

# NUKE INFO TOKYO

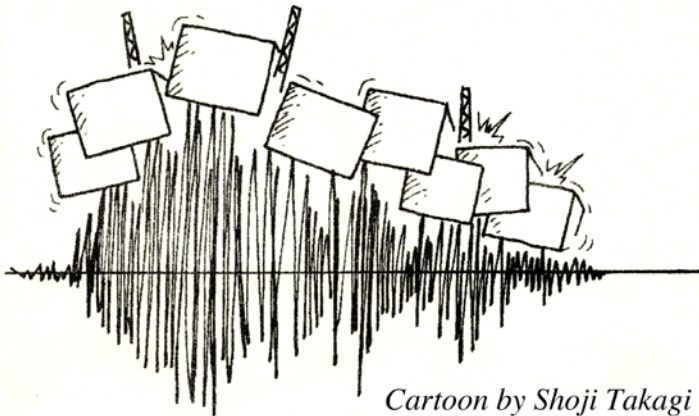
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## Kashiwazaki- Kariwa NPP: Assessment of Impact of Chuetsu-Oki Earthquake Runs into Trouble



Cartoon by Shoji Takagi

Since the July 2007 Chuetsu-oki earthquake, all seven reactors at the Kashiwazaki-Kariwa Nuclear Power Plant (KK) have been out of operation. The Governor of Niigata Prefecture said that, when considering the fate of the plant, he would keep the option of permanent closure on the table. He has not changed that position. Meanwhile, it was revealed in an internal document leaked to CNIC that Tokyo Electric Power Company (TEPCO) hopes to restart the plant from January next year. The residents of Niigata Prefecture are very worried about operating the plant again, so TEPCO is developing a lobbying campaign to overcome local resistance.

Niigata Prefecture established two investigation committees in March this year. The first committee has eight members and is considering equipment integrity and earthquake resistance and safety. The second committee has six members and is considering the earthquake itself and the condition of the ground on which the plant is located. Each committee has members who are opposed to reopening the plant. As of May 16, each committee had met three times.

KK was hit by an earthquake far bigger than predicted. The following issues need to be

addressed:

- 1) the nature of the damage incurred;
- 2) the location and seriousness of the damage;
- 3) KK's ability to withstand another earthquake, including after-shocks;
- 4) the condition of the ground on which KK stands;
- 5) the question of whether the judgments made by TEPCO and the government when the plant was approved were correct;
- 6) the connection between the fault plane which caused the Chuetsu-oki earthquake and

the surrounding active faults.

Until these issues have been clarified, no decision should be made about whether or not to restart the plant. The first three of these issues are being considered by the first of the above committees, while the last three issues are being considered by the second committee.

TEPCO has submitted an interim report about Unit 7 (ABWR, 1,356 MW, commenced operation in 1997). The report said that visual checks revealed no major damage. The report also claimed that calculations showed that the stress incurred by important equipment and the reactor itself as a result of the earthquake ground motion was within the allowed limits. It concluded that the integrity of the plant was maintained. TEPCO explained that

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this was because multiple "safety margins" were incorporated at the design stage. The report says that currently a portable Vickers Hardness Tester is being used to check for plastic deformation in representative locations and that so far no abnormalities have been found.

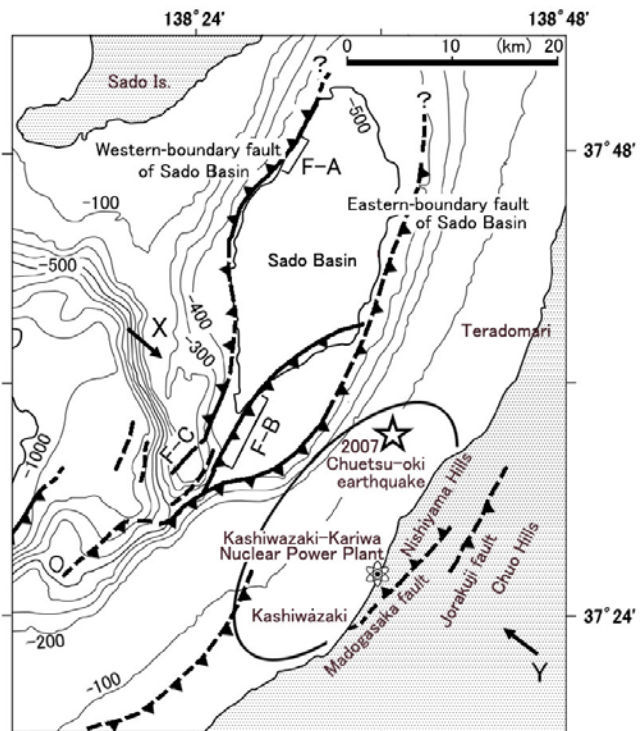
However, it is becoming increasingly clear that these tests and calculations are grossly inadequate. Visual inspections cannot be conducted in areas where there are high levels of radiation. Furthermore, it is not possible to check every nook and cranny for problems like plastic deformation, which cannot be assessed through visual checks. TEPCO intends to make do with representative checks, but who knows whether small defects that are not discovered in these checks will withstand the next shock? Non-destructive tests such as ultrasound tests and permeability tests have not yet been carried out. Even if they were, it is unclear how thorough such tests would be and how reliable the results would be.

The location of maximum stress derived from spectrum response analysis of pipes in the residual heat removal system was incorrect and the stress was grossly underestimated. This emerged as a result of cross-checks by Japan Nuclear Energy Safety Organization (JNES). It is clear that TEPCO's assessment is suspect.

The issue of "safety margin" has been discussed, but no agreed position has been reached. Those who support the restart of KK argue that several "safety margins" were built into the seismic design process and that this is the reason why KK survived the Chuetsu-oki earthquake. However, while "tolerance" is a precise concept meaning "the margin between the permitted stress and the stress incurred", committee members opposed to the restart of KK point out that it is incorrect to say that "margin in the calculation of the stress incurred" and "margin in determining the permitted stress" are also precise concepts. It is these fuzzy concepts that underlie the arguments of those who want to restart KK.

The debate in the second committee revolves around assessments of (a) the strength of the ground on which KK is built and (b) active faults. It began with the question of whether the ground is "soft as a piece of tofu" and whether a fault directly under the plant moved during the earthquake.

A conclusion has more or less emerged amongst researchers concerning the location and shape of the earthquake plane where the Chuetsu-



**Fig. 1 Major active faults in the vicinity of the Kashiwazaki-Kariwa Nuclear Power Plant**

The star shows the epicenter of the 2007 Chuetsu-oki earthquake. (Underground rupture along the seismic fault plane began directly beneath this point.) Slip on the fault plane spread to almost the whole area where aftershocks occurred (ellipse). Thick lines show active faults. (Broken lines are inferred ones.) Black triangles on the lines show dip-directions of the faults. The sea area is based on Watanabe *et al.*\*. F-A, F-B and F-C are faults after TEPCO's application for a license variation for Units 6 & 7. The Madogasaka fault is after Watanabe *et al.*. The Jorakuji fault is after Nihon no Katsudanso (New Edition) (Research Group for Active Faults of Japan (Ed.), University of Tokyo Press, 1991).

\* Watanabe Mitsuhsa, Suzuki Yasuhiro, Nakata Takashi: *Programme and Abstracts*, Japan Association for Quaternary Research, No. 37, Suppl., 4(2007).

oki earthquake originated. However, opinions still vary concerning the location and length of the submarine active fault that connects with that fault plane. This fault is called the "F-B fault" (see Fig. 1). The question is, how far does it go? In 1979 TEPCO assessed that it was 8 kilometers long and that it was not active. In 2003 TEPCO realized that it was a 20 kilometer-long active fault, but did not publicly announce this. The government also knew, but remained silent. In December 2007 TEPCO admitted that it was 23 kilometers. In March 2008 it revised this to 30 kilometers and on 28 April 2008 it increased its estimate again to 34 kilometers. The committee has begun to debate Mitsuhsa Watanabe's theory that the 50-60

kilometer Eastern Boundary Fault of Sado Basin and the F-B Fault are connected.

The KK problem is related to back-checks being carried out on all Japan's nuclear power facilities. New seismic design guidelines were established in September 2006. Checks are continuing to assess whether nuclear power plants and other nuclear facilities meet the standards established in the new guidelines. In March this year interim reports were submitted for 15 nuclear power plants. In addition, a final report was submitted for the Monju prototype fast breeder reactor. No report was submitted for KK, while interim reports had been submitted previously for Hamaoka NPP and the Rokkasho Reprocessing Plant. No interim report is planned for the Tokai Reprocessing Facility, but a final report is scheduled for July 2009.

Based on the new guidelines, the interim reports determined a design basis earthquake ground motion (Ss). In all cases Ss exceeded the "extreme design earthquake" (S2) under the old guidelines. Also, the active faults to be taken into consideration were assessed to be longer than before for some facilities. Nevertheless, it cannot be said that the assessments prioritized safety more than in the past. For example, the assessment of earthquake ground motion is particularly lax in those cases where no seismic center is specified. In those cases, the maximum ground motion is set at 450 Gal. However, on this basis the ground motion at the "free surface of the base stratum" for KK was set at 450 Gal, whereas in fact it is believed to have exceeded 1,000 Gal during the Chuetsu-oki earthquake. Clearly the alibi that there was a "sufficient safety margin" offers no way out.

On May 12, a Magnitude 7.9 earthquake struck Sichuan Province in China. The count of the dead and injured continues to grow and it is unclear when the full extent of the devastation will be known. China stated that the nuclear weapons facilities in Sichuan Province were "safe and secure", although it has admitted that more than 30 sources of radiation were buried by debris. The Sichuan earthquake was another reminder of the threat posed by nuclear facilities in the event of earthquakes. In order to avoid a nuclear-earthquake disaster in Japan, we must not allow the assessment of the implications of the Chuetsu-oki earthquake for the Kashiwazaki-Kariwa nuclear power plant to be carried out in a slipshod manner.

Yukio Yamaguchi (CNIC Co-Director)

*Continued from page 7* are right, the long-standing sanctions on nuclear trade with India could be brushed aside quite quickly.

With this in mind, the Abolition 2000 US-India Deal Working Group lobbied governments at the PrepCom in Geneva to demand that this issue be addressed in the context of the 2010 NPT Review Conference. We pointed out that it is inappropriate for the 45 members of the NSG to decide the matter without reference to the full NPT membership. As mentioned above, many non-NSG NPT members are deeply concerned about the implications of the deal for the three other states which developed nuclear weapons outside of the NPT. In particular, during this PrepCom many countries criticized a nuclear safety cooperation agreement between the US and Israel (March 2008). It is clear that Middle Eastern states are more interested in the implications for Israel's nuclear weapons program than any benefits they might derive in terms of nuclear safety.

Besides the official NGO presentation and direct lobbying of delegates, the US-India Deal Working Group sponsored a well-attended workshop during the PrepCom. Keynote speakers were M.V. Ramana from the Center for Interdisciplinary Studies in Environment and Development in Bangalore and Zia Mian from Princeton University in the US. M.V. Ramana provided general background on the deal and showed that it would substantially increase India's nuclear weapons production capacity. He also pointed out that any benefits from the deal in terms of India's energy supply and reduction of greenhouse gas emissions would be very limited. Zia Mian placed the deal in a wider geo-strategic and nuclear disarmament and non-proliferation perspective. He explained how it undermines the NPT itself, decisions of the 1995 NPT Extension and Review Conference and the 2000 NPT Review Conference, as well as United Nations Security Council Resolution 1172. He warned that the deal is driving a nuclear arms race in South Asia.

Philip White (NIT Editor)

# Full MOX Reactor to Burn Japan's Growing Plutonium Stockpile

**O**n April 23 the Minister of Economy Trade and Industry approved the establishment of the Ohma nuclear power plant (NPP) in Ohma Town, Aomori Prefecture. This article is adapted from the first of a series of articles about the planned Ohma NPP published in CNIC's Japanese newsletter.

## Part of the site not yet acquired

Ohma Town is located on the northern-most tip of Honshu, Japan's largest island (see map on page 5). A major problem for the Ohma NPP is the fact that a parcel of land right in the middle of the site has not yet been acquired. The area of this piece of land is a little over 1% of the 1.32 million square meter site and it includes the location originally proposed for the reactor building. It belonged to the late Asako Kumagai, who refused to sell it on the grounds that "the environment of Ohma cannot be exchanged for money". Her heirs have chosen to honor her wishes.

The owner and operator of the Ohma NPP, Electric Power Development Co. Ltd. (J-Power), was converted from a special semi-government company to a joint-stock company listed on the Tokyo Stock Exchange in October 2004. J-Power submitted an application for permission to establish the Ohma NPP in 1999. At that stage, including Asako Kumagai's parcel of land, it still hadn't acquired about 2% of the site. Nevertheless, the government accepted this unreasonable application.

With its land acquisition plan stalled, in October 2001 J-Power submitted a request to the Ministry of Economy Trade and Industry (METI) for a temporary suspension of the safety review. Then in February 2003, faced with privatization and having given up hope of Asako Kumagai parting with her land, J-Power announced a change of plan in which the location of the reactor core was shifted 200 meters to the south. As a result, Kumagai's land is now 300 meters from where the core of the reactor will be located.

In March 2004 J-Power withdrew its original application and submitted a new one in its place. This is the application which the minister approved in April this year, after the safety review reached the conclusion that the radiation exposure at the

borders of the site will not be a problem. Given the location of the Kumagai parcel, like an island that is legally outside the site, this is a highly dubious conclusion.

## New Earthquake Guidelines

In September 2006, after the Nuclear Industrial and Safety Agency (NISA) had completed its safety review and the application had been referred to the Nuclear Safety Commission (NSC), a new version of the Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities (New Earthquake Guidelines) was promulgated (NIT 112, 123). Flowing from the New Earthquake Guidelines, changes were made to the Ohma NPP application. The changes related to such things as the evaluation of active faults, the design basis earthquake ground motion and the classification of equipment in terms of importance in seismic design. As a result of these changes, Ohma will be the first NPP to be assessed under the New Earthquake Guidelines.

The possibility that an active fault runs directly beneath the Kashiwazaki-Kariwa NPP was highlighted by the Chuetsu-oki earthquake, which struck the plant in 16 July 2007. That earthquake revealed the problems with the method used hitherto to identify active faults. The Chuetsu-oki earthquake was a far stronger earthquake than was assumed in the safety review of the Kashiwazaki-Kariwa NPP. It damaged the site, buildings and equipment of the plant, and even now, although almost a year has passed, only a fraction of the inspections have been completed. As the full picture emerges, it is possible that the New Earthquake Guidelines and the current safety review method will be called into question.

Coming at such a time, it can only be concluded that the approval for the Ohma NPP was an attempt to forcibly close the safety review.

## Trump Card for Consuming Japan's Plutonium?

Ohma will be a 1,383 MW "Advanced Boiling Water Reactor" (ABWR). It is planned that the reactor will be fully loaded with mixed plutonium-uranium oxide (MOX) fuel. In the so-called "pluthermal" system to be used in Japan's other

reactors, the reactor core will take a maximum one-third load of MOX fuel. People are concerned about the safety implications of raising the MOX load to 100% for Ohma.

Why is such a dangerous reactor necessary? The complicated history of the Ohma plan tells the tale. Originally a CANDU reactor was planned for Ohma. Later this was changed to an Advanced Thermal Reactor (ATR), but the Federation of Electric Power Companies (FEPCO) demanded that the government abandon the ATR plan and use a full-MOX ABWR instead. To fit in with Japan's plutonium use plan, the Ohma reactor was changed repeatedly until finally a world-first full-MOX design was chosen.

J-Power now owns no nuclear reactors and no plutonium. All the plutonium required for Ohma's MOX fuel will be transferred from other electric power companies. These companies hope that by burning their plutonium Ohma will make up for the problems they are experiencing with their own pluthermal programs. Tokyo Electric Power Company, in particular, has no immediate prospect of moving forward with its pluthermal program.

### Reactor with Conditions Attached

On completion of Ohma's safety review, the head of the Nuclear Safety Commission, Atsuyuki Suzuki, gloated, "This is the first case in Japan in a long time of a plan for a nuclear power reactor at a new site." However, he also attached many unusual conditions saying, "The foundation of the safety confirmation of this plan is the results of the basic design stage safety review, but it goes without saying that this is the starting point. There are also many issues that depend on future efforts."

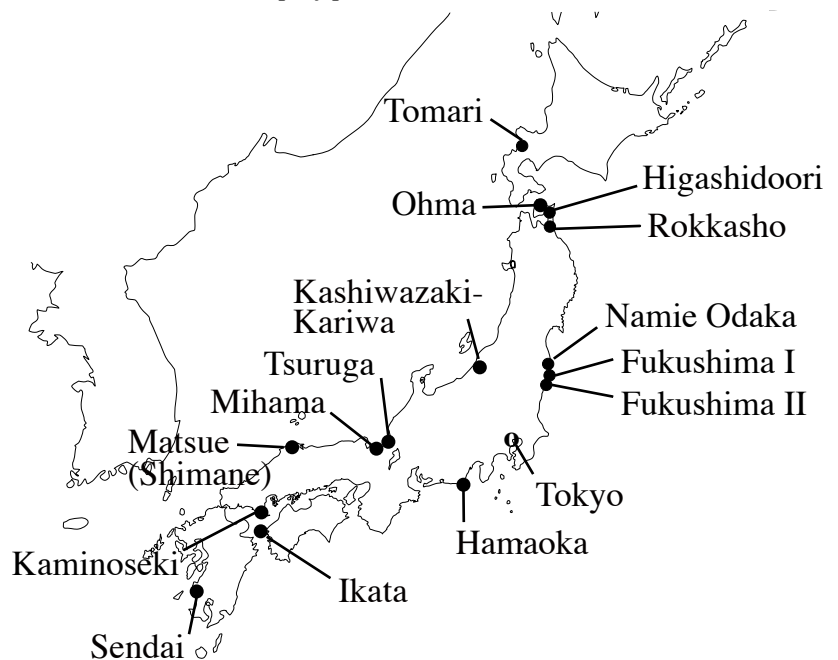
The approval includes a document entitled "Confirmation after the detailed design stage of the Ohma Nuclear Power Plant". This document requires detailed reports to confirm the earthquake resistance margins of buildings, equipment and pipes that are important for the plant's safety in the event of an earthquake. Also, although it is planned that the Ohma NPP will eventually operate with a full-MOX core, it will not begin with a 100% MOX load. Since it will be the first full-MOX reactor in the world, core data must be reported and

checked at each stage as the percentage of MOX fuel is gradually increased.

Ohma will be a new type of reactor with an unprecedented full-MOX core. It will be operated by a company that has no previous experience of operating a nuclear reactor on the basis of an unconvincing safety review. The attitude seems to be "Build it and give it a go. Treat it as a full-MOX experiment."

By Masako Sawai (CNIC)

Map of places mentioned in NIT 124



### Haiku for the season

*Carp-shaped streamers  
tangling and untying  
breath of the town*

By Hitoshi Ichinose

May 5th is "Boys Day" in Japan. In the lead up to this national holiday, streamers in the shape of carp fish are hung from flag poles and roof tops. Families hope that their boys will grow up strong like carp. (By the way, "Girls Day" is on March 3rd.)

# No Sign of Resumption of Vitrification at Rokkasho

## No chance of completing plant in May as planned

The final stage of the active tests of the Rokkasho Reprocessing Plant began in February this year, but the high-level liquid waste vitrification facility is still out of action, with no indication of when it will resume operation. According to Japan Nuclear Fuel Ltd. (JNFL), construction and testing of the plant is scheduled to be completed at the end of May, but this is now clearly impossible, so another extension is inevitable.

### Never Ending Vitrification Problems

The glass vitrification facility at the Rokkasho Reprocessing Plant has two glass melting furnaces, A and B. In November 2007, the facility began producing high-level glass canisters using furnace A, but production ceased at the end of the year due to problems controlling the temperature of the furnace. Platinum group metals had accumulated at the bottom of the furnace causing the molten glass to take more than twice the normal time to flow down. JNFL cleaned out the glass that remained in the bottom of the furnace and is trying to fix the operating method and the method of controlling the temperature. However, due to the high level of radiation in the furnace, all the work has to be done by remote control. It is a pains-taking process, so the glass was not cleaned out until the middle of April. The operating method, including temperature control, is being reviewed, but it is now clear that the vitrification process developed at the Tokai Reprocessing Facility was immature and that the technology transfer to the Rokkasho Reprocessing Plant was unsuccessful. (See NIT 122 for more details.)

### Oil Leak from Shearing Equipment

Meanwhile, on April 14, in the Head End Building in the upstream part of the plant, approximately 60 liters of oil spurted out from the oil pressure control equipment of the shearing machine. Shearing of spent fuel was stopped and at the time this article was being written it had not restarted. Only a few months earlier, on January 1,

750 liters of oil leaked from the same equipment and steps had been taken to prevent a recurrence.

In the January incident, a joint in a 1.5 cm diameter pipe which feeds oil from a tank to the shearing machine's oil pressure control unit was broken. In April the leak occurred at the connection between a pressure gauge and a pipe. A 2.6 cm diameter fluoride resin support ring to prevent oil from leaking from the joint had come loose. The ring had been refitted during an inspection in February, but it may have been fitted incorrectly. A worker found it on the floor on April 12, but couldn't locate where it came from. This shoddy failure to prevent the leak from occurring in the first place has led many local residents to believe that there are problems with JNFL's safety system.

### IAEA Seal Broken

The Rokkasho Reprocessing Plant is the world's largest facility subject to inspection in the context of comprehensive IAEA safeguards. However, on two occasions JNFL broke an IAEA seal on nuclear materials. The supervising authority issued a stern warning in response to these incidents. The polystyrene seal was located on a rail near the entrance to a building for storing uranium recovered during reprocessing. The first incident occurred in March. On that occasion, a worker who accidentally broke the seal was given a verbal reprimand by the office responsible, but in April the seal was broken again by a different worker. A surveillance camera confirmed that no uranium was removed, but the inadequacy of JNFL's warning to its workers has been strongly criticized.

By Masako Sawai (CNIC)

## US-India Nuclear Deal at the 2008 NPT PrepCom

The Preparatory Committee for the 2010 Non-Proliferation Treaty (NPT) Review Conference (PrepCom) was held from 28 April to 9 May in Geneva. I attended part of the PrepCom on behalf of CNIC and as Coordinator of the Abolition 2000 US-India Deal Working Group.

There were several references to the US-India Nuclear Agreement during this year's PrepCom. Few of the statements mentioned India by name, partly because governments are reluctant to expose themselves to bully tactics from India and the US, but also because they are concerned about the general principle, rather than just the specific case of India. Middle Eastern countries and members of the Non-Aligned Movement (NAM) are particularly concerned about the precedent the agreement sets for Israel. This came across very clearly in NAM's demand that "without exception" non-states parties to the Treaty should not be given access to nuclear material and technology.

Of the statements by members of the 45-nation Nuclear Suppliers Group (NSG), perhaps the most relevant to the US-India Nuclear Agreement were the statements made by Japan and Canada during a session on regional issues on 5 May. The Japanese delegate urged India and Pakistan to accede to the NPT as non-nuclear weapon states, to continue their moratorium on nuclear tests and sign and ratify the Comprehensive Test Ban Treaty and, pending the entry into force of the Fissile Material Cutoff Treaty, to declare a moratorium on the production of fissile material. Canada made similar comments. These issues correspond closely to the concerns raised in a letter signed by 130 experts and nongovernmental organizations from 23 countries, including the President of the 1995 NPT Review and Extension Conference (see NIT 122). This letter, dated 7 January 2008, was sent to governments represented on the NSG and the International Atomic Energy Agency's (IAEA)

Board of Governors. It also formed the basis of the official NGO presentation about the US-India deal, delivered on 29 April at this year's PrepCom by John Loretz of International Physicians for the Prevention of Nuclear War. While it was encouraging to hear Japan raise similar concerns to those expressed in the 7 January letter and the NGO presentation, in fact the statement was identical to Japan's statement at last year's PrepCom in Vienna. If anything, it was a step backwards, because last year Japan included an additional paragraph specifically naming the US-India Nuclear Agreement.

One wonders whether Japan raised these issues at the NSG. The Plenary Meeting of the NSG was held on 19-20 May, immediately after the NPT PrepCom. If some countries demand that any special exemption for India from NSG's export guidelines be made conditional on action in these areas, that would probably be enough to block the deal.

A final decision would not have been made at NSG's May meeting, because India must first sign a safeguards agreement with the IAEA. A text has been finalized, but due to opposition in India from political parties on whose support the government depends, the safeguards agreement has not yet been signed. It is reported that if the IAEA and NSG procedures are not completed by July, the US Congress will not have time to approve the Nuclear Cooperation Agreement during the life of the Bush Administration. July is probably not an absolute deadline. It might still be possible to ram the agreement through Congress at the last minute, but as things now stand, it seems likely that the US-India Nuclear Agreement will not be decided until after the next US President is elected.

That is good news, but no one should be under any illusion that the threat to the NPT regime will just disappear. A large section of the Indian establishment still wants access to foreign nuclear material and technology and the US nuclear industry is unlikely to give up hope of exporting to India. Furthermore, India recently initialed bilateral nuclear cooperation agreements with France (January 2008) and Russia (February 2008), so pressure for an exemption to NSG export guidelines will continue. When the political circumstances



Zia Mian (left) and M.V. Ramana at NPT PrepCom

*Continued on page 3*

## Electric Power Supply Plan in an Era of Saturated Demand

In April, the Ministry for Economy, Trade and Industry's Agency for Natural Resources and Energy announced the 2008 Fiscal Year Electric Power Supply Plan Outline. The Plan brings together the plans of all the electric power companies (EPCO). Although it is called a "Plan", as usual it has little relation to reality. A look at the plan for construction of new nuclear reactors reveals that the dates have been pushed back year after year. Some have been postponed for over 10 years.

Of course, reality is reflected in some aspects of the plan. The seven Kashiwazaki-Kariwa reactors, shut down last July as a result of the Chuetsu-oki earthquake in Niigata Prefecture, and Shika-1, which was shut down due to the cover-up of a criticality incident, are not included in the FY 2008 Plan. Both Shika-1 and Shika-2 were left out of the FY 2007 Plan. Shika-2 was shut down due to turbine damage. It recommenced operation at the end of FY 2007, but new problems immediately forced it to shut down again. However, as far as the FY 2008 Plan is concerned, it is operational again.

It is no longer possible to predict demand growth for Tokyo Electric Power Company (TEPCO) and Kansai Electric Power Company (KEPCO), which provide power to the megalopolises of Kanto and Kansai. This fact is plainly evident in the Plan.

Two years ago, in the FY 2006 Electric Power Supply Plan, TEPCO predicted that peak power output would reach 64.71 GW by 2015. However, this figure was reduced to 61.19 GW in the FY 2008 Plan, while the peak power output predicted for 2017 was only 62.36 GW, still less than the prediction for 2015 in the FY2006 Plan. Likewise, two years ago KEPCO predicted peak power output of 31.06 GW for 2015, but in the FY 2008 plan this was reduced to 30.51 GW, while the corresponding figure for 2017 was still only 30.83 GW.

All the EPCOs registered record total electric power demand (kWh) in FY 2007. Nevertheless, despite the fact that last summer was a record-setting heat wave, neither TEPCO nor KEPCO exceeded the records set five and six years ago respectively for peak power output (kW). Because the peak power output for the two biggest EPCOs did not rise, the record set six years ago for the nine regional EPCOs from Hokkaido to Kyushu combined was not exceeded either.

Decisions to construct power stations are determined by peak power output, so as long as peak power output does not increase, EPCO's want to postpone construction of new nuclear power plants. Relative to the predicted growth in demand (whether or not demand will in fact grow is unclear), it is obvious that the output of the planned reactors is too large. Compared to the

**Table 1: Nuclear Power Development Plan (1)**

Power Company	Location	Power (MW)	Commence(d) Construction	Commence Operations	Status
Hokkaido Electric	Tomari-3	912	Nov. 2003	Dec. 2009	Under Construction
Tohoku Electric	Namie Odaka	825	FY 2014	FY 2019	
	Higashidoori-2	1385	FY 2014 or after	FY 2019 or after	
Tokyo Electric	Fukushima I-7	1380	April 2010	Oct. 2014	Safety Assessment
	Fukushima I-8	1380	April 2010	Oct. 2015	
	Higashidoori-1	1385	Nov. 2009	Dec. 2015	
	Higashidoori-2	1385	FY 2012 or after	FY 2018 or after	
Chugoku Electric	Shimane-3	1373	Dec. 2005	Dec. 2011	Under Construction
	Kaminoseki-1	1373	FY 2010	FY 2015	
	Kaminoseki-2	1373	FY 2013	FY 2018	
J-Power	Ohma	1383	May 2008	Mar. 2012	Safety Assessment
Japan Atomic Power Company	Tsuruga-3	1538	Oct. 2010	Mar. 2016	Safety Assessment
	Tsuruga-4	1538	Oct. 2010	Mar. 2017	Safety Assessment
<b>Total</b>	<b>13 Reactors</b>	<b>17230</b>			

1. Table prepared by CNIC, based on 2008 Electric Power Supply Plan.



other planned reactors, the 825 MW Namie Odaka reactor is small, but that is because the construction plan goes back 40 years. The plan has been postponed year after year ever since. Apart from Namie Odaka, all the planned reactors are large scale. It is easy to understand why EPCOs hesitate to take the plunge. The output of nuclear reactors is difficult enough to adjust at the best of times. They are either operating at full throttle, or they are not operating at all, so if the reactors are too big to start with, they are a real problem.

The upshot of all this is that, besides the two currently under construction, the plans for eight of the other eleven planned reactors were pushed back one more year. Commencement of operations at Ohma was not pushed back, but commencement of construction is 9 months behind last year's schedule. Construction was postponed in last year's Plan also, so the proposed time required for construction has shrunk from 5 years 8 months to 3 years 11 months. Considering that the ABWR to be constructed at Ohma will be Electric Power Development Co.'s (J-Power) first nuclear power plant and that it will be the first full-MOX plant in the world, this schedule is patently absurd. There is no doubt that eventually the commencement of operations date will be pushed back too. In the case of Tsuruga-3&4, the dates were not changed in this year's Plan, but both were pushed back two years in the FY 2007 Plan.

The Japanese government's response to global warming presupposes the construction of all thirteen planned reactors. It is a disgrace that it is responding to the greatest crisis in human history by tinkering with vacuous desktop plans such as this.

### Nuclear Industry Developments in FY 2006

In February, the Japan Atomic Industrial Forum (JAIF) published the results of its nuclear industry survey. The results come from responses to a questionnaire by 11 EPCOs, 278 minerals and manufacturing companies and 24 trading companies.

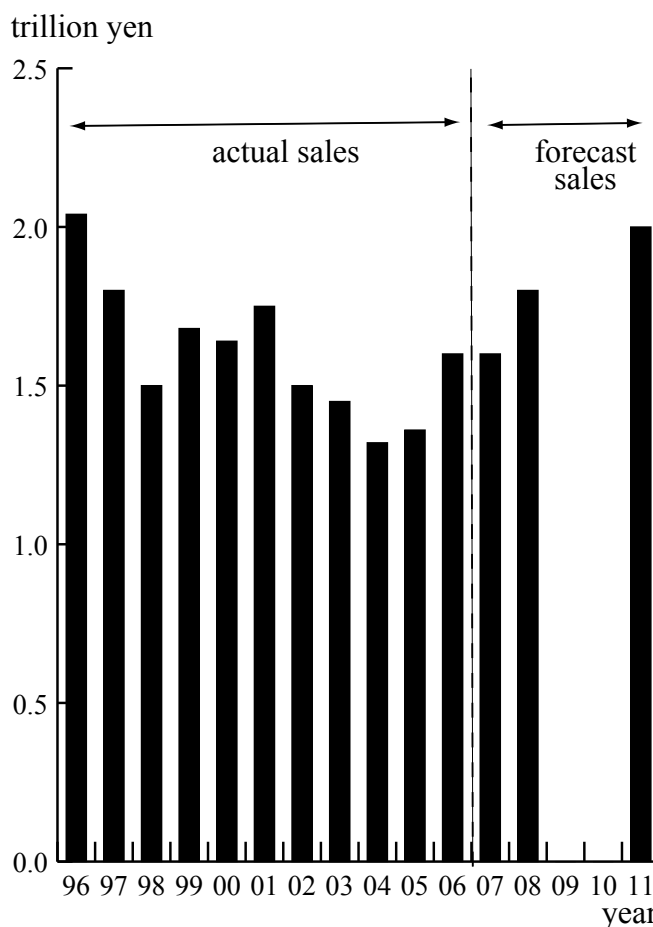
According to this survey, total sales of minerals and manufacturing companies are now on an upward trend after a low of 1.6 trillion yen in FY 2004. A further rise is not predicted in FY 2007 (perhaps the FY 2006 increase was too big), but sales worth 2 trillion yen are optimistically forecast for FY 2011. However, the increase in FY 2006

was from business other than nuclear power plants, such as the Rokkasho Reprocessing Plant, while nuclear reactor machinery continued its downward trend.

The downward trend in orders was reversed and at the end of FY 2006 (31 March 2007) orders were 1.8 trillion yen, 11% higher than the previous year. However, JAIF cautioned that it was not clear whether this represented a genuine upward shift. As explained in the above discussion of the Electric Power Supply Plan, EPCOs are not enthusiastic about new construction, so whether or not increased orders can be expected in future depends on the prospects of exports by the major manufacturers. Those prospects are far from clear.

Nishio Baku (CNIC Co-Director)

### Nuclear Industry Actual and Forecast Sales



Based on survey by Japan Atomic Industry Forum

## Group Introduction

**Anti-Nuclear Kagoshima Network****Study of Warm Water Released from Sendai NPP as Citizens' Science**

by Takeo Hashizume\*

**K**yushu Electric Power Company is carrying out environmental studies with a view to building a third reactor at the Sendai Nuclear Power Plant. Meanwhile, each month since February last year, we have been conducting a citizen-side study of the warm water released from the existing Sendai reactors.

Our study was motivated by discoveries beginning the year before last (2006) that the temperature of water released from nuclear power plants around the country had been falsified. Although I call it a "study", actually all we have been doing is measuring the water and air temperature once a month at the warm water outlets and the surrounding area. It is not as if we expect this to lead immediately to any significant discoveries. However, while at first it seems impossible to come to grips with a nuclear power plant, by continuing to monitor the warm water released, we hope to get some physical sense of the plant.

On Kyushu Electric's web site "Due to the fact that the temperature of the warm water released from the power plant (the temperature rise is no more than 7°C) drops quickly as it spreads over the surface of the water, is radiated into the atmosphere and mixes with the surrounding sea water, the area in which the temperature of the sea water rises 1°C or more is mostly confined to within about 2 kilometers of the shore. No impact has been recognized on marine organisms living within this area."

About 130 cubic meters of warm water, its temperature raised by 7°C, is released each second from Sendai NPP's two 890 MW reactors. Compare this to the average 80 cubic meters per second that flows from River Sendai. In other words, the warm water released from the NPP in one day is enough to raise the temperature by 7°C of a region of sea one kilometer square by 10 meters deep.

Kyushu Electric says the temperature rise does not exceed 7°C, but in March the water released from Sendai NPP was measured at 26.7°C, compared to 19.1°C at Kushikino, 15.5 kilometers to the south, and Nishikata, 15 kilometers to the north. That represents an increase of 7.6°C. Nearer to the NPP, at Tsuchikawa, 6.5 kilometers to the



*Members of Anti-Nuclear Kagoshima Network (author left)*

south, the temperature was measured at 19.4°C, while at Karahama, 5 kilometers to the north, the temperature was 19.5°C, suggesting that the nearer you get to the NPP the more the temperature is raised. In July, even though only one reactor was operating, we were surprised to find that the temperature of the water released was 31.4°C, compared to 23.8°C at Kushikino, representing a difference of 7.6°C. Given that the temperature at Nishikata was 25.4°C, it might be inferred that at a distance of 15 kilometers the sea temperature is raised by 1.6°C. The temperature of the sea around the NPP is not influenced by the warm water from the reactors alone. It is also related in complex ways to currents and tides and the temperature and quantity of water flowing from River Sendai. Seen from the waterfront, it is clear that you can't draw the simplistic conclusion, as Kyushu Electric does, that the warm water released from the NPP has no effect.

Furthermore, it is hard to believe that killing plankton with chlorine to prevent barnacles and the like from adhering to cooling pipes has no impact on marine organisms. The quantity of carcinogenic substances produced, such as trihalomethane, is on a totally different scale to what you get in tap water. Just because humans don't consume it directly, doesn't mean we shouldn't be worried about it. Old fishermen grumble, "When the nuclear power plant came along, oysters opened their mouths and died. And you can't catch fish any more either."

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# NEWS WATCH

## **Request for Hearings on Pluthermal for Tomari-3**

On April 18, Hokkaido Electric Power Company requested the prior approval of Hokkaido Prefecture, Tomari Village and the surrounding two villages and one town for its pluthermal plan for Tomari-3 (PWR, 912 MW). Tomari-3, which is currently under construction, is due to commence commercial operations in December 2009. This is the first time that such a request has been made for a reactor under construction.

Considering that the MOX fuel will not be manufactured until after local approval is received, the safety assessment is completed and central government approval is obtained, it will not be possible to load MOX fuel during the first reload, which is planned for January 2011. It is more likely that MOX will not be loaded until the second reload, which is expected to occur in February 2012.

## **Manufacture of MOX Fuel for Ikata and Hamaoka Begins**

Manufacture of MOX fuel for Ikata-3 (PWR, 890 MW) began on April 23 at the Melox Plant in France. Shikoku Electric Power Company entered into a contract with Mitsubishi Heavy Industries (MHI) for the supply of MOX fuel. MHI subcontracted the work to Melox, which will manufacture 21 fuel assemblies containing 0.6 tons of plutonium. Shikoku Electric aims to implement pluthermal\* by Fiscal Year 2010.

Manufacture of MOX fuel for Hamaoka-4 (BWR, 1137 MW) began on May 7, also at the Melox Plant. Chubu Electric signed a contract with Global Nuclear Fuel Japan (GNF-J) for the supply of 48 MOX fuel assemblies. GNF-J subcontracted fabrication of the fuel to Melox. Chubu Electric also plans to implement pluthermal by FY 2010.

\* The term 'pluthermal' refers to the use of plutonium in the form of mixed oxide fuel (MOX) in 'thermal' - as opposed to 'fast' - reactors.

## **Applications Called to Host TRU Waste Dump**

A legal amendment passed last year allowed TRU waste (transuranic isotopes, and other long-lived isotopes, such as iodine-129 and carbon-14) arising from reprocessing, MOX fuel fabrication plants, etc. which are destined for geological disposal to be disposed together with high-level radioactive waste (HLW). On April 2, the Nuclear Waste Management Organization (NUMO), which has been trying to find a site for HLW, began calling for applications to host a waste dump for TRU as well. From now on NUMO will be seeking applications to host three types of waste dumps: 1) HLW only, 2) TRU only, and 3) HLW and TRU.

The radiation on the surface of TRU waste containers is higher than for HLW in an "overpack", it will begin to leak sooner, and is more likely to be released into the environment. Furthermore, if TRU and HLW dumps are collocated, they will mutually affect each other to increase the likelihood that both TRU and HLW will be released into the environment.

## **Various Computer Programming Errors**

On April 8, Japan Nuclear Fuel Ltd (JNFL) announced that it would amend data relating to surface radiation on 13,916 drums of waste received at its Rokkasho Low-Level Radioactive Waste Disposal Center between FY1993 and FY2007. It said that the original data was incorrect. In January an error was discovered for drums received from Kansai Electric Power Company's Mihama Nuclear Power Plant. When data from other NPPs were checked, errors were discovered for Chugoku Electric's Shimane NPP, Shikoku Electric's Ikata NPP and Japan Atomic Power Company's Tsuruga NPP. The errors were due to a programming mistake by the manufacturer (the same company for all except Mihama). In each case the recorded figures were 1% lower than they should have been. There were other errors, but because the figures had been rounded, no change was required. JNFL claimed that even after the

figures were corrected, the benchmarks were not exceeded.

Also on April 2, Tokyo Electric Power Company (TEPCO) announced that alpha radiation detected on April 2, during a periodic measurement for the exhaust pipe of an incinerator building at its Kashiwazaki-Kariwa NPP, was one hundred thousand times lower than it should have been. The mistake was discovered when alpha radiation was detected again on April 8. The mistake was caused by an error in the alpha radiation calculation formula entered into the operating software. In this case too, TEPCO claimed that the figure was still under the benchmark, even when multiplied by a hundred million.

Again on April 8, in this case the computer programming error related to calculation of the strength of pipes owned by six power companies and Japan Atomic Energy Agency. Because the weight of the pipes at 16 NPPs and the Monju Fast Breeder Reactor was not entered into the calculation, the stress was underestimated. The program was produced by Hitachi in 1980, meaning that the mistake was not discovered for nearly 30 years. Of course, the companies assure us that the results of the recalculation confirm the pipes' safety.

One wonders how many other such errors remain.

### **MHI and Areva to Cooperate on Fuel Cycle**

On April 11, Mitsubishi Heavy Industries (MHI) and Areva reached a basic agreement on a cooperative project related to the nuclear fuel cycle. The focus of the business is supply of a wide variety of nuclear fuel, such as fuel for PWR and BWR, including MOX fuel, and fuel for High Temperature Gas Reactors. MHI plans to invest in an Areva-owned Virginia USA fuel fabrication

company. It appears that they are also considering establishing a joint company in Japan.

Meanwhile, Toshiba is trying to take over Nuclear Fuel Industries Ltd (NFI) in order it to gain the ability to supply PWR nuclear fuel. To this end, it is applying pressure to NFI's parent companies, Furukawa Electric Co. Ltd. and Sumitomo Electric Industries Ltd.. It appears that Mitsubishi Heavy Industries is responding by attempting to take over NFI itself.

### **Red Light for Autumn Restart of Monju**

It seems that there is no chance of restarting Monju (Prototype FBR 280 MW) in October as planned. Numerous defects have been discovered in the installation of sodium leak detectors. By the end of April, 24 detectors with deformed tips had been discovered. Atsuyuki Suzuki, Chairman of the Nuclear Safety Commission (NSC), said on April 17 that the incident must be taken seriously. He said, "The incident seems to have common causes with the sodium leak accident in 1995." He also strongly criticized the delayed response of the Japan Atomic Energy Agency and admitted, "The NSC cannot hand off the situation, because the NSC also reviewed the regulatory activities. "

Meanwhile, on April 26 Fukui Prefecture and Tsuruga City gave their prior consent for the initial fuel load replacement plan\*\*, indicating their intention to cooperate with the restart of the reactor. \*\* Replacement fuel is required to replace degraded old fuel (see NIT 123).

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