 10^{18} neutrons per cm^2 showed more embrittlement than the same material exposed to 8.8~10 x 10^{18} in a material test reactor as shown in the upper part of Fig. 1. This fact suggests that the accelerated irradiation tests cannot simulate the real change of the steel caused by irradiation in commercial reactors. Moreover, a strange result has been observed when it was discovered that the character of the embrittlement differs depending on the direction of cutting the specimen (L-C and C-L orientation shown in the Figure 1) and the location of specimen taken from the vessel. There is a belief that anisotropic segregation of impurities such as copper is involved but the real cause has not yet been confirmed. This fact leads to a concern that surveillance test results cannot be taken at face value.

The rate of irradiation in material testing reactors is higher than that of real reactors by four orders of magnitude. In other words, thirty years' worth of irradiation is given in a day or so. Therefore it just cannot be expected that this process would have the same kind of effect as in real reactors. But the radiation embrittlement forecast model used now is based on the assumption that the level of embrittlement is determined by the amount of total irradiation without paying any attention to the rate of irradiation. This is expressed in the following formula:

$$\Delta \text{DBTT} = \text{CF} \times f^{p}$$

where ΔDBTT stands for the increase of ductile-brittle transition temperature; CF for material factor determined by the amount of impurities such as copper; f for the fluence, i.e. the total amount of neutron irradiation. The parameters of this formula are determined to fit the experimental data. The value of p varies depending on the empirical formula: 0.5, 0.27, etc. The most serious defect of this formula is that the flux, i.e. the rate of irradiation, is not taken into consideration. Thus experimental data under different conditions are mixed to form the empirical formula. Besides, there is no ground for assuming that

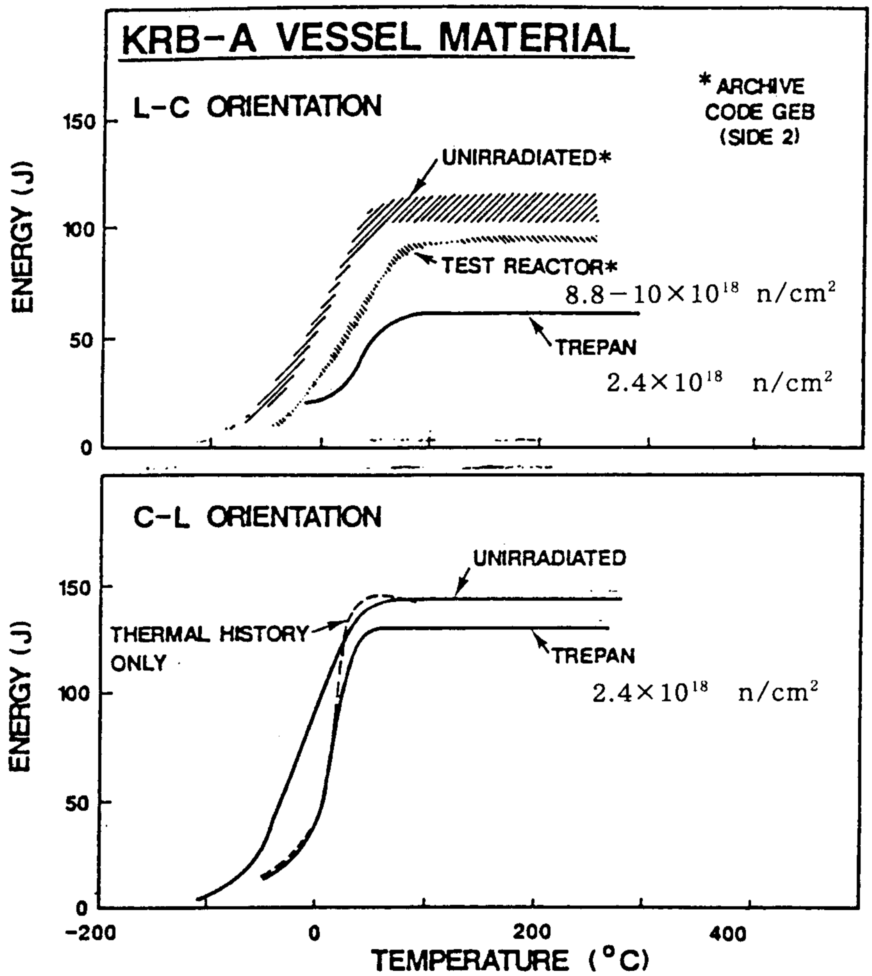


Fig. 1 The Result of Examination of the Pressure Vessel of the Gundremmingen Power Plant [after J. R. Hawthorne and A. L. Hiser, “Experimental Assessments of Gundremmingen RPV Archivial Material for Fluence Rate Effects Studies”, Effects of Radiation on Materials : 14th International Symposium (Vol.II). ASTM STP 1046, N. H. Panchan, R. E. Stoller and A. S. Kumar, Eds., American Society for Testing and Materials, 1990, pp 55-79.]

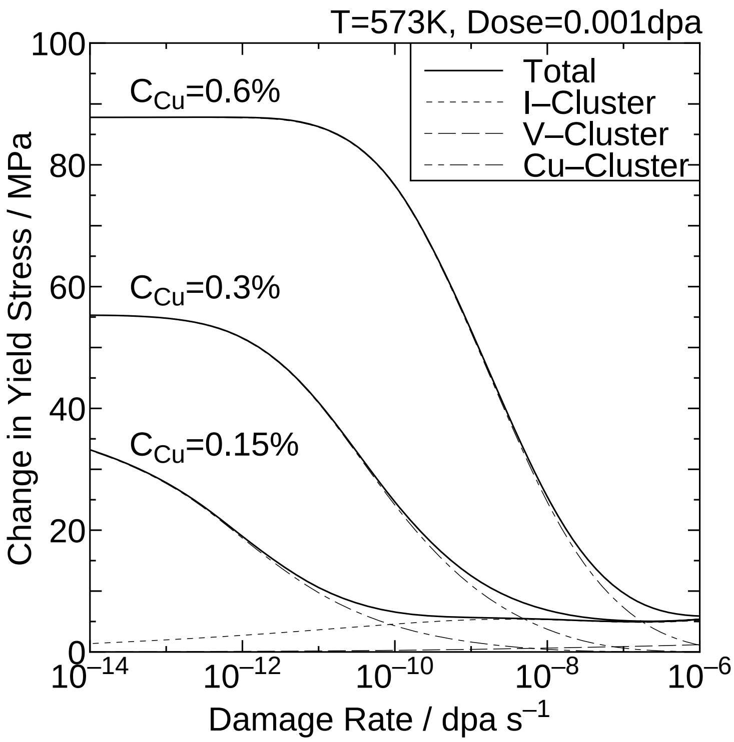


Fig. 2 Embrittlement forecast based on the computer simulation of Fe-Cu model alloy

the material factor CF and the amount of irradiation f should be independent from each other and actually, it has been known from recent studies that impurities such as copper can have a larger effect when irradiation occurs slowly.

Significant flux effect in BWR

The present author in collaboration with colleagues performed a computer simulation based on a chemical rate equation theory in order to investigate the effect of the flux in relation to impurities such as copper, which has been ignored so far. The degradation process of the material exposed to neutrons is considered to be as follows: the neutrons expel atoms that are part of the crystal lattice leading to the formation of vacancies and interstitial atoms; microscopic regions called cascades are also formed; these lattice defects meet in each other and lead to the formation of vacancy clusters and interstitial atom clusters (secondary defects). Impurities such as copper replace their positions with excess vacancies successively forming impurity clusters. These various kinds of secondary defects act as obstacles against plastic deformation, making the material hard and brittle.

By expressing this process with a chemical rate equation following the time sequence with an appropriate assumption, the way that clusters are formed can be determined. Then, the degree of the embrittlement of the material caused by those clusters can be calculated using a model called Russel-Brown mechanism.

An example of the results obtained in such a way is shown in Figure 2. It shows the increase of the yield strength (=hardening amount) with the flux on the x axis at the fluence of 0.001dpa. dpa (displacement per atom) is a unit signifying the ratio of atoms expelled. 0.001dpa means that one out of 1000 atoms being expelled. This approximately corresponds to the amount expelled when neutrons with an energy level no less than 1 MeV hitting at a ratio of 7 x 10^{17} per cm^2 in LWR's. This is the irradiation amount at the early period of PWR's and at the mid to latter period in the case of BWRs.

This figure shows that even with the same amount of irradiation, the degree of embrittlement is larger for the region of lower flux and smaller for the region of higher flux. Although the difference is marked for the cases with higher copper content, this tendency itself is clearly observed at a relatively small content level of 0.15%. This is due to the fact that because it takes a longer time for the same amount of exposure to be achieved in the case of low flux, the number of times when the vacancy moves around is bigger, leading to a greater formation of copper clusters. Since the flux is around 10^{-12}dpa/sec for BWR and 10^{-10}~10^{-9} dpa/sec for PWR, this effect is expected to be especially marked in the case of BWR. On the other hand, the accelerated irradiation tests in material testing reactors involve 10^{-8}dpa/sec. Therefore there is a danger that the embrittlement in actual reactors, BWR's in particular, could be extremely underestimated. Furthermore, because the cause of the hardening in such accelerated irradiation tests is the formation of interstitial atom clusters, the origin of the hardening itself is different. Thus the above-mentioned irradiation embrittlement forecast formula using accelerated irradiation data is based on flimsy grounds and underestimates the risk for BWR in particular.

Growing danger with aging

Now, what is the actual situation with respect to embrittlement at nuclear power plants in Japan? At nuclear power plants, surveillance specimens of the same origin are put inside the reactor both for the pressure vessel base metal and welding material. Operators are required to take out the surveillance specimens a certain number of times during the course of the operation to inspect the embrittlement situation (in most cases this has been done only once or twice). Figures 3 and 4 show the relation between the increase of the ductile-brittle transition temperature and the amount of irradiation for base metal and welding material, respectively, based on the result of the examination released by the former Ministry of International Trade and Industry (now the Ministry of Economy, Trade and Industry). In the figure, BWR (accelerated) signifies the data obtained from the specimen closer to the core so that neutron flux is larger by an order of magnitude. The three quadratic curves in the figures represent the embrittlement curves determined from the data around 1970, namely at the early operational period of nuclear power plants. These were used in documents provided in the permission application for the Tokai 2 power plant. The "sensitive case (Carpenter)" represents embrittlement of the kinds of steel that tends to go through embrittlement more easily. It should be noted that in the case of BWR ordinary irradiation, more than half the data points of both the base metal and the welding material are above this curve. Furthermore, although the worst case represents a curve connecting the worst embrittlement data points at the time, there are ten points of actual measurements above this curve. This shows that the pressure vessel materials of these reactors are under severe embrittlement, conditions that were foreseen at the time that permission was being considered.

How did this happen? The data obtained at the time must have been

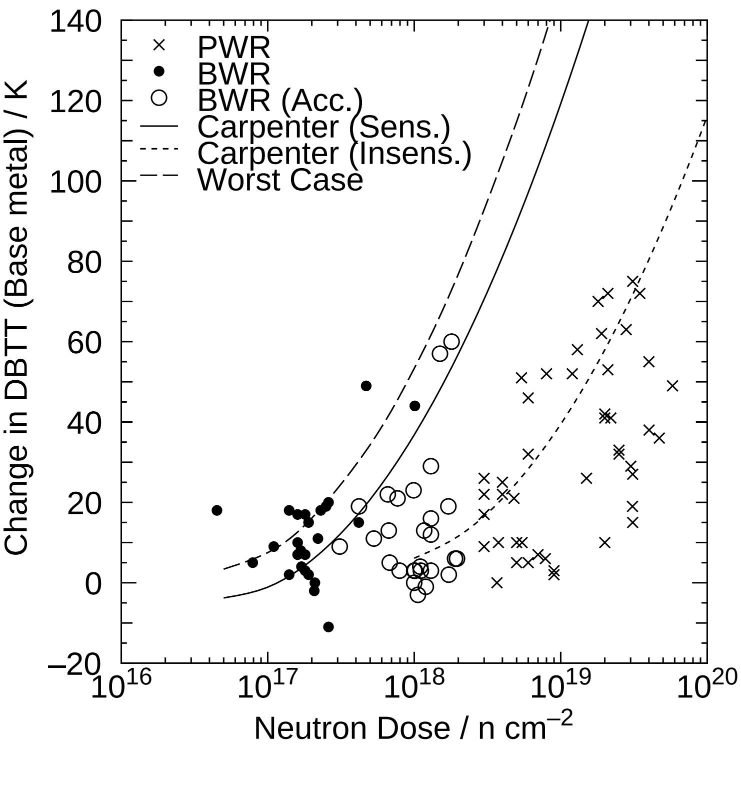


Fig. 3 The result of analysis of the pressure vessel surveillance test data of nuclear power plants in Japan (base metal)

mainly obtained by accelerated irradiation tests because it had not been too long since the start of reactor operations. As was explained above, these do not represent the picture of embrittlement of actual reactors. Thus a large discrepancy resulted between the forecast and the actual data in BWRs where the flux is low.

That the forecast based on the accelerated tests could not be used would mean that embrittlement of pressure vessels is advancing further into the realm of the unknown, day by day. The embrittlement forecast formula mentioned at the beginning of this paper is the one used in the Rev. 1 (1977) and Rev.2 (1988) of America's Nuclear Regulatory Commission (NRC) Regulation Guideline, and a similar formula is used in Japan. However, these formulas are nothing more than the data obtained at that time jumbled up into one formula ignoring the difference in flux. As can be understood easily, the data for the area with lower fluences must involve lower fluxs and the data for the area with higher fluences must involve higher fluxs. There is no scientific meaning in connecting these data points.

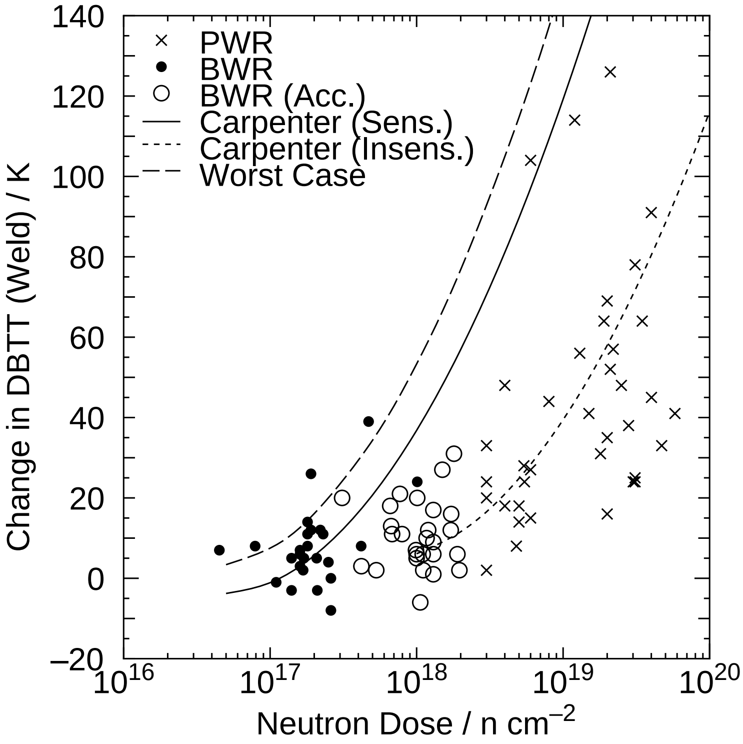


Fig. 4 The result of analysis of the pressure vessel surveillance test data of nuclear power plants in Japan (welding material)

The fact that the flux effect is important has recently been recognised at last, and it has become a task for the nuclear industry and academic circles to revise the embrittlement forecast formula that does not fit reality. This is because the work is essential as part of measures to cope with problems stemming from the aging of reactors. The pressure vessels have been designed with the assumption of a service life of 40 years (with the effective use period assumed to be 32 years). As it gets more and more difficult to construct new reactors – reflecting a world-wide trend – moves are gaining momentum to use aged reactors longer by extending reactor life to around 60 years.

A study group on schemes for using aging reactors focusing on the reactor vessel steel has been started by the industry and the government with the participation of some academics. Once again, the discussion is taking place behind the scenes. It is keenly felt by researchers close to the nuclear industry that this industry is very exclusive. Unless this is changed, there will be no public forum for debating the safety issues.

With the extension of operation periods, a shortage of surveillance specimens placed inside reactors also becomes a problem. The possibility of reuse of specimens and miniaturization of specimens is being studied, but this is only at the research stage. Without monitoring and with uncertain theoretical forecasts, it is possible that workers will be forced to operate reactors based on guesswork. What is needed now is the release of data, including the offering of specimens to researchers, that can withstand safety verification, and open discussions for scholars and the public.

Court Cases Involving Rokkasho Nuclear Fuel Cycle Facilities

At Rokkasho Village, Aomori Prefecture, the following four facilities are being operated: a uranium enrichment plant, a low-level radioactive waste (LLW) disposal center, a vitrified waste storage center, and a completed spent fuel storage pool for a reprocessing plant that is currently under construction. Residents filed administrative lawsuits against the government's granting of permission for the operation of these four facilities. All lawsuits are currently under deliberation. In Japan, even if there are lawsuits in process concerning the operation or construction permissions, the construction and operation of the facilities continue. Following is a brief sketch of the current status of the facilities and a summary of points of contention in the lawsuits.

1. Circumstances leading to the establishment of the nuclear fuel cycle complex

Prior to the establishment of the four nuclear fuel facilities in Rokkasho Village, Aomori Prefecture, there was a plan to construct a large-scale petroleum complex, and about 52.8 km^2 of land was half forcefully bought up. However, this plan collapsed following the two oil shocks of 1973 and 1979, and a vast amount of land was left unused except for land allotted for the National Petroleum Storage Site (2.6 km^2). Rokkasho Village's plight over nuclear issues began when the Federation of Electric Power Companies (FEPCO), which was looking for a site for a nuclear fuel cycle complex, set its eyes on this land. FEPCO submitted an application to Rokkasho Village and Aomori Prefecture to accept the complex in July 1984. It was difficult for local residents who had already sold their lands to protest against the siting of this nuclear complex. Nonetheless, a strong opposition campaign was carried out by city residents, unions, and youth groups. Despite such an outcry from residents, about eight months later, in April 1985, the Governor and the Village Mayor each signed an agreement to accept the complex (10 km^2). FEPCO had only asked the Village and the Prefecture to host three facilities: the uranium enrichment plant, the LLW disposal center, and the reprocessing plant. It is clear that ample and detailed information was not provided, considering that the vitrified waste storage center was explained as an annex to the reprocessing plant when in fact it is a completely separate facility. In addition, the environmental impact assessment was simply an appropriation of the one done for the petroleum storage site. This plan was promoted from the very beginning with such unjust procedures which deceived local residents.

2. Safety Review

The safety review procedure for the construction of Japan's nuclear fuel facilities consists of two processes: a review by the controlling agency (first step) and a review by the Nuclear Safety Commission (second step). The applications are submitted to the controlling agency and then are reviewed separately by the two establishments, but basically the review processes are identical. After the two reviews, the Prime Minister issues the permissions. The safety review only concerns the basic blueprint of the facilities and excludes layout details, transportation of nuclear fuel materials, and specific operational management. The controlling agency reviews layout details and construction procedures after the Prime Minister issues the permissions, but the Nuclear Safety Commission (NSC) is not directly involved with this process. The lawsuits against the four facilities are thus administrative lawsuits against the Prime Minister who issued the permissions to construct and operate the facilities. The facilities were previously planned and constructed by the Japan Nuclear Fuel Industries Inc. (the uranium plant and the LLW disposal facility) and the Japan Nuclear Fuel Service Co., Ltd. (the vitrified waste storage facility and the reprocessing plant). However, the two companies merged into the Japan Nuclear Fuel Ltd. (JNFL) and the company is constructing the reprocessing plant and operating the three other facilities.

3. Up-dates on the facilities

The Uranium Enrichment Facility

The enrichment of uranium is done by a Japanese-developed “centrifuge separation method.” It is currently operated at 1,050 ton Separative Work Unit (tSWU), and is eventually planned to be operated at 1,500 tSWU. However, the 1A line which was the first to be operated is now completely shut down due to automatic shut down of a number of centrifuge separators. This is obviously due to the failure of centrifuge technology development and it is highly unlikely that the planned full operation of 1,500 tSWU in 10 years will ever materialize. Utilities that want to lower the cost of nuclear-generated electricity are not interested in the construction of additional facilities at this plant since the cost of enrichment is indeed about 5~6 times that of the prices of overseas competitors. Increasingly, Japanese utilities are importing fuel assemblies manufactured overseas.

The Low-Level Radioactive Waste Disposal Center

Low-level radioactive waste produced by the operation of nuclear power plants is stuffed into 200 liter drums and disposed of underground. The facility is currently licensed to store 400,000 drums, but the plan is to ultimately store 3 million drums. The drums are laid sideways into cement boxes, called pits, which are set about 10 meters below ground level. The pits are covered with lids, and then finally covered with soil. The pits’ lifetime is estimated as 30 years, but long-term safety has never been proven. In addition, it has been confirmed that the drums shipped from the many nuclear plants to the facility include some that are corroded with rust and holes (see NIT 74, p.12), and it is certain that radioactivity will leak into the pits earlier than estimated.

	Uranium Enrichment Plant	LLW Storage Center	Vitrified Waste Storage Center	Reprocessing Plant (Under Construction)	
				Reprocessing Plant	Spent Fuel Storage Pool
Current Capacity	1,050tSWU	400,000 (200/ drums)	1,440 Canisters	800t/year	3,000tHM
Ultimate Capacity	1,500tSWU	3,000,000 (200/ drums)	2,880 Canisters		
Operation Permission	10 / 08 / 1988	15 / 11 / 1990	03 / 04 / 1992	24 / 12 / 1992	24 /12 / 1992
Court Appeal	13 / 07 / 1989	07 / 11 / 1991	17 / 09 / 1993	03 / 12 / 1993	03 / 12 / 1993
Operation Initiation	27 / 03 / 1992	08 / 12 / 1992	26 / 04 / 1995	(July, 2005)	02 / 10 / 1998
Construction Cost as of April 2001 (yen)	About 250 bil.	About 160 bil.	About 80 bil. (current capacity)	2.14 bil.	

Table 1 Capacity, Status and Dates concerning Rokkasho Nuclear Fuel Cycle Facilities

The Vitrified Waste Storage Center

This facility is not an annex to the reprocessing plant currently under construction, and was built to store all levels of "returned" waste produced during overseas reprocessing of Japanese spent fuel. However, so far it has accepted only vitrified high-level waste. (The construction of a separate storage facility within the Rokkasho reprocessing complex is planned for the vitrified waste which will be produced by the operation of the Rokkasho plant.) The reprocessing contracts signed with Britain and France are for 7,100 tons of Japanese spent fuel, and the estimate of the vitrified high-level waste to be returned to Japan was recently corrected to 2,200 canisters from the original 3,500. At the center, nine canisters are stuffed into stainless steel thimble tubes, which are then placed in underground storage pits to be cooled by natural ventilation. The condition set by locals to the government in exchange for accepting "returned waste" was that the storage period will be limited to 30~50 years. But there are no concrete plans for the construction of a final disposal facility, and thus it is unclear as to how long the waste is going to be stored here. There are no plans to construct additional facilities to store low and intermediate "returned waste" which, along with the high-level vitrified waste, are by-products from the process of overseas reprocessing of Japanese spent fuel, and are currently stored in France and Britain.

The Reprocessing Plant

The plant's annual capacity is 800 tons and is under construction now. The plant is a hodge-podge of acquired technology: technology involved in the main process (dissolution and separation) is imported from the French company COGEMA; high-level liquid waste treatment technology from British Nuclear Fuel plc. (BNFL); iodine separation technology from Germany; and vitrification technology from the Japan Nuclear Cycle Development Institute (JNC). The spent fuel storage pool was completed long before, and the transportation of spent fuel has already began. About 1,600 tons of spent fuel will be stored in the pool by the planned completion of the plant in July 2005. The completion was planned for 1997 in the original application, but was postponed four times. The construction cost has risen sharply, and is 2.14 billion yen, three times compared to its original estimation of 760 million yen. It is certain that the cost will have risen further by the time of its completion. A test operation using water was began at a completed section of the facility in April 2001 to identify dysfunctional parts. However, it is doubtful that such test runs will be sufficient to guarantee safe operation

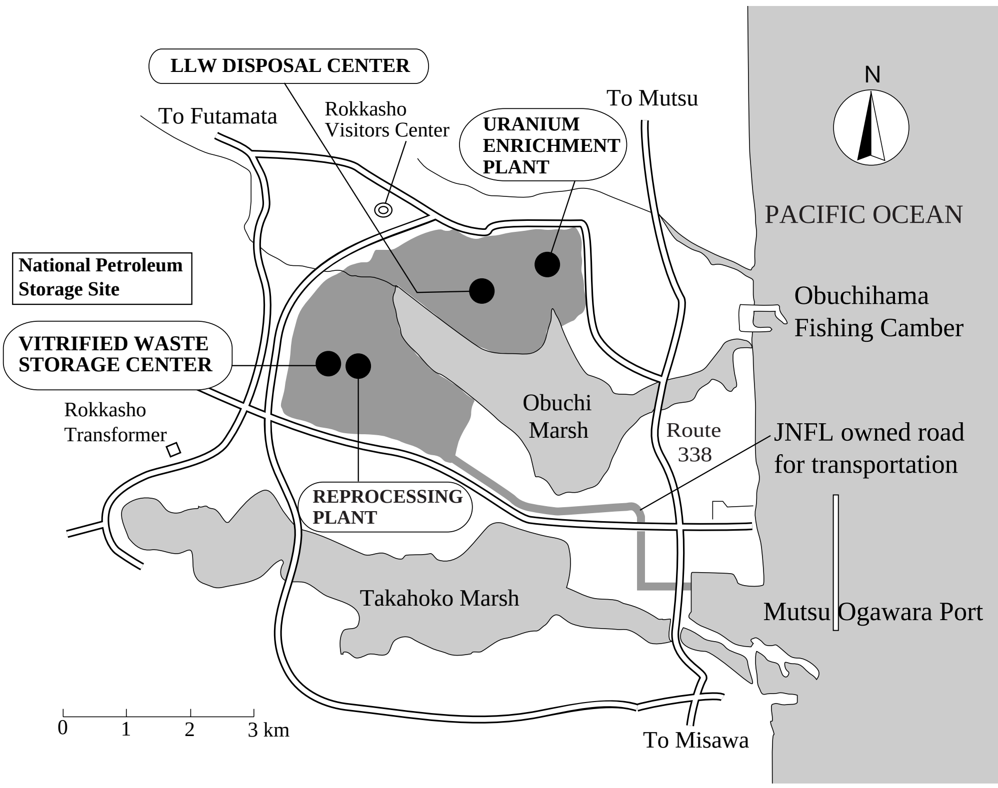


Fig. 1 Rokkasho Nuclear Fuel Cycle Complex

of the facility given that there have already been a number of small problems during the operation of the spent fuel storage pool. JNFL's inexperience and the fact that the plant's technology has been adapted from various companies pose serious concerns over operational safety. Moreover, the necessity of the plant itself is in question as doubts are cast over the necessity of producing plutonium at Rokkasho considering the following facts: the growing excess plutonium stockpile from the reprocessing of Japan's spent fuel in Britain and France; the failure of the development of Japan's Monju Fast Breeder Reactor; and the significant delay in the initiation of the MOX utilization program.

4. Issues of contention in the lawsuits

Each facility has a number of problems particular to itself, but common problems will be introduced here:

Accident Assessment

The assessments of radiation damage, conducted as part of the safety review procedure, from each facility during normal operation and in times of accidents is grossly underestimated. Especially with the reprocessing plant, the conclusions of the assessments of two cases — a fire within the plutonium refining cell, and a criticality accident triggered in a dissolution tank — were that an extremely low amount of radioactivity would be released. The adopted hypothetical number of accidents itself is a gross underestimation. The plaintiffs, consisting of citizens, are making a case using Jinzaburo Takagi's assessments and data of released radioactivity from reprocessing plants in Sellafield, the U.K. and La Hague, France. One of Dr. Takagi's hypothetical assessments is based on a mere 1% release of radioactivity from a damaged high-level waste tank, but the conclusion indeed is that the release would effect 2/3 of Japan (see Figure 2).

Geological Situation

The entire country is located in a mobile belt with high volcanic and seismic activity anyway, but the complex is located in an area called the "earthquake nest." The ground underlying the facilities is weak and the existence of an active fault was confirmed right under the site for the reprocessing plant, but the government contends that the fault is not active. In addition, there are many active faults in the surrounding land and sea, and there have been a number of serious earthquakes in the area in the past.

Nearby Military Base

About 40 km south of the complex is the U.S. Misawa Military Base, and 13 km south is a ground-air fighting training field. This base is equipped with American F16 fighters and Japanese Self Defense Force's F2 fighters, which are flying day and night for training and spying. Including commercial flights, there are 40,000 flights a year which pass over the complex. Luckily, there have been no crashes into the facilities so far, but there have been a number of crashes and fires involving aircraft, and the misfiring of dummy bombs in the vicinity.

By Masako Sawai

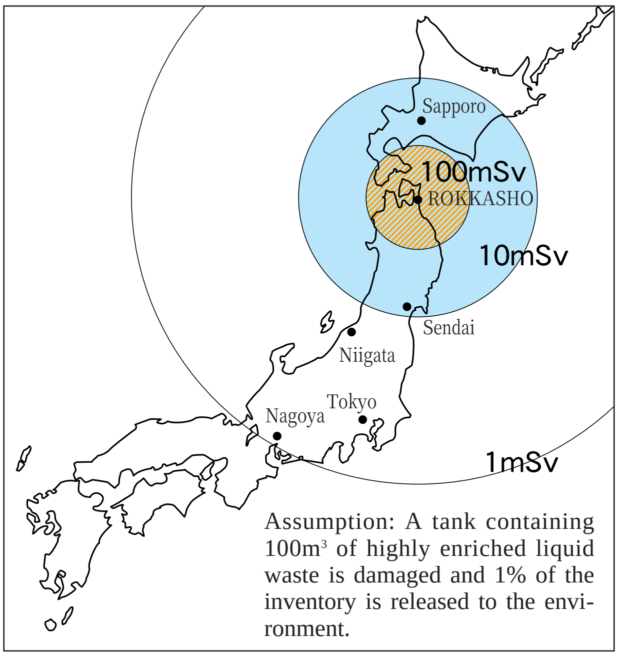


Fig. 2 Damage Assessment of an Assumed Accident at Rokkasho Reprocessing Plant. (by Dr. J. Takagi)

Open Debate on JCO Accident Reveals NSC's Imprudence

On 24 February 2001, an open debate was held in Yokohama City, in which members of the JCO Criticality Accident Comprehensive Assessment Committee (JCAC), set up by CNIC and the Japan Congress Against A- and H-Bombs, and the government's Nuclear Safety Commission (NSC) had a heated discussion on the 1999 JCO accident. The NSC established the Uranium Processing Plant Criticality Accident Investigation Committee (UCAIC) shortly after the accident, and rushed to create a final report which was submitted to the controlling agency at the time (the former Science and Technology Agency) on 24 December 1999 (see NIT 75, pp7-9).

The JCAC released its final report in September 2000 and demanded that the NSC hold a co-sponsored open debate with the committee. NSC did not take up the challenge, but instead suggested that it would set aside time for an open debate during its own "Local Nuclear Safety Committee." The committee, set up following the accident, is not an official decision-making body, and is meant to be held across the country. Its first meeting was held in Tokai Village in August 2000. Our committee took up NSC's offer to hold an open debate at the second meeting of this "Local Nuclear Safety Committee" in Yokohama City.

There were ten panelists, five from each side including NSC Director Shojiro Matsuura and JCAC Chairman Michiaki Furukawa. Though the time was short, the following points were made clear from the debates: that the UCAIC gave utmost priority to complete the final report within 1999; thus the UCAIC's investigation was concluded without ample deliberation on a number of unresolved factors concerning the accident; that NSC members do not clearly understand the factors concerning the core causes of the accident; and finally, that the reforms being carried out by the NSC following the accident have been superficial.

The recurring comment from the NSC members during the debate was; "Why is that important? It has nothing to do with the contents of the final report." For example, this comment was given regarding the amount of uranium that was poured into the precipitation tank which triggered criticality − a nuclear chain reaction. The amount is literally "critical" in the investigation of the cause of the accident and many documents imply that the amount poured was less than the figure 16.6 kg adopted by the UCAIC. NSC member Mr. Kanagawa contended that "We did not find the differences between sources an important matter. We would like to hear what kind of difference it would make to the conclusion of our final report if the amount poured was less than 16.6 kg." To protect the final report from any criticism, the NSC chose to assert that not even the criticality mass is important.

Mr. Kanagawa repeated the same comment when JCAC members pointed out that the analysis of the uranium solution involved in the accident, which could have covered for the insufficient measurements of released radioactivity, was insufficient. "How important is the analysis of remaining radioactivity in the uranium solution? Please explain why it is important." The NSC members would not admit that it is vital to conduct a thorough analysis of the remaining uranium solution for assessing the released radioactivity during criticality. The audience was given a vivid impression that the investigation carried out by the NSC was not based on a serious desire to decipher the accident.

It was disclosed by one of the NSC members, Mr. Suda, who did not belong to the Commission when he was a member of UCAIC, why such a sloppy job was done. He contended that "there was strong pressure to finish the final report no matter what by the end of December of that year." Following such comments, which highlighted the insufficiency of the NSC's investigation from a safety analysis aspect, the NSC's argument turned into one that contended that the final report was more of a response than an investigation. The NSC Director asserted that "the final report was for introducing countermeasures, and not so much to report on an investigation." How can they apply countermeasures and reforms without deciphering which conditions and regulatory authorities were responsible for causing the accident?

JCAC members (five from the right) and NSC members at the open debate. (24 February, 2001)

Also, they avoided facing the fact that the NSC had part of the responsibility over the accident. Members repeated that "during the safety review, only the contents of the applications are reviewed and thus nothing further can be done." Following the accident, the NSC has hailed the strengthening of safety regulation. However, by defending their insufficient safety review system, which failed to prevent the JCO accident, they are denying their own claims of reformation.

Despite being NSC members, they are not aware of truly important matters concerning safety, and conducted an investigation not for finding facts but to draw an end to discussion about the accident. This is the kind of attitude which brings about accidents.

In January 2001, following the restructuring of ministries, the NSC was moved to the Cabinet Office, and its secretariat was set up as an "independent" body with an increase in staff. NSC hails that it has become more independent and has improved its function due to these changes. The NSC contended that one of the objectives of this debate was to "clarify the issues which need to be reviewed" for the Commission to make further progress in its reformation. This objective was met during the discussion by a number of specific points raised by our committee members.

However, at an NSC meeting held on 5 March 2001 where "the results of the second Local Nuclear Safety Committee" were on the agenda, no discussions were held on the core matters confirmed during the debate, and the meeting ended with only a brief report that the committee meeting had been held. With such an attitude, it is doubtful that the Commission will truly carry out a thorough "self-review" as stressed in the Nuclear Safety White Pages 2000 edition published by the Commission in March 2001.

Our committee has handed in a set of written questions to the NSC, based on the committee's assessment of the accident and the issues which the NSC failed to clarify during the debate of 24 February, and is awaiting the commission's response.

By Satoshi Fujino

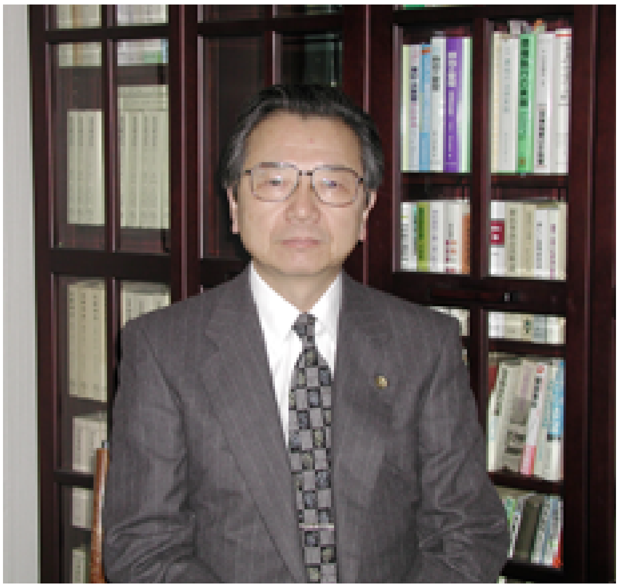
Anti-Nuke Who's Who

Koji Asaishi

Imbued with the spirit and love of the rebel: a true anti-nuclear activist.

By Wakako Yamamoto

Throughout the world the tide is turning against nuclear energy. A sustainable society is one which accepts life in all its diversity and which lives in harmony with all living beings. Japan, however, has adopted a national policy supporting the nuclear fuel cycle — a concept which is clearly falling to pieces. Nevertheless, the government is contriving to create an intensive complex of nuclear-related facilities in Rokkasho Village, Aomori Prefecture. It is now rushing to send spent fuel, high-level waste and low-level waste to those facilities. The "Group of Ten Thousand Plaintiffs for the Lawsuit to Stop the Nuclear Fuel Cycle" (hereinafter "10,000 Plaintiffs Group") have for over 15 years been opposing the nuclear fuel cycle facilities and running a court battle demanding that the project be withdrawn.



Koji Asaishi quickly realized the deceit and the danger of the nuclear fuel cycle plan, and in 1988 he became a key figure in setting up the "10,000 Plaintiffs Group". He was the leader of the defense council, and in 1996 became the delegate of the "10,000 Plaintiffs Group." Ever since Aomori received the request to become the nuclear fuel cycle site, the "10,000 Plaintiffs Group" has been the center of the citizens' opposition movement. Simply being the group's president must have caused him enormous toil. Without the support and understanding of his lovely wife, also a lawyer, he couldn't have carried forward the campaign as he did. Did he pass his regular workload on to her, perhaps?

Asaishi was the Aomori Lawyers' Association's Pollution Response Committee chairperson for 25 years. He is a member of the Japan Lawyers' Association's Pollution Response and Environmental Protection Committee (Energy and Nuclear Energy Subcommittee) and has done surveys of nuclear energy facilities both within Japan and overseas. He drew attention to the legal issues involved with the nuclear fuel cycle plan and was an instigator of opposition to nuclear energy and to the nuclear fuel cycle both within and outside of Aomori. As a legal professional he continually appealed to the Japan Lawyers' Association and succeeded in shifting the association's stance by speaking out about the dangers of the nuclear fuel cycle at symposiums and large gatherings. Many groups have cowered before the nuclear fuel cycle program, a top-down national policy, but the Japan Lawyers' Association has persistently taken an anti-nuclear stance, adopting a resolution in favour of the suspension of nuclear fuel reprocessing and calling for a shift to renewable energy at their 2000 general meeting in Aomori.

He was no doubt greatly moved by the Chernobyl tragedy. He says he wants to make Aomori a safe place for his three children to return to before he dies. He hasn't changed a bit from the man who, 15 years ago, held a microphone in his hand as an anti-nuclear speaker. His heart is penetrated by the spirit and love of the rebel and on it are inscribed the words of the late Giichiro Yonaiyama: "Fighting begins with hatred". Hidden behind his calm face is the strength of one who has frequently confronted despair. He will never lose sight of hope.

NEWS WATCH

Utilities Delay Power Plants' Construction Plan

Japan's ten major electric power companies published, at the end of March, their power supply plans through FY2010. The tendency of these companies to refrain from constructing new power plants is very obvious, as the growth rate of power demands has become slower, and severe competition is expected due to deregulation of the electric utility industry. Thus many plans for construction of additional power plants were postponed from one to five years, and there is one plan which was completely frozen.

Plans for initiating the operation of eight nuclear power plants were postponed for one year, but every year the same thing has happened. The power companies wouldn't mind longer postponements, but they have been delaying their plans year by year so they will not stray too far from the government's development plan.

FNCA Holds Second Coordinators' Meeting

The second coordinators' meeting of the Forum for Nuclear Cooperation in Asia, which was formed on the initiative of Japan's Atomic Energy Commission (AEC), was held on 14~16 March in Tokyo. The meeting was attended by one coordinator from each of the nine member countries. It was proposed at the meeting that support should be given for improving the management system of used radioisotope (RI) radiation sources, and for the establishment of a university for nuclear science and technology. It was decided that they would discuss how to materialize these plans.

Residents Near Shika Plant Form Autonomous Disaster Prevention Organization

The Hokuriku Electric Power Co.'s Shika Nuclear Plant is located in Shika Town, Ishikawa Prefecture, where Shika 1 (BWR, 540 MW) has been in operation since 1993 and Shika 2 (ABWR, 1,358 MW) is under construction. On 10 March 2001 "A Network for Lives" was formed with the purpose of residents preparing themselves to protect their own lives in case of accidents at the Shika plant. The membership consists of 690 people living in Shika Town as well as those in one adjacent city and five towns. Twelve iodine tablets each were distributed to all of the members. Later the group plans to purchase simple radiation detectors and rent them out, and to conduct autonomous evacuation drills.

Plans for Off-site Spent Fuel Storage Set in Motion

Plans to build off-site storage facilities for spent fuel, which continues to accumulate on nuclear plant sites, are being consolidated. Tokyo Electric Power Company (TEPCO), which asked Mutsu City, Aomori Prefecture in December 2000 for permission to conduct a "siting feasibility survey" (see NIT No. 82, pp. 4-5), has been vigorously holding explanatory meetings at various places in the city since

February in an effort to win over citizens to agreement on conducting the survey.

Kansai Electric Power Company (KEPCO) also revealed on 26 March that it has narrowed the prospective sites to four locations. In the area that KEPCO covers, the Chamber of Commerce of Obama City, Fukui Prefecture, has voiced its invitation for siting the facility, but according to KEPCO's President Hiroshi Ishikawa, no location in Fukui Prefecture is included among the four candidate sites. The governor of Fukui Prefecture has requested KEPCO to move the spent fuel out of the prefecture.

Neighboring City Mayors of Sendai Plant Oppose Additional Construction

On 28 March 2001, the mayor of Kushikino City, which is situated in the south of Sendai City, Kagoshima Prefecture, stated his opposition to the Kyushu Electric Power Company's plan to construct Sendai 3 (APWR, 1,350 MW). It was very unusual for the mayor to go against the city council's resolution, passed on the previous day, in favor of conducting an environmental assessment survey for the additional reactor, and express his opposition to the plan. The mayor explained that "upon respecting citizens' voices", he decided to make the announcement.

In Akune City, in the north of Sendai City, the mayor expressed his opposition to the plan in response to the city council's resolution against the plan. The council of Takaono Town, further north of Sendai, also adopted a decision opposing the plan.

Simultaneous Shipments of HLW and MOX; Last Shipment of Tokai 1 SF

The simultaneous shipments of HLW and MOX, on which NIT reported in the previous issue (No. 83, pp. 1-2), have been completed. High-level waste (HLW) was shipped to a storage facility in Rokkasho, Aomori Prefecture on 21 February, and MOX on 24 March to the Kashiwazaki-Kariwa nuclear plant. According to an announcement made by Japan Nuclear Fuel Ltd. (JNFL) on 29 March 2001, the next shipment of vitrified HLW from the French company COGEMA will consist of 152 canisters and is planned to take place during July 2001 and March 2002.

On another note, the Japan Atomic Power Co. (JAPCO) has said that the last shipment of spent fuel from Tokai 1, the only decommissioned reactor in Japan, will leave the country sometime during June or July 2001 and head to the U.K. for reprocessing.

HOYA Glass Assisting Nuclear Weapons Development Facility?

The American corporation HOYA Glass, a subsidiary of Japan's HOYA Glass, famous for its optical glasses, won the bid to supply glass specially produced for laser use for the National Ignition Facility (NIF) now under construction at America's Lawrence-Rivermore Research Institute for laser fusion. HOYA Glass is under severe criticism in Japan for assisting nuclear weapons development, as this NIF will conduct performance tests of nuclear weapons. In February 2001, in response to open questions submitted by the Japan Congress Against A- and H- Bombs, the company announced that it will not supply the glass, but reversed this claim the next month, basing its reversal on the Chairperson's confirmation at the 1998 International Fusion Energy (IFE) forum held in Japan that "NIF is not centered around sustaining and expanding technology for self-defense."

However, according to the U.S. Department of Energy, "the main objective of NIF is to sustain the group of nuclear weapons-related physics experts in America," and thus it is clear that the glass supplied by HOYA is connected to America's nuclear weapons development.