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Japanese Overseas MOX Fuel Fabrication and Current Situation of MOX Fuel Use in Japan

A shipment of 28 BWR fuel assemblies consisting of plutonium uranium mixed oxide (MOX) fuel fabricated at Belgonucleaire for the Kashiwazaki-Kariwa Unit 3 reactor in Niigata Japan left Cherbourg, France on 19 January 2001. This is the second shipment of MOX fuel from Europe to Japan, and the first since the BNFL quality control data falsification scandal occurred in December 1999. As a result of the BNFL scandal, opposition to Japan's Plutothermal Program, the program to use MOX fuel in commercial light water reactors, has increased tremendously, and citizens in the village of Kariwa are now preparing to collect signatures in an attempt to hold a referendum to stop MOX use from taking place in the Kashiwazaki-Kariwa Unit 3 reactor.

In July 1999, 8 fuel assemblies of PWR plutonium uranium mixed oxide (MOX) fuel for Kansai Electric's Takahama Unit 4 reactor located in Fukui Prefecture, and 32 fuel assemblies of BWR MOX fuel for Tokyo Electric's Fukushima Daiichi Unit 3 reactor located in Fukushima Prefecture, departed Europe on a two month sea voyage to Japan. However before the two ships arrived in Japan, the Independent, a British daily newspaper, published an article which revealed that several lots of Takahama Unit 3 MOX fuel, still under fabrication at BNFL's MOX Demonstration Facility (MDF) in Sellafield in the United Kingdom, had falsified quality control data. Kansai Electric immediately sent an investigation delegation to Sellafield to determine the extent of the falsification and whether or not the data for Takahama Unit 4 (en route to Japan) was also affected.

Kansai Electric published an interim report on 24 September that concluded that the quality control data for Takahama Unit 4 was legitimate. However, upon the request of legislators of Fukui Prefecture, Kansai Electric released the quality control data and total pellet measurement data for the Takahama Unit 4 fuel. A subsequent analysis of the data by citizen groups revealed that this data was also falsified, and on 19 November 1999, 212 citizens took Kansai Electric to court to seek an injunction to prevent the loading of the fuel into the reactor. On 16 December 1999, the day before the verdict was scheduled to be handed down, Kansai Electric admitted that the data for Takahama 4 had also been falsified, and announced that it would not use the fuel. The fuel remains unused in the spent fuel pool of the Takahama Unit 4 reactor, and is to be returned to the United Kingdom at BNFL's expense.

After this announcement, the Ministry of International Trade and Industry (MITI) instructed Tokyo Electric to investigate the state of quality control at Belgonucleaire, the company that fabricated the company's MOX fuel. On 24 February 2000, Tokyo Electric issued a final report that concluded that there was no problem with the quality control data for the MOX fuel fabricated at Belgonucleaire for the Fukushima Daiichi Unit 3 and Kashiwazaki-Kariwa Unit 3 reactors.

However, the data released by Tokyo Electric in its final report was presented in such a way that it would mask any irregularities or manipulation of the data if they existed. It was subsequently learned through questioning of Tokyo Electric and MITI that a thorough statistical analysis of the data had not been carried out by either of these parties. On 9 August 1999, 864 citizens took Tokyo Electric to court seeking a provisional disposition (injunction) against the use of the Belgonucleaire fabricated Fukushima Daiichi Unit 3 MOX fuel. The total number of plaintiffs now numbers 1103. There have been five hearings, and evidence about how the data is suspect has been submitted by the plaintiffs. The defendant, Tokyo Electric, has not rebutted the arguments. Governor Eisaku Sato of Fukushima Prefecture has stated on numerous occasions that the understanding of the citizens is a prerequisite for approving the use of the fuel and that this has receded since the JCO criticality accident at Tokaimura on 30 September 1999, and the BNFL data falsification scandal. Prefectural nuclear safety officials have stated that they are "extremely interested" in the outcome of the court case.

On 26 December 2000, legislators in the village of Kariwa in Niigata Prefecture voted in favor of a referendum to be conducted on the use of MOX at the Kashiwazaki-Kariwa reactor. The referendum bid was subsequently overturned by the mayor of the village, but citizens and legislators have now started a drive to collect signatures from the electorate to force a referendum on the issue. This procedure is known as "Chokusetsu-seikyu" in Japan. The citizens will begin collecting signatures on 4 February. The deadline for signature collection will be 4 March. If citizens are successful in obtaining the signatures of 1/50th of the electorate, a petition to request a referendum will be officially submitted to the mayor who will then issue a comment on it before sending it to the village council for deliberation and voting. Citizens are aiming to

gather signatures from over 50% of the eligible voters of Kariwa.

After Takahama Unit 4 fuel was determined to have falsified data, MITI established the BNFL Fabricated MOX Fuel Data Problem Investigation Committee to look into why Kansai Electric and MITI had not discovered the falsification at an earlier date. The committee's final report, submitted to the Nuclear Safety Commission on 22 June 2000, required MITI to enact new ministerial ordinances for its Imported Fuel Assembly Inspection Regime. According to the revised ordinances, in the future utilities will be required to submit an application to import MOX fuel prior to fuel fabrication taking place, and once again before the fuel leaves the country where it was fabricated. These changes have been established so that it is still possible to make changes to the fuel design, the quality control plan, and the manufacturing process prior to fuel fabrication, and to investigate the quality control data before the fuel departs for Japan.

However, because the fuel fabricated at Belgonucleaire for the Kashiwazaki-Kariwa reactor was produced before the new ministerial ordinances came into effect, the old imported fuel inspection regime applies. To help confirm the quality control regimes at overseas MOX fabrication facilities, the committee suggests that overseas third party organizations should be used to boost credibility of the domestic utilities' investigation findings. In the case of the Kashiwazaki-Kariwa MOX fuel, Tokyo Electric asked a Belgian firm, AIB Vincotte International (AVI) to witness the company's reconfirmation activities. However, this company has close ties to the Belgian nuclear industry, and citizens groups in Japan have questioned the independence of this organization.

MOX Fabrication in Europe

In total 16 PWR MOX fuel assemblies have been fabricated at BNFL's MDF for Kansai Electric, and 60 BWR MOX fuel assemblies have been fabricated at Belgonucleaire for Tokyo Electric. None of this fuel is yet to be used. Tokyo Electric originally had a contract to fabricate 220 BWR assemblies at Belgonucleaire, however Tokyo Electric reported at last year's annual shareholders meeting that a decision was made not to fabricate the remaining assemblies at Belgonucleaire. Instead, Tokyo Electric announced that the production of the remaining 160 BWR assemblies is to take place at Cogema's MOX fuel fabrication plant, Melox, in Marcoule, France. While the exact number of assemblies has not been made public, it is believed that production of some of these fuel assemblies is currently taking place at Melox.

Kansai Electric also has a contract for the fabrication of 32 PWR assemblies at Cogema. It has been reported that the fabrication of the first 16 of these assemblies began in December of 1999 but was suspended in August 2000, after 8 fuel assemblies had been completed, and the remaining 8 assemblies had been fabricated up to rod form.

As for BNFL, the £300m Sellafield MOX Plant, completed in 1996, remains without an operating license, and BNFL has announced that MDF will no longer fabricate MOX fuel for commercial purposes.

To date, MOX fuel has not been used on a commercial scale in Japanese nuclear power plants.

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