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CNIC Citizens' Nuclear Information Center

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KK-7 stopped due to radioactive leak KK-6 begins start-up tests



Protesters against nuclear fuel shipment call for KK closure (Kashiwazaki City, September 15, 2009)

Tokyo Electric Power Company (TEPCO) was hoping that Unit 7 (ABWR, 1,356 MW) would soon be the first plant at its Kashiwazaki-Kariwa Nuclear Power Station (KK) to resume commercial operations since the July 2007 Chuetsu-oki Earthquake. However, on July 23, the day before the plant was scheduled to enter commercial operations, there was a leak of radioactivity in the reactor's primary circuit. It was suspected that the leak came from a damaged fuel rod. The governor of Niigata Prefecture responded by choosing to prioritize safety and public confidence. As a result, approval for commercial operation has been postponed for several months.

The reading for xenon-133 (a noble gas with a half life of 5.24 days) in the primary circuit, where steam or hot water flow from the reactor to the turbine through the condenser and back to the reactor, was found to be six times the normal level. The following day (July 24), the reading had increased to 450 times the normal level.

Apparently, the xenon-133 gas (a fission product) had escaped from a small hole in the casing of a fuel rod. Several questions arose as a result of the leak.

Was the hole formed as a result of the Chuetsu-oki Earthquake? Will it increase in size? Are there holes in any other fuel rods?

TEPCO claims that by inserting and withdrawing control rods it was able to identify the fuel assembly containing the leaking fuel rod. This assembly was not inspected before start-up tests began on May 8. KK-7 has 872 fuel assemblies, just 20 of which were inspected using an underwater camera. These visual inspections did not reveal any problems, but when two of these 20 fuel assemblies were further inspected using a fiberscope, foreign matter was discovered in one of the assemblies. This fuel assembly was removed and disposed of. Not surprisingly, TEPCO was criticized for the inadequacy of its original inspection.

The upshot is that KK-7 will not resume commercial operations as scheduled. The plant is currently undergoing tests at below full power. However, on September 1 TEPCO announced that it would not wait for the next scheduled periodic inspection, but that instead it would shut down the reactor at the end of the month to check the other fuel assemblies.

In March this year Niigata Prefecture's technical review committee allowed the plant to begin start-up tests, ignoring warnings from some committee members. Considering the way things have turned

Contents

KK-6 Restart, Kashiwazaki Finances	1,2
Hamaoka Earthquake	2,3
New Government's Nuclear Policy	4
Rokkasho Reprocessing Plant Delayed	5
Public Finance & Export Insurance	6
JCO tenth anniversary	7,8
Worker Exposure Data FY2008	9
Who's Who: Hiromitsu Ino	10
News Watch	11,12

out, it is fair to state that the committee shares responsibility for the current situation. The experts who warned the committee in March have pointed out that unless the leaking fuel assemblies are taken apart, it will not be possible to find precisely where the radioactivity is coming from or the cause of the leak. Debate on the issue within the technical review committee and the subcommittee looking into equipment integrity and earthquake resistance is continuing.

Meanwhile, KK-6 began start-up tests on August 31. TEPCO intends to bring it up to full power by

mid September. The three local groups opposed to nuclear power, along with concerned citizens, are demanding that start-up tests be suspended until the investigations into KK-7's leaking fuel rod problem have been concluded. On September 4 they submitted demands to Niigata Prefecture and Kashiwazaki City for both KK-6 and KK-7 to be immediately shut down and for thorough inspections to be carried out.

Yukio Yamaguchi (CNIC Co-Director)

Hamaoka Nuclear Power Station Struck By Earthquake

Chubu Electric Power Company's Hamaoka Nuclear Power Station was struck by a magnitude 6.5 earthquake at 5:07am on August 11. The epicenter was 37 kilometers from the Hamaoka plant in Suruga Bay, in Shizuoka Prefecture (see map). The depth of the earthquake source was 23km. By comparison, the epicenter of the M6.8 Chuetsu-oki Earthquake, which struck the Kashiwazaki-Kariwa Nuclear Power Station (KK) in July 2007, was 10km from the plant and the depth of the source was 10km.

Hamaoka-4 and -5 shut down automatically. At the time, adjustment operations were being carried out at Hamaoka-4, which was in the final stages of scheduled maintenance. Unit 5 had just completed scheduled maintenance two weeks earlier, while Unit 3 was still shut for scheduled maintenance. Units 1 and 2 were shutdown permanently in January this year (see NIT 128).

The maximum ground motion recorded at the base plate of each plant was as follows.

Plant	Unit 1 (BWR, 540MW)	Unit 2 (BWR, 840MW)	Unit 3 (BWR, 1,100MW)	Unit 4 (BWR, 1,137MW)	Unit 5 (ABWR, 1,380MW)
Ground Motion	109 Gal	109 Gal	147 Gal	163 Gal	426 Gal

The extraordinarily large ground motion recorded at Unit 5 was less than the 600 Gal "Extreme Design Earthquake" (S2) for the plant under the old seismic guidelines, or the 800 Gal "Design Basis Earthquake Ground Motion" (Ss) under the revised guidelines. However, the spectrograph readings submitted by Chubu Electric to the Nuclear Industrial and Safety Agency (NISA) showed that in the natural period range (0.35 - 0.45 second) the spectrograph recorded on the second floor basement of Unit 5 exceeded the "Maximum Design Earthquake" (S1) under the old seismic guidelines. Surprisingly, the ground motion

at the base plate of Hamaoka Unit 5 was larger than that the 322 Gal recorded at KK-6 and the 356 Gal at KK-7 (both ABWR, 1,356 MW) during the Chuetsu-oki earthquake, despite the fact that the latter earthquake was larger and the epicenter was much closer.

Release of Radioactivity

On the day of the earthquake a radiation monitor in the fuel exchange area within the Unit 5 reactor building indicated that the radioactivity level was eight times higher than normal. The radioactivity concentration in the fuel pool water was measured at 10 Bq/cm³, which is fifty times the normal level of 0.2 Bq/cm³. Elevated radioactivity was also recorded in the fuel coolant purification pump room in the reactor building of Unit 2.

Chubu Electric initially said that no radiation was released. However, a release of radioactive iodine-131 (300,000 Bq) from Unit 5 was detected on August 19. According to Chubu Electric,

the radioactivity was noticed during the weekly replacement of an exhaust gas filter in the reactor. It claimed that the radioactivity concentration was three times higher than cautionary levels but lower than legally allowable levels.

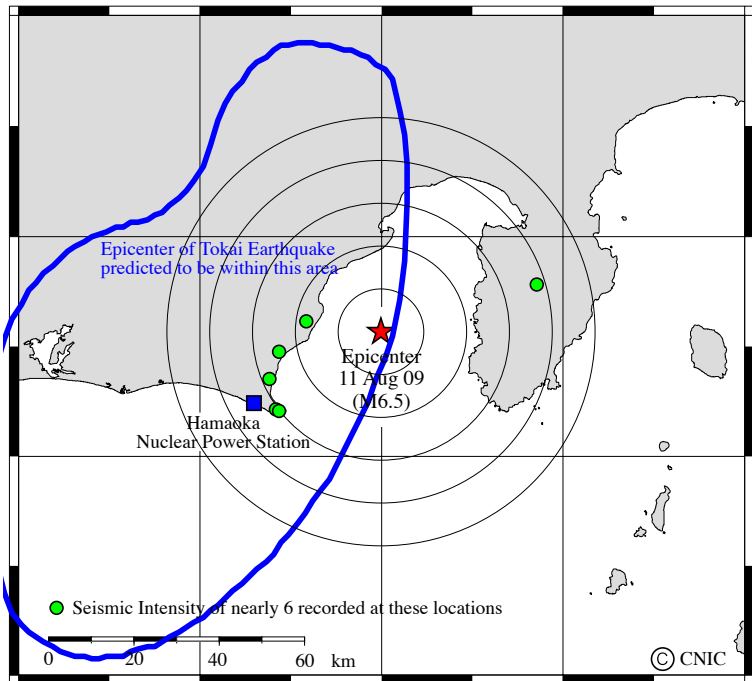
Damage

Chubu Electric said that initial visual inspections revealed no damage, but in subsequent reports it acknowledged that the earthquake had caused damage to the plants. An August 18 report identified a total of 46 problems, 25 of which related to Unit 5. Damage to Unit 5 included cracks in the walls

of the turbine building, damage to the motor control unit of a control rod drive mechanism, malfunction of a start-up range neutron monitor, incorrect measurement by a reactor feedwater flow meter and damage to a weld in an air conditioning duct in the containment cask. Damage to other units included subsidence and upheaval of the ground around the cooling water intake area for Unit 1 and malfunction of a start-up range neutron monitor in Unit 4.

Comments

This earthquake gives rise to serious questions about the safety of the Hamaoka Nuclear Power Station. The fact that an earthquake that arose so far away could cause so large a ground motion begs the question of whether the plant could withstand an earthquake immediately beneath the plant. It is predicted that the Tokai Earthquake will be in the order of M8.4 - M8.5. Such a quake will release 700 - 1,000 times as much energy as the August 11 quake. Furthermore, it could strike directly beneath the Hamaoka Nuclear Power Station. Chubu Electric claims that the Hamaoka units have been strengthened to withstand a ground motion of 1,000 Gal, but the evidence from the recent earthquake suggests that this is far from sufficient.



It is likely that Unit 5 will be shut down for several months, but Chubu Electric is hoping to restart Units 3 and 4 soon. One wonders what it will take for the government and the nuclear power companies to learn their lesson. It seems that nothing less than a full-scale nuclear-earthquake disaster will suffice.

Philip White and Chihiro Kamisawa (CNIC)

* Gal is a measure of acceleration. 1 Gal = 0.01 m/s².

Continued from page 6 • Proposals should be reviewed by an independent review committee.

JBIC and NEXI are both looking to expand their involvement in export credit and insurance for nuclear energy related projects in which Japanese companies are participating (see NIT 126). In January this year NEXI created a new insurance facility called "Trade and Investment Insurance for Preventing Global Warming". This facility provides for up to 2 billion yen in insurance cover over a period of 10 years for projects deemed to contribute to reducing greenhouse gas emissions. Eligible categories include projects related to nuclear power production.

JBIC has also taken special steps to facilitate its involvement in nuclear energy related projects. In principle, JBIC financial support is restricted to developing countries, but exceptions may be approved by regulation for investment finance that maintains or improves the international competitiveness of Japanese industry. Cabinet approved such a regulation on August 28, 2008 to allow JBIC to provide investment finance for the

construction of nuclear power plants in developed countries. The government is particularly keen to promote Japanese involvement in planned US plants.

However, the government is not only focusing on the U.S. in its promotion of nuclear exports. The newly established International Nuclear Energy Cooperation Council (see NIT 131) is adopting an all-Japan approach aimed at passing on know how about nuclear security and safety to countries which plan to introduce nuclear power, in particular in Asia.

The NGO submission applies to both developing and developed countries. However, it notes that the risks of promoting nuclear power in developing countries, which often suffer from governance problems and lack the necessary democratic participatory processes and technical skills, are particularly great. Under these circumstances, the submission demanded that the government exercise the utmost caution when considering proposals for public finance and export insurance for nuclear projects.

Philip White (NIT Editor)

Nuclear Energy Policy Under a New Government

After winning a landslide victory in the House of Representatives election held on August 30, the Democratic Party of Japan (DPJ) has formed a coalition government with the Social Democratic Party (SDP) and the People's New Party (PNP). It might be hoped that a change of government would herald a change of nuclear energy policy, but we should not be too sanguine about the chances of a significant improvement. There is a wide range of views about nuclear energy within the DPJ (as indeed there is in the Liberal Democratic Party (LDP), which ruled Japan for most of the last fifty odd years). While minor coalition partner SDP favors a nuclear phase out, its influence on nuclear policy within the new government is likely to be quite limited. PNP is a relatively recent breakaway from the LDP and is unlikely to rock the boat on nuclear energy issues.

The prospects for policy change are likely to depend very much on the ability of civil society to make serious proposals that have the potential to garner widespread support. The first opportunity will be the budget estimates for the 2010 fiscal year. Anyone can see that allocating 20 billion yen for the Monju prototype fast breeder reactor (FBR) is throwing good money after bad. This should be the first item cut from the budget request. Funding for fairyland proposals like the demonstration FBR to follow the Monju prototype should also be reviewed. It should also be obvious that a review of the Atomic Energy Commission's fundamental policy statement, Framework for Nuclear Energy Policy, should be scheduled as soon as possible.

Before the election DPJ issued a policy Manifesto in which it said that "[w]hile placing safety first and gaining the understanding and confidence of the people," it would "take steady steps toward the use of nuclear power." This quote is from the English summary. The same section in the full Japanese version refers also to "secure supply". Given that Japan's nuclear power program has been a failure with respect to "safety first", "secure supply", and "understanding and confidence of the people", if the DPJ were to get serious about these issues, that in itself would represent a major change.

In regard to "safety first", DPJ's Manifesto states, "a highly independent nuclear safety regulatory commission will be established under

Article 3 of the National Government Organization Act." The existing Nuclear Safety Commission was established within the Cabinet Office in 1978 under the Nuclear Energy Basic Law, the same law that covers the Atomic Energy Commission (AEC). Article 1 of the Law states, "The Objectives of this Law shall be to secure energy resources in the future, to achieve the progress of science and technology and the promotion of industries by encouraging the research, development and utilization of nuclear power..." Thus NSC's safety assurance role is compromised from the start by association with the promotion of nuclear energy.

NSC is supposed to act as a double check on the Nuclear and Industrial Safety Agency (NISA), which regulates the nuclear industry. However, as part of the Ministry for Economy, Trade and Industry (METI), the ministry with prime responsibility for promoting nuclear power, NISA's independence is also compromised. NSC and NISA, or any regulatory body that replaces them, should have nothing to do with the promotion of nuclear power. Serious consideration should also be given to the question of whether the double check relationship should be retained, or whether it would be better to merge NSC and NISA into a single regulatory body. Likewise the question of whether the AEC should continue to exist in its current form should be openly debated.

Another area that should be openly debated is the respective responsibilities of government and industry. DPJ's Manifesto states, "Reprocessing of spent nuclear fuel and disposal of radioactive waste from nuclear power plants are long term projects, so the government should take final responsibility for establishing the technology and for the project." If they are not careful this type of loose wording could have the effect of reinforcing industry's already irresponsible attitude. Electric power companies have primary responsibility for safety assurance and for dealing with the problems of spent fuel and radioactive waste produced in their nuclear power plants. On the other hand, the role of government is to regulate so that the failures of industry do not lead to nuclear disasters or become an excessive economic burden. Government is also responsible for averting potential disasters when all else fails. In this sense the government has "final responsibility", but industry must not

Continued on page 5

Rokkasho Reprocessing Plant: 14 Month Delay

On August 31 Japan Nuclear Fuel Ltd. (JNFL) announced that it had extended the estimated date of completion of construction and testing of its Rokkasho Reprocessing Plant by fourteen months to October 2010. It was the seventeenth time that the schedule had been extended. Compared to the original schedule, the cumulative delay now amounts to nearly thirteen years. Active tests using spent nuclear fuel started in March 2006, but since then JNFL has gradually extended the schedule in response to numerous problems with the vitrification facility. Testing of the vitrification facility is the final stage before construction of the plant is officially declared to be complete. This time JNFL was forced to concede that it would take a substantial amount of time to restore the plant and complete the tests, so a longer than usual extension was announced.

Testing of the vitrification facility began in November 2007, but the process of mixing glass with highly radioactive liquid waste from the reprocessing of spent fuel and sealing it in canisters has been plagued with problems. Tests were suspended repeatedly, because JNFL was unable to solve the problem of metal particles (platinum group elements) accumulating in the bottom of the vitrification furnace. Last December it was discovered that a fireproof tile had fallen from the inner wall of the furnace. Then in January, while attempts were being made to remove the tile, 150 liters of high-level radioactive liquid waste leaked from a pipe within the vitrification cell.

It seems that most of the leaked fluid evaporated within the cell. The liquid, which contained concentrated nitric acid, formed a mist which adhered to and corroded cables and equipment in the cell. JNFL claims that it will take eleven months to fix these problems and a further three months to complete the tests. However, this schedule assumes that everything will go smoothly from now on.

In practice, JNFL's estimate of fourteen months is unlikely to be achievable. Problems caused by the corrosive nitric acid mist will certainly increase and restoration work in such an environment will be extremely difficult. Furthermore, so far tests have been carried out on only one of the two vitrification furnaces (furnace A). It is possible that

furnace B, which is immediately alongside furnace A, has also been affected. It seems unrealistic to allocate just three months to complete tests on both furnaces, considering all the problems that have arisen while testing just one furnace. Under the circumstances, even JNFL was forced to admit that "this is just an estimate" and that "it might take slightly longer".

With test operations suspended, by the end of this year Rokkasho Reprocessing Plant's spent fuel storage pool, which can hold up to 3,000 tons of spent fuel, will reach 95% capacity. Consequently, JNFL has decided not to accept any more spent fuel from utilities during 2010.

Rokkasho's spent fuel storage pool has a maximum holding capacity of 1,500 tons each of BWR and PWR spent fuel. Japan has a similar number of BWR and PWR plants, but the storage capacity in spent fuel pools at BWRs is relatively limited. There is not much space left in the spent fuel pools of some of these plants, in particular at Tokyo Electric Power Company's (TEPCO) Fukushima I and Fukushima II nuclear power stations. In collaboration with Japan Atomic Power Company, TEPCO plans to build an interim spent fuel storage facility with a capacity of 5,000 tons in Mutsu City in Aomori Prefecture, but the facility is still undergoing safety assessments. If operation of the Rokkasho Reprocessing Plant is further delayed, utilities are likely to consider responses to the lack of spent fuel storage capacity such as re-racking of existing pools and additional temporary on-site storage facilities.

Masako Sawai (CNIC)

Continued from page 4 be allowed to offload its rightful responsibilities onto the government or the general public.

Our hope is that the new government will reassess recent trends that are inconsistent with the principle of "safety first". These include reducing the time taken for periodic assessments, extending the time between inspections, and life extensions and uprates for aging reactors. We hope the DPJ led government will strive to create a rigorous and rational nuclear regulatory system.

Baku Nishio (CNIC Co-Director)

Public Finance and Export Insurance for Nuclear-Related Exports

NGOs Demand Rigorous Safety Assessment, Information Disclosure and Stakeholder Involvement

Concerned about the potential environmental and social consequences of the Japanese Government's vigorous promotion of nuclear exports, on July 27, Japanese NGOs submitted demands regarding finance for nuclear energy related projects to the Ministry of Finance (MoF), the Ministry of Economy, Trade and Industry (METI), Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI). The submission demanded rigorous safety assessment, information disclosure and meaningful stakeholder involvement for projects supported by JBIC and NEXI.

The submission was drafted by the following four Japanese NGOs.

Japan Center for a Sustainable Environment and Society

Citizens' Nuclear Information Center

Friends of the Earth Japan

Mekong Watch

In addition to these four NGOs, the submission was endorsed by 15 other Japanese NGOs.

JBIC and NEXI currently lack adequate guidelines for the assessment of nuclear related issues, such as safety, accident response and radioactive waste management. Furthermore, access to information and stakeholder involvement in relation to projects' nuclear component is not guaranteed.

During a public consultation process that continued for much of 2008, NGOs demanded that provisions covering nuclear energy related projects be included in revised environmental and social guidelines. The new guidelines were released in July this year, but no such provisions were included. However, in a response dated November 11, 2008 to a question by Diet Member Masamichi Kondoh, the government said, "JBIC will produce guidelines that ensure that finance is not provided for [nuclear] projects where the project proponent has not provided appropriate information to residents in regard to confirmation of the project's safety, accident response and management of radioactive waste." The government has not indicated whether NEXI will produce similar guidelines.

The NGOs welcomed JBIC's intention of



Cartoon by Shoji Takagi

producing guidelines for nuclear-related projects and called on NEXI to do likewise. It is expected that JBIC will commence some form of consultation process towards production of the guidelines later this year.

The submission's main points are as follows: Public support should not be provided for nuclear-related projects in regions of tension and regions where terrorism is rife, or for projects in politically unstable countries.

- Public support should not be provided for nuclear-related projects in countries which have not ratified an Additional Protocol with the IAEA.
- Safety standards at least as high as those in Japan should be required.
- Nuclear facilities should be designed to withstand worst-case accidents, including earthquakes and aircraft crashes.
- The details and the efficacy of safety plans and management and disposal plans for radioactive waste, including spent nuclear fuel, should be confirmed.
- Appropriate standards and monitoring systems in regard to worker radiation exposure should be in place.
- The ability of project proponents to carry out the project should be confirmed.
- Adequate access to information and stakeholder involvement and consent should be assured, including for stakeholders outside the borders of the country in which the project is carried out.
- Alternatives to nuclear energy, including renewable energy and energy efficiency should be considered.

Continued on page 3

An Accident not to be Forgotten

10 Years have passed since the JCO Criticality Accident

It is painful to remember this dreadful accident, but to commemorate the tenth anniversary I decided to jot down a few thoughts.

The initial shock

At noon on September 30, 1999 NHK news reported that a criticality accident had occurred at Tokai-mura and that two workers were in a semi-conscious state. The accident, which occurred at the JCO Uranium Conversion Plant, was the first criticality accident in Japan. It was not hard to predict from the NHK report that the accident would end in tragedy for these two workers. Immediately after hearing the news, I had a conversation with professor Takasugi who I happened to meet in Yokkaichi University. He had not yet heard about the accident.

Furukawa: This afternoon's top news item is decided then.

Takasugi: Did something happen?

F: There was a criticality accident at Tokai-mura. I think two people are going to die.

Mr. Takasugi had worked in NHK for 35 years and his background was in humanities. Like a true journalist he immediately checked it out on the internet.

T: It says they were seriously injured. It sounds bad.

Recalling the background to the accident

JCO was a subsidiary of Sumitomo Metal Mining Co. Its main work was "reconverting" low enriched uranium (U-235 isotope ratio 3-5%) from uranium hexafluoride form to uranium oxide.

On this occasion, however, JCO was using medium enriched uranium (U-235 isotope ratio 18.8%). It is much easier for uranium of this enrichment to reach criticality. JCO had received an order from the former Power Reactor and Nuclear Fuel Cycle Development Corporation (PNC) and was refining medium enriched uranium scrap to produce a concentrated solution. The solution had to be homogeneous and, because of the risk of a criticality accident, the process was very time consuming.

For whatever reason, JCO decided to bypass these long-winded procedures. It tried to create a homogeneous solution by mixing a large quantity of concentrated uranium solution in a "precipitation

vessel", even though the dimensions of the precipitation vessel were such that the solution could easily go critical. Using the natural uranium solution this procedure was not difficult, but because of the high concentration and enrichment, on this occasion it was very dangerous. Many of the plant's staff must have been aware of the danger, but no one ordered the workers to stop. Clearly communication within the company was very poor. Another issue is that the work should have been carried out by staff who were experienced in handling nuclear fuel.

The solution went critical and stayed critical. Early the following morning (October 1) the coolant around the precipitator was removed and borate solution (a good neutron absorber) was poured in. Criticality was finally stopped, but by that time neutrons and volatile radioactive substances had been continuously emitted from the solution for 20 hours.

The two workers involved were Hisashi Ohuchi and Masato Shinohara. When the accident happened they were both right next to the precipitation vessel, so they received very high radiation doses. Ohuchi died late December the same year and Shinohara died in April the next year. I pray for the souls of these two innocent young men.

They are the only workers in the history of Japan's nuclear industry to have died of acute radiation disease. This was also possibly the only nuclear accident in the world to have exposed people living in the surrounding area to direct neutron radiation, so in that sense too it is natural that the accident should have attracted so much international attention.

Article in Nature

The 7 October 1999 issue of *Nature* (Vol. 401 Issue 6,763) contained a scathing article about the accident. Below is an extract about Japan's nuclear bureaucracy.

"The Japanese government seems unable to set up competent regulatory bodies with sufficient staff and expertise. The Science and Technology Agency's Nuclear Safety Commission is a group of part-time academic experts who rubber-stamp documents produced

by a small team of officials, who are far too few in number, and lack the expertise needed to regulate the safety of such a huge and potentially dangerous industry. Similarly, the country has not equivalent of the US Food and Drug Administration, even though its pharmaceutical market is of comparable size to that of the United States."

These are harsh words, but the article makes very important points about the problems of Japan's nuclear bureaucracy. Re-reading them I was impressed by how insightful they were.

I am reminded of Parkinson's Law, the adage articulated by English social scientist C.N. Parkinson in the best selling book *Parkinson's Law: The Pursuit of Progress*. The law goes, "Work expands so as to fill the time available for its completion." The book, laden with irony, is an insightful analysis of all sorts of social phenomena. It seems to me to make similar points to the above article in *Nature*.

After the accident the nuclear safety administration was changed, but although the staff of the Nuclear Safety Commission increased, I do not believe that problems with the nuclear safety assurance system were resolved. Just looking at the response to the impact of the July 2007 Chuetsu-oki Earthquake on the Kashiwazaki-Kariwa nuclear power station, it is even possible to see areas where the system has deteriorated.

Problem of the plant's location

It might not have been so when the plant was first constructed, but at the time of the accident the plant was surrounded by houses. Nuclear fuel should not be handled in such places.

The American movie *Silkwood* (starring Meryl Streep), which is based on a true story, presents a very real picture of nuclear fuel production. The scene where the main characters enter the plant site gives the impression that there are no other buildings in the vicinity. If you are going to produce nuclear fuel, that is the type of place to do it.

Even if it is hard to find such a place in Japan, it is essential to avoid situations in which residents could become exposed to neutron radiation. The conversion test building where the accident occurred was near the edge of the site, nearer to residents' houses than to the central office building. Permission should not be given to fabricate nuclear fuel using medium enriched uranium in such a

place. It was claimed that it is difficult to rescind approval once it has been granted, but there were opportunities to rescind the approval. The license was reviewed when JCO became independent. At that time the license to handle medium enriched uranium should have been rescinded. The Science and Technology Agency (STA), the regulatory authority at the time, bears a heavy responsibility.

Responsibility for the accident

However, all the responsibility should not be pinned on JCO and STA. PNC was also responsible. It should have carried out the work itself. Nevertheless, it must also be recognized that PNC was given too many tasks to carry out with the limited staff and skills available to it. The fast breeder reactor, reprocessing and disposal of nuclear waste are each very complicated tasks in their own right. On this basis we must conclude that the heaviest responsibility lies with the government and its promotion of the nuclear energy program.

Final remarks

Perhaps the average member of the Japanese population has forgotten this accident by now, but there are some who have not forgotten. I would like to be numbered among the latter group. I intend to remain interested in the problems of nuclear power and to remember the lessons and warnings from this accident.

Michiaki Furukawa (Emeritus Professor of Nagoya University, nuclear chemist, member of CNIC Board of Directors. His major is nuclear chemistry.)

Afterword

In October 1999 CNIC and Gensuikin jointly established the Committee for Comprehensive Social Impact Assessment of the JCO Criticality Accident to carry out an independent investigation of the background and causes of the accident. The committee's findings were compiled in two Japanese pamphlets published in September 2000 and October 2005 respectively. CNIC also published the following English pamphlet in May 2000:

Criticality Accident at Tokai-mura - 1 mg of uranium that shattered Japan's nuclear myth.

Workers' Radiation Exposure Data for FY2008

On July 16 the Nuclear Industrial and Safety Agency (NISA) released its 2008 Fiscal Year (April 2008 to March 2009) report on radiation exposure incurred by people working at nuclear power plants, fuel cycle facilities and radioactive waste facilities and the current status of radioactive waste management. Figures 1 and 2 show the fluctuation in worker exposure at commercial nuclear power plants over the past three decades.

The total collective dose in FY 2008 for people working at nuclear power plants was 84.04 person sieverts, an increase of 5.86 person sieverts compared to the previous year. Radiation exposure of subcontractor workers accounts for over 96% of the total dose.

The greatest increase was 3.1 person sieverts at the Kashiwazaki-Kariwa Nuclear Power Station. Since the Chuetsu-oki Earthquake in July 2007 all sorts of equipment problems have been found. We presume that the increased radiation exposure was incurred during inspection and repair work related to these problems.

The 256 people who received radiation doses in the 15-20 milli-sievert range were all subcontractor workers. The highest individual dose was 19.5 milli-sieverts at the Takahama Nuclear Power Station. The highest individual dose for an electric power company employee was 14.6 milli-sieverts at the Fukushima I Nuclear Power Station.

The data published by NISA does not take into account the fact that many people work at more than one

site. According to the Radiation Dose Registration Center for Workers (Registration Center), which calculates the total dose received by individuals at all work places, one person who worked at 4 different sites received a total dose in the 20-25 milli-sievert range, while 531 people received doses in the 15-20 milli-sievert range.

Mikiko Watanabe (CNIC)

Figure 1: Fluctuation in Total Dose

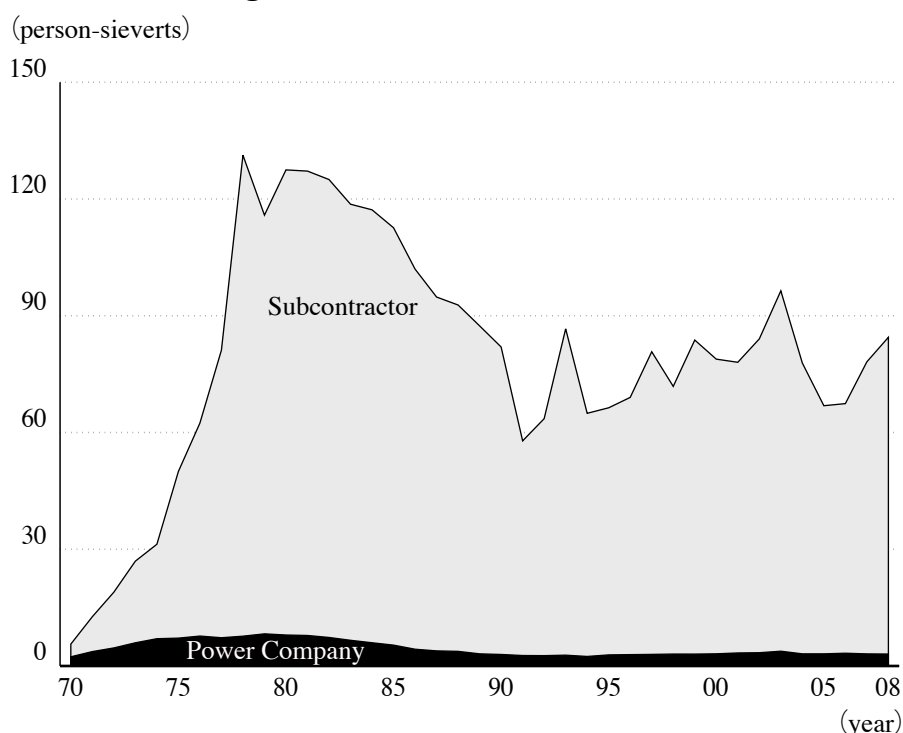
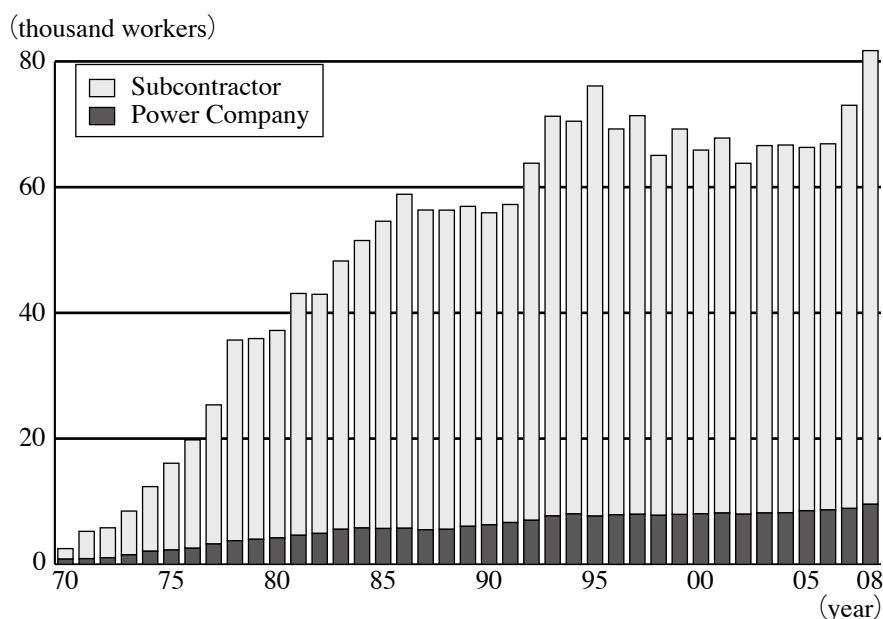


Figure 2: Fluctuation in Number of Exposed Workers



Anti-Nuke Who's Who

Hiromitsu Ino: a scientist critiquing nuclear energy

by Yukio Yamaguchi*

In July 2007, when the Chuetsu-oki Earthquake struck the Kashiwazaki-Kariwa Nuclear Power Station (KK), one man who was particularly concerned was Hiromitsu Ino. As a physical metallurgist, he had given evidence in the lawsuit calling for the closure of KK-1 on the grounds of cracking and deterioration of metal components. The lawsuit had only just finished when the earthquake struck.

Professor Ino was one of four scientists and engineers who immediately after the Chuetsu-oki Earthquake established the Group of Concerned Scientists and Engineers Calling for the Closure of the Kashiwazaki-Kariwa Nuclear Power Plant (KK Scientists). They issued a statement on August 21, 2007 calling for the closure of the plant (see NIT 120). Ino has been their official representative ever since.

In the two years since the group was formed they have been very active, making submissions to the Nuclear and Industrial Safety Agency, to the governor of Niigata Prefecture and to the two subcommittees established by Niigata Prefecture in the wake of the earthquake, one to consider equipment integrity and earthquake resistance and safety and the other to consider the nature of the earthquake and the condition of the ground on which the plant is located. They have also issued four leaflets targeted at ordinary citizens. The first of these was published in English in Nuke Info Tokyo (NIT 123).

Ino studied internal friction in steel as a post-graduate student in the field of applied physics at Tokyo University. Thereafter he researched the microscopic structure of metals and alloys and contributed internationally in a wide range of materials science fields.

There are many superb specialists in all sorts of academic fields, but there is one important difference between Ino and a large percentage of these "experts". That is that Ino succeeded in bridging the gap between specialist research and social activism. He didn't achieve this by accident. As a young man he joined Yoshiro Hoshino's History of Modern Technology Research Group. There he was trained in the ways of technology and society alongside other activist scientists including Jun Ui (chemist, environmental pollution issues including Minamata Disease), Yoshichika Yuasa



(civil engineer, CNIC advisor) and Isao Yoshimura (statistician, chemical poisoning issues including thalidomide). It was the rigorous training he received under the guidance of Professor Hoshino that enabled him to bridge the divide.

Eventually he became involved in issues as diverse as lawsuits related to thalidomide and class discrimination. His scientific expertise combined with the experience he accumulated working on social issues led him to speak out about the social responsibility of scientists and technologists.

Ino held CNIC founder Jinzaburo Takagi in high esteem. Takagi succeeded in becoming a "citizen scientist" by deconstructing and reconstructing his own specialist field. Ino feels that he has not come so far. That is typical of his modesty. Anyone who has witnessed his work within progressive scientific networks including the Science, Society and Humanity Group and the Entropy Society will recognize this aspect of his character.

After working at Osaka University, Tokyo University and Hosei University, Ino is now an Emeritus Professor of Tokyo University. He is a founding member of the consumers' group "Organic Farm Lifestyle Laboratory", which places a high priority on socially and environmentally sustainable lifestyle.

A great deal of responsibility fell on his shoulders when he became representative of the *KK Scientists* group. The membership grew rapidly after the statement by the initial four members. They looked to Ino for leadership and he did not let them down.

*Yukio Yamaguchi is a CNIC Co-Director, a visiting professor of environmental science at Wako University and a former Tokyo University classmate of Hiromitsu Ino.

NEWS WATCH

Japan and Mongolia sign Memorandum of Cooperation

On July 16, Toru Ishida, Director-General of the Agency of Natural Resources and Energy (ANRE) and Sodnom Enkhbat, Director General of Mongolia's Regulatory Agency, the Nuclear Energy Agency, signed a memorandum of cooperation in the nuclear power field. The areas of cooperation include human resource development, uranium resource development, and the improvement of the investment environment in Mongolia. The signing coincided with a meeting in Japan between Mongolian Prime Minister Sanjaa Bayar and Japanese Prime Minister Taro Aso. The agreement is for three years, but it can be extended with the agreement of both countries.

Advisory Committee on International Nuclear Relations established

The Advisory Committee on International Nuclear Relations, established by the Atomic Energy Commission, held its first and second meetings on July 23 and August 27 respectively. The Committee will consider issues related to cooperation with countries which do not currently have nuclear power programs, but which plan to introduce nuclear power plants. Its terms of reference cover the following five areas:

- the promotion of peaceful use and nuclear non-proliferation;
- strengthening of technical capacity;
- expansion of Japan's nuclear industry abroad;
- promotion of global warming response;
- promotion of international contribution.

New framework for human resource development in Asia

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI) have established the Career Development Program for Foreign Students in Japan. The program includes human resource development in the field of nuclear energy in Asia. Instructors will be sent abroad and students will be given the opportunity to train

in Japan. Currently eight students are receiving training. They come from Indonesia, Kazakhstan, Mongolia, Thailand and Vietnam, all countries with plans to introduce nuclear power or to develop uranium resources. There are thirteen participating companies, including plant makers, electricity utilities and trading companies.

Negotiations begin for Japan-Korea Nuclear Cooperation Agreement

Negotiations for a Nuclear Cooperation Agreement between Japan and South Korea began in Seoul on July 30. The Prime Ministers of the two countries had agreed in January to proceed with negotiations. Discussions about the negotiation schedule and contents of the agreement have begun, but no details have been released. An agreement was signed in May 1990 concerning cooperation on information exchange and exchanges of experts, but that agreement did not cover transfer of nuclear technology, equipment and material.

First meeting of FNCA 3rd Phase

The first meeting of the Forum for Nuclear Cooperation in Asia's (FNCA) Study Panel on Approaches toward Infrastructure Development for Nuclear Power was held in Tokyo on July 30 and 31. FNCA is hosted by the Japan Atomic Energy Commission. The meeting was attended by nine countries - Bangladesh, China, Indonesia, Malaysia, the Philippines, South Korea, Thailand, Vietnam and host country Japan - and the International Atomic Energy Agency. On the first day, Japan, China and South Korea gave presentations about their experiences of introducing nuclear power, while countries intending to introduce nuclear power reported on the current status of their plans. On the second day case studies were presented of activities to urge the international community to include nuclear energy in the Clean Development Mechanism (CDM) system. A report on progress of the human resource development database was also presented.

Fusion R&D

On August 8 the Japan Atomic Energy Agency (JAEA) and the National Institute for Fusion Science (NIFS) of the National Institutes of Nature Sciences signed a cooperation agreement aimed at furthering research and development on nuclear fusion energy. JAEA owns the plasma device "JT-60" at Naka in Ibaraki Prefecture, while NIFS owns the Large Helical Device (LHD) in Toki in Gifu Prefecture. By employing their R&D skills and human resources in a complementary and integrated fashion, the two organizations aim to facilitate progress on the "ITER broad approach" being pursued at Rokkasho Village in Aomori Prefecture.

Monju restart this fiscal year?

On July 12 replacement of degraded fuel was completed at Japan Atomic Energy Agency's (JAEA) Monju Prototype Fast Breeder Reactor (FBR, 280 MW) located in Tsuruga City, Fukui Prefecture. Then on August 12 final confirmation tests of the overall integrity of the plant were completed. The same day, Toshio Yamauchi, Senior Vice Minister of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), visited Fukui Governor Issei Nishikawa and Tsuruga Mayor Kazuharu Kawase to officially communicate the government's aim of restarting Monju this fiscal year (by March 31, 2010). JAEA wants to restart Monju as early as February. This would be two years later than the target date of February 2008 announced when modification work began in March 2005.

Report on FBR Cycle Demonstration Process

On July 28, the Five-Party Council for Smooth Transition to the FBR Cycle Demonstration Process delivered a report to the Atomic Energy Commission identifying technical issues and ways of advancing the FBR demonstration process. The five parties are the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Economy, Trade and Industry (METI),

the Federation of Electric Power Companies (FEPC), Japan Electrical Manufacturers' Association (JEMA) and Japan Atomic Energy Agency (JAEA). The Council is made up of administrators and researchers.

The report suggested that the transition from light water reactors (LWR) would take longer than expected. It also suggested that a common facility could be used to reprocess spent fuel from both LWRs and FBRs and that plutonium recovered from FBR spent fuel could be used to fuel the LWR pluthermal program instead of the FBR program. Emphasis was placed on points that would bind utilities to the process, even though they would prefer to escape.

Defective MOX fuel pellets

On August 19, Kansai Electric Power Company (KEPCO) announced that some of the fuel pellets being fabricated at Areva's Melox plant for its Takahama-3&4 reactors (PWR, 870 MW) failed to meet its own internal standards. It decided not to use the defective pellets and to reduce its order from 8 fuel assemblies each for the two reactors to 8 assemblies for Unit 3 and 4 assemblies for Unit 4. KEPCO refused to disclose costs or the results of the inspection on the grounds that they are commercial in confidence under the terms of its contract with Melox. It also said that it does not have sufficient information. KEPCO's response exposes the defects of the quality control system. Melox effectively has a monopoly over MOX fuel fabrication, so customers are forced to accept relaxation of standards. The defective pellets were assessed against these loose standards. Melox refused to provide data and resisted halting production claiming that the pellets were usable.

Nuke Info Tokyo is a bi-monthly newsletter that aims to provide foreign friends with up-to-date information on the Japanese nuclear industry as well as on the movements against it. It is published in html and pdf versions on CNIC's English web site: <http://cnic.jp/english/>

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