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Citizens' Nuclear Information Center

3F Kotobuki Bldg., 1-58-15, Higashi-nakano, Nakano-ku, Tokyo 164-0003, JAPAN

URL: <http://cnic.jca.apc.org/>

e-mail: [cnic-jp@po.ijnet.or.jp](mailto:cnic-jp@po.ijnet.or.jp)

## Few Safety Improvements Seen Since JCO Accident



On 30 Sep. 2000, a year after the JCO accident, about 110 people dressed in mourning clothes gathered in front of the Science and Technology Agency to remind the officials and the public of the accident and the victims who are still suffering physically, mentally, and economically. 400 people attended a symposium following this protest. The day was rapped up with a candle light procession through down town Tokyo. Similar protests and symposiums were held across the country.

A year has passed since the JCO criticality accident, but little improvement can be seen in the safety regulation of the nuclear industry.

This accident was a tremendous shock to Japan's nuclear power industry because in a single instant it destroyed the myth of safety that the industry had built over time. The conclusion of the report by the Accident Investigation Committee established by the Nuclear Safety Commission (NSC) says, "We must discard the 'myth of nuclear safety' and idealist slogans about 'absolute safety'." This shows that the NSC itself has abandoned the myth of safety. But some argue that the JCO accident did not occur in the generating sector, and that nuclear

power plants would not have such accidents.

The myth of safety was backed by the industry's implementation of measures from a perspective that gave precedence to "accident prevention," which meant that accidents could be prevented if facilities were provided with engineered safety devices. But the JCO

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accident occurred where accidents supposedly couldn't. Its occurrence exposed the industry's flaws and showed that the accident had been bound to happen. Specific flaws included the lack of geometrical control on the precipitation tank, and no measures at all to prevent accident worsening. A major reason for this was the facility's flawed safety inspections, which are the responsibility of the NSC and of the Science and Technology Agency (STA), the government administrative agency in charge of the industry. Apparently STA had also neglected to check how the facility was being operated.

The NSC has made 103 proposals to the government and to the industry meant to prevent a reoccurrence, but all are symptomatic and leave doubts as to whether they can effectively prevent a repeat. In fact, one of the items changes the approach on accident prevention that has prevailed until now by saying that we must have a complete turnaround in perception, from "absolute safety" to "an assessment of safety based on risk criteria." This represents a switch from the previous philosophy of putting "accident prevention" before everything else to an approach based on preventing the worsening of accidents and mitigating their impacts. In other words, it introduces the doctrine of risk assessment. Such a change is hard to accept.

Some of the proposals are mere sugarcoating. One proposal to the government is to "perform a follow-up investigation taking into consideration matters like how people living near JCO have been taxed mentally," but in fact the exact opposite is being done. The Health Management Review Committee established by the NSC after the accident claims there is nothing to worry about because the exposure dose was under 200 mSv. It just emphasizes that the situation is safe, and does not lend an ear to what area residents have to say. What is more, JCO paid for only the first health diagnosis, leaving citizens to foot the bill even if they succumb to illness and have to see a doctor. The STA has recently added to its list of exposed people a number of delivery servicepeople, members of the press and others

who were temporarily near JCO at the time of the accident and now claims that 667 people were exposed due to the accident. People in Tokaimura have formed a victims' association that is negotiating with the government and JCO for the issuance of accident victim IDs and coverage of medical expenses (See NIT No.77).

NSC's report on the accident therefore is too general and offers no hope of a solution. But through several revisions of laws, STA and NSC have somewhat improved measures for preventing accidents and the worsening of accidents.

#### Improvement of Nuclear Regulatory Law

Until recently, periodic inspections were only mandatory for nuclear power plants and reprocessing plants. All other nuclear-related facilities were not subject to periodic inspections and therefore, following the accident, periodic inspections were made mandatory at all nuclear facilities. However, periodic inspections would not have prevented the JCO accident. The accident was triggered by the deviation from normal procedures which was brought about under pressure to reduce cost by rationalizing the work process. This "inside manual" was prepared by the company itself. However, such manuals aren't in the criteria for periodic inspections. Similarly, the education of workers on radiation has been made mandatory as well, but the education manual stresses the safety of radiation instead of concentrating on the dangers of it.

#### Improvements of the NSC

NSC is responsible for keeping an eye on whether the controlling agency is properly conducting periodic inspections and other safety control measures. However, it will only be looking at documents and thus little is expected from this.

Two major improvements were made for the pre-operation safety review. First, manufacturing process has been included in the criteria for the safety review. Not only the facility but the use of it will be included in the evaluation as well. At JCO they were dissolving uranium with nitric acid to purify it, then made it into

uranium powder, and following that were re-dissolving it. The process for that final re-dissolution was never made very clear, and a separate line for that process was never set up. The process was thus carried out with existing equipment. There should have been separate equipment for this process since the concentration of uranium was highly different. It will become easier to identify the insufficiency of equipment now since the manufacturing process has been included into the safety review. However, deviations carried out company-wide will be difficult to identify even with this new improvement. Wherever there is even a remote possibility of criticality, a criticality accident could be fully prevented if safety control is limited to only geometrical-control and not extended to mass control and other controls which rely on humans. Unfortunately, such regulation does not exist yet.

Following the fact that JCO was handling uranium concentrate to 18.8%, NSC has revised its safety review guidelines for nuclear-related facilities which handle uranium concentrated by 5~20%. The guideline requires facilities to come up with measures to prevent criticality. However, though the guideline has geometrical control as the basis for criticality prevention, it allows companies to rely on mass control by setting a limit to the amount to be handled when it is difficult to equip their equipment with geometrical control. But the JCO accident has taught us that we cannot rely on humans and that only physical geometrical control can prevent criticality. In addition, this new guideline will only apply to newly built facilities and not to the existing ones.

#### The enacting of the Law on Special Nuclear Disaster Countermeasures

Many were exposed due to the accident because there was a lack of measures to prevent further expansion of the accident and because the officials were slow in directing evacuation and other countermeasures. Since the accident exposed the serious weakness in

disaster prevention and countermeasures, the Law on Special Nuclear Disaster Countermeasures was enacted in December 1999. The law has made it mandatory for companies to prepare an accident countermeasure plan and to set up a disaster countermeasure section. This is a welcomed improvement since such requirements were never made before. It also calls for the strengthening of the role of the central government and a speedy reaction by it during a nuclear disaster. However, this law requires countermeasures to be taken for the residents only when the radioactive leak has reached 10,000 times the normal reading. This is extremely insufficient from the view of preventing residents' exposure.

Though many improvements have been made or are in the process of being made, they are not enough. In the background of the accident was the intensifying of economic competition which led to the negligence of safety. It is expected that economic competition will further intensify. Such projections should force the government to further strengthen regulations and safety reviews/inspections. Safety culture alone cannot prevent accidents.

The JCO Criticality Accident Comprehensive Assessment Committee organized by CNIC and the Japan Congress Against A-and H-bombs released its final report in September 2000 and made seven suggestions to the NSC including demands for a reinvestigation of the accident and a commitment to take care of the residents' physical and emotional health. The committee also carried out research into the effects of the accident on the life of local residents. It was found through this field-research that 25% of the residents who were within 350 meters radius of JCO had experienced nausea, metallic tastes in their mouths, headaches, rashes, and many other symptoms after the accident. There has been no aftercare provided by the government. The accident is not over, and the care of exposed and affected residents are the upmost tasks to be seriously undertaken by the government.

By Hideyuki Ban

# The Impact of a Possible MOX Fuel Accident at Fukushima I-3

The legal case against TEPCO's use of MOX

On 9 August 2000, over 850 plaintiffs from across the country, including 138 from Fukushima Prefecture, took Tokyo Electric Power Co. (TEPCO) to the Fukushima District Court asking for a suspension of the use of MOX fuel at Fukushima I. The first hearing was held on the next day, when the plaintiffs explained their case to the court. Their main argument is that there is a strong possibility of falsification of the quality-control data for the 32 MOX fuel assemblies already on site at Fukushima I-3.

If it is assumed that Belgonucleaire's proficiency in manufacturing MOX fuel pellets roughly is about equal to that of British Nuclear Fuel plc (BNFL), then Belgonucleaire's relatively imprecise quality inspection of the pellets' outer diameter should statistically result in a 35% rejection rate. This is because the inspection standards become more rigorous when the number of inspected pellets is low: smaller deviations will be cause for rejection. There are many reasons, such as the size of plutonium spots, which seem to justify the assumption that Belgonucleaire's manufacturing proficiency is lower than BNFL's. However, TEPCO has announced that no pellets were rejected during the outer diameter inspection for the lots prepared for Fukushima I-3. Hideyuki Koyama (Osaka Group Opposed to Mihama, Ohi, and Takahama Nuclear Power Plants) showed that statistically, this is extremely unlikely, and that there is a strong possibility that some kind of falsification took place.

The second hearing was held on 18 September. TEPCO was supposed to present its refutation, but were unable to offer a sufficiently credible refutation of the plaintiffs' claim that a 0% rejection rate is statistically abnormal. Without

admitting it, TEPCO had apparently given up trying to offer any explanation. On the same day, the second appeal was made with an increased number of 1,107 plaintiffs, of which 214 were from Fukushima Prefecture.

The danger of using MOX Fuel with dubious data

When MOX fuel is burned in nuclear plants designed for burning uranium fuel, many safety problems arise. For example, the control rods worth are reduced, the emission of radioactive gasses increase, and difficulties arise due to the lower delayed neutron ratio. (See International MOX Assessment report published by CNIC.) Using MOX fuel which is of a low quality, or which exceeds the reactor's design criteria, further increases the likelihood of accidents. Damage to fuel rods and malfunctions in the cooling system are particularly likely in such circumstances. Large amounts of radioactivity may be released and diffused due to the functional failure of reactor vessels and filters.

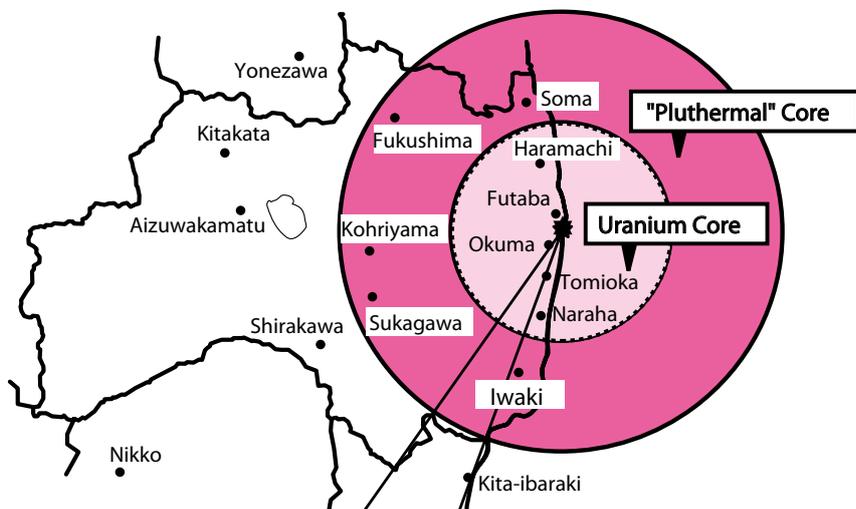
If there is an accident at Fukushima I-3

Exposure doses for residents resulting from a diffusion of radioactivity caused by a severe accident at Fukushima I-3 were calculated by applying the same method used in the disaster assessment in 'WASH-1400', an accident analysis report produced by the U.S. Atomic Energy Commission.

The plan to burn MOX fuel in light water reactors is called the plu-thermal program in Japan. In the core of a pluthermal reactor, there are ten times more actinides such as plutonium, americium, and curium than the core of a uranium reactor. Actinides cause serious internal

### Accident Hazard at Fukushima I-3 Reactor

**3.0 Sv Area (Lethal to half of the persons exposed)**



#### Accident Assumptions

[Meteorological condition]  
 Wind velocity: 4m/sec Pasquil stability: D Weather: Clear  
 [Type of accident]  
 A core meltdown due to emergency core cooling failure followed by a steam explosion in the reactor vessel. The steam explosion is assumed to rupture the containment and a substantial amount of molten fuel is ejected to the atmosphere. (WASH-1400 BWR-1)  
 [Release of fission products (fraction of core inventory)]  
 Rare gases: 100%; Te: 70%; I, Ru: 50%; Cs:40%; Sr:5%; lanthanides (including actinides): 0.5%  
 [Consequence of MOX fuel use]  
 Four percent of total actinides, which are produced in a significant amount as a consequence of MOX fuel burn up, is released. ©Citizens' Nuclear Information Center

exposure in human bodies and thus pose a very serious threat to human health.

The main results from the calculations are shown in table 1. In short, exposure doses resulting from an accident at a plutermal reactor would be twice those produced by an accident at a uranium reactor. A given exposure dose would be received by residents over twice the distance. The overall affected area would be four times larger. When fatalities by cancer from an accident at a plutermal reactor is calculated with an assumption that Tokyo was downwind, the number of cancer fatalities would increase from 0.4 million in the case of an accident at a uranium reactor to 10.6 million (See table 2). In view of such risks, MOX utilization is simply too dangerous.  
 By Chihiro Kamisawa

Table 1 Distance for equal exposure dose (km)

Exposure Dose (Sv)	Uranium Core	"Plutermal" Core
6.0 (Lethal)	15.3	32.9
3.0 (Lethal to half the persons exposed)	29.0	56.4
1.0 (Acute injury)	67.0	126.3

Table 2 Number of cancer fatalities in 300km radius downwind of reactor (assuming the wind blew in the direction of Tokyo)

Uranium Core	"Plutermal" Core
400,000	1,060,000

#### SUBSCRIPTION

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 Citizens' Nuclear Information Center  
 3F Kotobuki Bldg., 1-58-15 Higashi-nakano, Nakano-ku, Tokyo 164-0003 JAPAN  
 Tel: 81-3-5330-9520; Fax: 81-3-5330-9530  
 Translators: Rick Davis, Gaia Hoerner, Taeko Miwa, Kumiko Tanaka, Junko Yamaka, Nobuaki Yamakoshi  
 Proof-readers: Antony Boys, Michael Donnelly, Antony Moore Editor: Gaia Hoerner

# A Tribute to Dr. Jinzaburo Takagi Anti-nuclear Scientist and Activist



## A Brief Biography

Jinzaburo Takagi was the co-founder and former Director of Citizens' Nuclear Information Center. Takagi's extensive scientific analytical work on nuclear issues has greatly contributed to the education of the Japanese and international public, media, and officials on the dangers of utilizing nuclear materials.

Jinzaburo Takagi, known by many as Jin, started his career in nuclear activism from a position as associate professor of nuclear chemistry at Tokyo Metropolitan University (TMU). He was born in 1938, graduated from Tokyo University in 1961 and spent four and a half years working for the nuclear industry followed by another four years for the nuclear institute at Tokyo University, winning the Asahi Science Encouragement Award in 1967. He gained his doctorate in 1969, and was Guest Scientist at the Max Planck Institute for Nuclear Physics in 1972-73. He stepped off the ladder to top status within the nuclear elite when he left TMU in 1973 and set up the non-profit Citizens' Nuclear Information Center (CNIC) in 1975. He directed CNIC until he was forced to resign the position in 1998 due to his health. However, he remained active in CNIC as a scientific advisor and as a member

of the Board of Directors. Up until his very last days, he reported on the results of his analytical and public education work through CNIC publications, including CNIC Monthly in Japanese and the bimonthly Nuke Info Tokyo in English. Takagi carried out a great deal of research, and wrote many books and innumerable articles on nuclear issues, environmental protection and peace, with special emphasis on the fight against the nuclear threat, and for human rights. A number of his books have been translated into Korean, and he recently published an English book on the JCO accident together with CNIC. The results of the international research organized by Takagi on mixed plutonium-uranium oxide (MOX) fuel have also been published in English, French, Russian, and in Japanese.

He was a key figure in organizing a number of important international symposiums such as the "International Conference on Plutonium" (1991, Ohmiya, Japan) "Why Plutonium Now?" (1993, Tokyo, Japan), and the "International Symposium on Reprocessing" (1994, Aomori, Japan). He also organized an international research project on the use of MOX fuel in light water reactors ('A Comprehensive Social Impact Assessment of MOX Use in Light Water Reactors' i.e. the International MOX Assessment (IMA) research) and served as the project leader. This project involved prominent experts from Japan, Europe, Russia, and America, and ran from 1995-97. For this research and their persistent work on plutonium issues, Takagi and the project sub-leader, Mycle Schneider of WISE-Paris, received the Right Livelihood Award in 1997. (See NIT 63 for more info.)

Towards his later years, he became very active in nurturing young alternative scien-



tists who would contribute to a socially and environmentally-friendly world. Using the Right Livelihood Award money to initiate an educational program, Takagi set up the Takagi

School for Alternative Scientists in 1998. Since then, the students of the Takagi School have undertaken many projects and have held many public educational seminars. Recently, some students of the Takagi School and CNIC staff jointly produced a counter-report to a Japan Nuclear Cycle Development Institute (JNC) report favoring geological disposal of radioactive waste. This counter-report was given prominent exposure in the media and was reported on the front page of one of the major newspapers in Japan. The report has initiated a serious debate in Japan and many public forums have been held with participation from key people from each side.

In addition to the Right Livelihood Award, Takagi received many other awards. In 1992 he received the Yoko Tada Human Rights Award and in 1996 the Ihatov Award (Kenji Miyazawa Society Ihatov Center, Hanamaki City) for his contribution as a scientist working for the people. In 1997 he received the Peace Award from Nagasaki Prefecture Hibakusha Membership Association. He was also successful as a writer of children's books and received the Sankei Children's Book Award in 1993.

His funeral was held quietly with a small number of people. There will also be a public memorial service on 10 December 2000. Though the service will be all in Japanese, foreigners in Japan and abroad are more than welcome to participate. (Please contact Gaia Hoerner of CNIC if you are interested in attending.)

In his hopes to continue participating in the anti-nuclear and other social and environmental activities, Takagi included in his will the idea of a Takagi fund. A preliminary form of this fund already exists and has been assisting the education of CNIC staff, the Takagi School and other projects. It was his hope to make this fund self-sustaining. The fund will be used to: 1) encourage and nurture researchers who are endeavoring for citizens' science; 2) encourage and nurture non-profit organizations which are endeavoring for citizens' science; and 3) nurture young Asian researchers. The fund is open to domestic and international donations. Again, please contact CNIC should you would like more information regarding this fund.

Finally, we are in the process of putting together a memorial collection. We have already received many messages through e-mail. For those who would like to have your message included in this collection, please send it to us by e-mail and we will be happy to include it in the collection. For those who have already sent messages by e-mail, we will only publish messages in this collection after we receive permission to do so. We are looking forward very much to receiving messages from all of you.

By CNIC



CNIC staff and Takagi in Rokkasho, Aomori Prefecture. Takagi was strongly against the establishing of a nuclear fuel cycle site in this remote and beautiful village.

## A Farewell to Our Outstanding Leader Dr. Jinzaburo Takagi

Yukio Yamaguchi (Co-Director, CNIC)

Dr. Takagi passed away with his partner, Kuniko, present at his side in a hospital in Tokyo. The direct cause of his death was rectum cancer. Up until the previous afternoon he never lost consciousness. He was 62 years and 2 months old, still too young to go.

He began to feel sick around the spring of 1998, and was found to have cancer in July that year. It was only a few months after the Takagi School for Alternative Scientists had started. He didn't want to stop working in order to prolong his life and instead he chose to continue working until his death while receiving treatments for his illness. He refused to have radiation treatment and chose to try anti-cancer drugs, Chinese herbs (kampo), and to have a better diet. Kuniko supported his decision fully and stood by him all along.

He didn't hide his illness, but rather talked about it openly. Members of CNIC as well as anti-nuclear activists all through Japan and abroad sent him wishes and encouragement that he would overcome his illness. Appreciating all that encouragement, he struggled hard against his illness. Dr. Takagi's brother, a medical doctor from Kyoto, rushed to Tokyo to see Takagi and terribly regretted that his brother's illness had gotten that serious before being diagnosed. He predicted his brother would live only for another few months. That made Dr. Takagi really anxious and he wondered how many more books he could actually finish writing before he had to go.

He survived for two more years, however, and accomplished an incredible amount of work. He published the following books: *Aiming for Citizens' Science*, *Living as a Citizen Scientist*, *Criticality Accident at Tokai-Mura*, *Liberation from Nuclear Myths*, and *Testimony*. He also wrote a report for the Geological Disposal Research Group of CNIC and Takagi School, worked for the Takagi School as a leader, gave lectures, and acted as the scientific advisor of

CNIC.

In mid-September Dr. Takagi entered a quiet hospice in downtown Tokyo while he occasionally went to a hospital to be treated for immunotherapy. It was 28 September when I visited him at the hospice. He looked like he was in quite serious pain. He said, "I can't talk so well anymore, but don't worry about



me," and we talked for about one hour, just the two of us. At one point he asked for some cold water and I poured some in the glass. He drank it down as if it was the best drink he had ever had. I said to him "when you get a little better, let's go to a hot spring for rest." He paused for a while and said, "Hot spring? That will be nice." and smiled. That was the last time I saw him.

His work will be appreciated and recognized even more from now on. In my opinion, he had finished writing the last chapter of the classic, *The Transuranium Elements* (1958, G. Seaborg) as he aspired to do in his youth.

Dr. Takagi accomplished so much in his life. To me he was a poet, a sharp scientist, an activist, an organizer, a passionate person, and a significant individual. In addition, he was a philosopher with an exceptionally strong will. He also showed the world that a "citizen scientist" can actually exist who works for the people and not for the establishment. Being one of his successors, I would like to give my sincere appreciation to all of you who had supported Dr. Takagi and worked with him for all these years. And I would like to ask you for your continued support of CNIC and the anti-nuclear movement.

Hunger strike against the plutonium program and the Pu shipment by Akatsukimaru during the winter of 1992 ~ 1993.

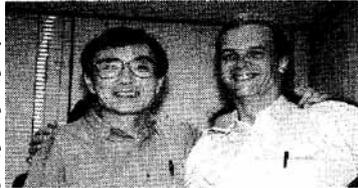
## My Colleague, Teacher, and Friend - Dr. Jinzaburo Takagi

Mycle Schneider (WISE-Paris)

The loss of Takagi-san is bitter, for his partner, for his colleagues, for Japanese society and for humanity as a whole. Jinzaburo Takagi represented that rare combination of a superb scientist and an avant-garde thinker, encyclopedic knowledge and political wisdom, integrity and highest ethical standards. Above all, he remained a very human being. And he was my friend.

Takagi-san was a gifted teacher. When one does not understand the language, one tends to observe people much closer. With my zero knowledge of Japanese language I had ample opportunity for observation during speaking tours, on-and off-the-record meetings and press conferences with Takagi-san. His audiences were fascinated by his talks. He was never acting, he just had a very intense way of speaking, often slowly and soft, sometimes affirmative and loud, but always convinced and therefore convincing.

We had met for the first time in 1986 in Vienna, at the occasion of the presentation of a major study on nuclear hazards, for which we were co-authors amongst others. In 1991 Takagi-san invited me to Japan to speak at the Omiya International Plutonium Conference. From then on, our cooperation developed into an exceptional transcontinental working relationship. And we became very close friends. The International MOX Assessment (IMA), directed by Takagi-san with my assistance, became our largest common project. It took more than two years of coordination, research, editing, internal and external review before the comprehensive evaluation of plutonium fuel was finally published in late 1997. This work has remained without rebuttal by the plutonium industry until today. Just when we had accomplished the IMA Project, we jointly received the Right Livelihood Award, often called the Alternative Nobel Prize. The jury had recognized "a unique partnership in the struggle to rid humanity of the threats posed by the manufacture, transport, use and disposal of plutonium." We considered the award an outstanding honor. I had never seen Takagi-san so nervous as he was during his acceptance speech at the Swedish Parliament's Plenary in December 1997.



The author and Dr. Takagi

The notion of passing on knowledge and capacities had become increasingly the main focus of Takagi-san's work over the past 10 years. The ideas to start up the "Takagi School" with the Award money and, through his last will, to establish a "Takagi Memorial Fund" for the support of young independent scientists, were logical consequences. While speaking and writing abundantly, we both felt that we had failed so far to develop a systematic approach to education and to pass on the specific approach to analysis we had developed: always systemic, always international, always oriented towards democratization of the decision making process. For appropriate decision making, it is necessary to develop both understanding of the whole picture and of the interaction between the pieces of the puzzle. The idea that this is possible without listening to all components of society is fallacious. Whatever their background, the conscious and responsible citizen is the only realistic guaranty for the decision maker to limit errors and their potential devastating consequences. Nothing has been more harmful to industrialized societies like France and Japan than the arrogance of the elite and bureaucratic apparatus. The plutonium lobbyists have been wrong in energy consumption forecasts, uranium price development, and many other aspects. But it simply does not matter. The same people are still there and it just goes on. And it will go on, in Rokkasho-mura or elsewhere, as long as a truly democratic decision making process does not force the lobby to public scrutiny and full accountability.

This is what Takagi-san's approach and all his efforts of the past 25 years were all about. This is what CNIC's role will remain. CNIC's history that makes it the key reference on nuclear issues in Japan and on Japan outside Japan, certainly is the result of a collective effort of many but it was based on Takagi-san's outstanding personality and reputation. In the future, CNIC has to adapt to the new situation. The safeguarding of technical and analytical credibility is one challenge, the maintenance of the international network will be another. This is the moment Japanese society - and the international

# Renewable Energy in Japan

## No.3: Biomass and Energy Conservation

This is the last in a series of articles on renewable energy in Japan. The focus is on biomass energy. The analysis includes the topic of energy conservation as well since Japan, more than ever, needs to recognize the necessity to reduce energy consumption.

community - needs you all.

### 1. Biomass energy

#### 1.1 What is Biomass?

Biomass energy means energy that is produced from biomass. It is also called biofuel, as coal and oil are called fossil fuel. This type of energy includes for example wood gas obtained from woods\* and methane from grains such as sugar cane. These energy sources are sometimes classified as wooden biomass and food biomass respectively. Fig. 1 shows various forms of energy obtained from biomass.

\*By burning wood with very little air, some flammable gas containing carbon monoxide and hydrogen can be obtained. It is easy to generate electricity by using wood gas to drive, for example, internal-combustion systems such as engines.

#### 1.2 Government's commitment

When compared with other renewable energy sources, biomass energy hasn't been recognized as a promising source of energy. Following the oil shock in 1973, the Forestry Agency did try to encourage the use of wood

biomass by establishing model projects in 1983. However, the cost was high and after oil prices stabilized mainly by the lowering of kerosene prices, most projects were halted. Biomass is experiencing a comeback in recent year. One reason is that more and more people are concerned about the danger of nuclear power, wanting especially to be less dependent on nuclear power because of the JCO criticality accident. Another reason for the new interest is that Japan has to deal with issues of global warming. When biomass energy is utilized, it releases only the same amount of CO<sub>2</sub> as it has absorbed. For this reason, it is considered not to have contributed to global warming. With respect to cost, if an environmental tax is introduced and fossil fuel is taxed at the appropriate rate, then some people believe that biomass can compete with other oil based sources.

According to the data provided at a March 2000 meeting of the Comprehensive Energy Review Committee's New Energy Committee of the Agency of Natural Resources and Energy

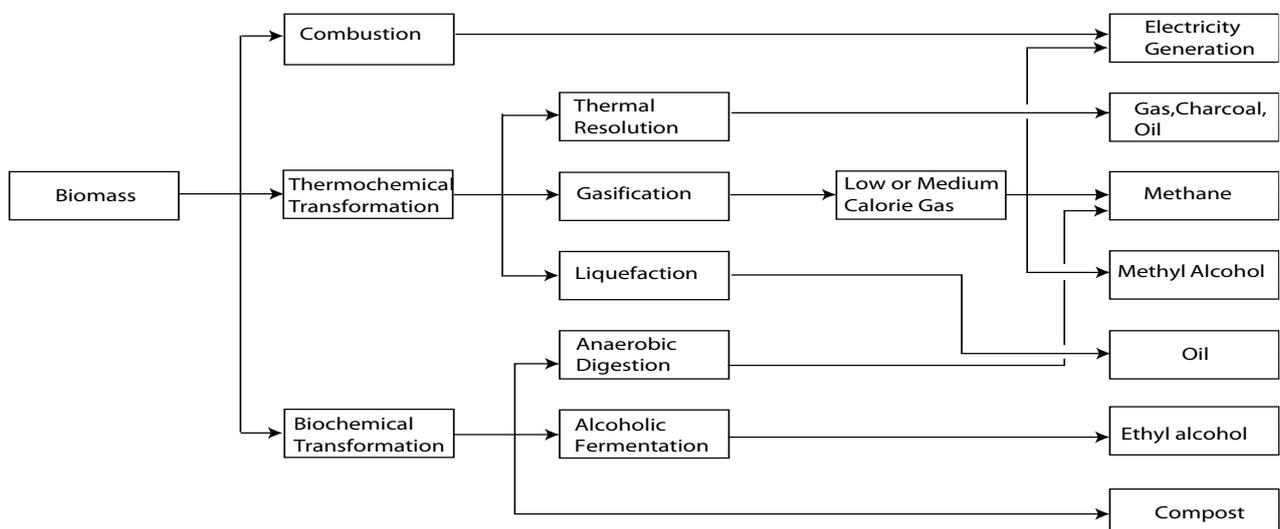


Fig.1 Energy Transformation Technology of Biomass

(ANRE), the oil equivalent of possible biomass supply in 1990 was 37 million tons (if thinned trees are included, the figure reaches 45 million tons). A micro study done in Miyagi Village in Gumma Prefecture (population 8,000 and village area 48km<sup>2</sup>) showed that the gas produced by the droppings of 60,000 pigs and 3,000 cows for milk production and 7,000 cows for meat production can easily exceed the village's primary energy demand (including electricity). In spite of this promising aspect of biomass, due to its various forms as shown in fig 1, the definition of biomass has not been clearly established yet. Thus government subsidy programs and other measures have not been established so far.

### 1.3 Local initiatives

Some municipalities started introducing wood biomass programs around June of this year. Prefectures such as Kochi, Gumma, Iwate, Mie have organized committees to evaluate the possibilities of commercializing biomass. The purpose of the move is not only to replace oil and fight against global warming. It is also an attempt to become locally independent in the supply of energy. Most of these efforts are still in the planning stage. The prefectures are examining site possibilities and studying how best to design a collection system for wood to be used as fuel. They are also examining electricity and heat supply systems. In this way each region will locally find an appropriate energy system. (Tokyo is also involved in this move. About 38% of the land in the municipality of Tokyo is actually forest area!)

There are a number of projects currently under way. Yagi Bio-Ecology Center in Yagi-cho, Kyoto Prefecture, is using livestock droppings (650 cows and 1,500 pigs) and soy curd by-products (5 tons a day) to produce methane gas and generate electricity. The project is currently generating 140kW and co-generation\* is also being done. Suntory, a famous beer manufacturer, has developed a gas co-generation system using methane from waste water produced during beer making procedures. The

system produces 22% of the electricity and 35% of the heat used in the factory. In addition, it conserves 7% of energy and reduces CO<sub>2</sub> by 7%. The technology will likely be adopted by other manufacturers in the near future.

\*Production of two useful forms of energy such as high-temperature heat or steam and electricity from the same fuel source.

## 2. Energy Conservation

### 2.1 Energy conservation - A familiar concept for Japanese people

Japan has become a huge energy consumption nation. However, Japanese people have been very energy conservation minded for a long time. For instance, in the Edo era (1603-1867) clothes were recycled (see fig. 2) and there was even a kind of business that collected small bits of used candles for reuse. People used to live without harming their environment. But now we are trying to satisfy our desires without considering environmental consequences. Our way of life has been based on producing excessive waste and consequently harming the ecosystem.



Fig. 2 A drawing of a recycled KIMONO shop in Edo-period. From Oedo Energy Situation, Eisuke Ishikawa, 1993, Kodansha Publisher

### 2.2 Attempts by Governments

MITI (Ministry of International Trade and Industry) revealed in March of this year that it will drastically strengthen energy conservation measures. There are three reasons for this. In the first place, the government is finally in some aspects admitting the impossibility of the plan to construct additional 20 nuclear plants by the year 2010. Meeting future energy demand has become uncertain. Second, even though Japan

proposed at COP3 in 1997 to reduce energy consumption by oil equivalent of 56 million kl per year by 2010, it is now considered difficult to achieve such a goal. This figure is more than the amount of energy conserved during the period of the two oil shocks. It will not be easy to accomplish. Finally, energy demand is actually increasing for home usage in the household sector and for travelling in the transportation sector. These figures suggest that more and more people are pursuing comfortable and luxurious life styles.

One of the programs MITI is planning to implement, is a plan to set up a 24 hour monitoring system for the amount of energy used in the home and office. This will enable people to easily find out how much energy they are using (see fig 3). MITI also plans to promote Energy Service Companies (ESCOs) that conduct energy conservation as business. Based on these plans, an energy conservation committee was set up in July within the Comprehensive Energy Review Committee of the ANRE for the first time in 7 years. The result of this committee's deliberations will be passed on to the comprehensive committee which will decide Japan's future energy policies.



Fig. 3 An Energy Conservation Navigator

### 2.3 People's Attempts at Conservation

Since energy conservation is the easiest path for us, a number of measures have been tried by ordinary citizens. One of the most popular things that people are trying is to reduce the consumption of energy in stand-by mode. Electric appliances such as TV and VCR and air conditioners using remote control systems continue to run even when the switch is turned off. The amount of electricity used in stand-by mode as a consequence is fairly significant. According to the calculations done by MITI's affiliated foundation, Energy Conservation Cen-

ter, the amount of electricity consumed in such a way accounts for 9.4% of the total consumption in the home. Each household spends on average 9,800 yen per year for this. If you add up all the households in the country it comes to 18 billion kWh. Such a demand for electricity alone requires 2 or 3 nuclear reactors. Because of this, special switches for the outlets are being sold. If the new switch is installed, you don't need to take the plug out of the outlet each time in order to conserve energy.

As this solution becomes more known, manufacturers are starting to develop appliances which consume less energy in stand-by mode. In such a way the active involvement of people has influenced the manufacturers to do more about energy conservation.

### 3. Conclusion

Biomass energy is not well-known yet, but it has great potential. Wood biomass is especially promising since the domestic forestry has not been doing especially well in recent times because the price differential with imported wood has been widening. An increased interest in biomass energy could provide the industry with a good opportunity to revitalize itself. As for energy conservation, people have been quite conscious of the need for it, but this is more because of the high electricity bills people are facing rather than from environmental considerations.

I have discussed renewable energy in these three articles. You probably realize that Japan has very little fossil fuel compared to other countries. Renewable energy sources, on the other hand, are really abundant. Nuclear power has been promoted with great determination in the past. But this was because it was a government policy and it suited the times when mass consumption was considered right. However, we have to mend our vicious ways now for the sake of future generations. I'd be greatly interested in receiving advice and help on these issues from readers of the Nuke Info Tokyo.

By Tadahiro Katsuta

## Japan's Separated Plutonium Inventory (as of the end of 1999)

FACILITY		AMOUNT of Pu	S: stockpile
		(total Pu in kg.)	U: in use/ ready for use
Reprocessing plant	<b>Total</b>	<b>528</b>	
	As nitrate	375	S
	Stored as oxide	154	S
Fuel fabrication plant	<b>Total</b>	<b>3,491</b>	
	Stored as oxide	2652	S
	Under test /processing	481	S
	Completed fuel	358	S
Reactor sites	<b>Total</b>	<b>1,298</b>	
	Joyo	38	U
	Monju	367	U
	Fugen	0	U
	LWR	465	U
	Critical assemblies	428	U
Overseas reprocessors	<b>Total</b>	<b>27,596</b>	
	U.K. (BNFL)	6,957	S
	France (COGEMA)	20,639	S
<b>TOTAL</b>		<b>32,914</b>	<b>S(31,616)+U(1,298)</b>

### Surplus Plutonium Becoming a Serious Problem: Plutonium Program Must be Overturned

shows that Japan's plutonium stockpile has increased sharply to 32.9 tons, 5.3 tons of which is domestically stored. Fortunately, no plutonium was extracted in reprocessing plants in Japan because the one and only Tokai Reprocessing Plant had not been operating since it closed down after the fire and explosion in 1997. As for fuel demand, there was no movement because Monju Fast Breeder Reactor has not operated since the accident in 1995.

This steep rise mainly resulted from the increase of plutonium extracted in foreign countries. The sum of plutonium stockpiles in France and England amounted to 27.6 tons. Because of the delay in reprocessing in England, the increase was not as high as expected. But despite that, there was an increase of 3.2 tons

ture MOX fuel with the extracted plutonium and transport it to Japan to use in light water reactors, but the BNFL MOX data fabrication scandal has seriously delayed the beginning of this plan and it is unrealistic to think that it will progress accordingly.

Looking at the actual demand for plutonium, anyone can see that there is no need to increase the plutonium stockpile anymore. If Tokai Reprocessing Plant re-starts its operation as planned, the domestic plutonium stockpile will unnecessarily increase, triggering serious concerns inside and outside Japan. The most important thing is to immobilize the plutonium that has already been extracted, and prevent any further extraction.

By Hideyuki Ban

## Anti-Nuke Who's Who

# Michiaki Furukawa

## A Man of Knowledge and Action

By Kimiko Shizuri

A year has past since that shocking JCO criticality accident. Unusual words such as 'criticality', 'neutrons' and 'sievert' were heard nation-wide. The accident brought nuclear power issues to the front, and though in different degrees depending on their circumstances, people reflected on nuclear power. The government formed the accident investigation committee and hastily created its final report. In what seemed like an effort to forget this nightmare as soon as possible, the government largely blamed JCO workers for causing the accident with hardly any reflections on its own responsibilities.

On the other hand, the Citizens' Nuclear Information Center and the Japan Congress Against A- and H-Bombs formed the JCO Criticality Accident Comprehensive Assessment Committee, and examined what the real problems were. The Committee recently published its final report. The real subject of this article, Dr. Michiaki Furukawa, is the man who made a lot of effort to get the Committee's long discussions condensed down to a statement of conclusions. Dr. Furukawa is a member of CNIC's Board of Directors. He has appeared as one of the expert witnesses in the court case against the Government on granting permission for the uranium enrichment facility located in Rokkasho, Aomori Prefecture. Many commented that his testimony on 28 July 2000 was very convincing, as the one by Dr. Jinzaburo Takagi last spring was. Dr. Furukawa was also a speaker for CNIC's open seminar on 9 November 2000 about the JCO accident.

Fundamentally, he is an excellent nuclear chemist. He has taught at a number of universities for many years, and I am his first graduate student of Nagoya University. Apart from studies and research, I learned much from him. He is widely informed, and has his own



ideas. He initiates them by his peculiar expressions. I think he loves teaching by nature. If you sit next to him at a table and have beer, be resolved to listen only to him for the next two hours. I guarantee you'll have a good time with him.

If I remember correctly, he became 67 years old last June. Yet he still teaches at a private university, and goes to several research institutes to help with their experiments, in addition to the activities I mentioned above. He must be very busy everyday. Two years ago, he was less energetic than now, so I asked him what had happened to him. He answered; 'I'm already in my last years'. I guess the long-time trouble he had had with his eyes was annoying him. His recent energetic activities make me assume that he has made peace with his turmoils. He is leading such a fruitful and refreshing life that it makes me feel that it is not so bad to be in your late years.

I want to warn you on one thing: he is a big fan of classical music. His daughter became a vocalist because of his influence. Stay away from him if he is listening to "Boris Godounov." He listens to it when he is in an extremely bad mood.

# NEWS WATCH

## Promoters Meeting Held for Establishment of Executing Company for HLW

On 14 September 2000, a meeting of promoters was held to establish the Nuclear Waste Management Organization of Japan which will carry out the final disposal of high-level radioactive waste. It is planned that they will apply for an establishment permission from the Ministry of International Trade and Industry (MITI) within October. The twelve promoters include the presidents of nine utilities across the country, the president of Japan Atomic Power Co, the president of the Japan Nuclear Cycle Development Institute, and the vice chairperson of the Federation of Electric Power Companies. It was officially decided that Kazunao Tomon, an advisor to Tokyo Electric Power Co., would become the chairperson of the Center, and Asao Kuroda, former president of Japan Asahan Aluminum Co. and an ex-official of MITI, the vice-chairman.

## Proposal Submitted for New Long-Term Nuclear Plan

On 22 August 2000, the Atomic Energy Commission's Council for the Formulation of a Long-Term Program submitted to the Commission the revised draft of the Long-Term Program for Research, Development and Utilization of Nuclear Energy. The Commission is accepting public comments until early October, and after revision the plan is expected to be officially decided by December.

Its most striking characteristic is that it does not contain numerical figures such as the target capacity of nuclear power and the time for the commercialization of fast breeder reactors.

Instead, it presents no more than an outline of policy. This is a result of accommodating the claims of utilities which don't want to be bound by the plan.

## 76% Opposed to the Plan for the Horonobe Underground Research Laboratory

The Hokkaido Prefectural Assembly began its session on 20 September, 2000. Its agenda focused on the Japan Nuclear Cycle Development Institute's plan to build an Underground Research Laboratory in Horonobe-cho in Hokkaido for high-level radioactive waste disposal.

Earlier on 14 September, a local opposition group published the result of a survey of the residents of Horonobe and seven neighboring municipalities. According to this, 76% of the respondents were against the plan, far exceeding the 16% who were in favor. People against the plan organized a motorcade consisting of a tractor and a number of cars, and on 16-18 September drove from a town near Wakkanai, the northernmost city in Japan, to Sapporo City, the capital of Hokkaido, to hand the survey results to the governor.

## Hokkaido Governor Says Yes to the Construction of Tomari 3

At the 5 September 2000 Prefectural Assembly meeting, the Hokkaido Governor officially announced his approval of the construction of Tomari 3 (PWR, 912 MW). On 18 September, he submitted to the secretariat of the Electric Power Development Coordination Council a written agreement for the Prefecture to have the reactor included in the national government's basic plan for power-source develop-

ment. In the document, the Prefecture has asked the national government to: 1) conduct a safety review in which the residents' opinions will be reflected; 2) expand the target of receivers of grants-in-aid; and 3) provide measures for medical care in case of emergency.

### Nothing Could Be Done for Exposed Victims

A worker became sick when he was working in a sump tank in the radioactive waste treatment building at Hokkaido Electric Power Co.'s Tomari nuclear plant (2 PWRs, 579 MW each). Several workers tried to rescue him, and when they tried to take him out of the tank using a rope ladder, one of them, who was pushing him up from behind, fell flat on his back in radioactive liquid waste. He died in hospital, evidently as a result of suffocation rather than injuries from the fall.

Radioactivity of 21 Bq/cm<sup>2</sup> was detected from his hips and 95 Bq/cm<sup>2</sup> from his underwear, but no warning was given to those who had taken him to the hospital in an ambulance. It was reported that since the hospital had no prearranged measures for dealing with exposed patients, physicians and nurses were in a great panic. The injured man was treated by physicians who wore protective gears for X-rays.

### Damages to SG Pipes Due to Stray Metal Chips

It was found on 24 August 2000 at Mihama 3 (PWR, 826 MW) during its regular inspection that some alien objects had found their way into the steam generator (SG), and had rubbed down three pipes. A later survey found out that these objects were metal chips (54 mm x 42 mm, 0.3-2 mm thick, and warped into a shape like a plate), which had been produced when pipes of the main feed valve were being welded during a regular

inspection conducted in April last year. It was also found that these chips had entered through a pipe which is connected to the SG, due to a failure to clean properly after construction - a rudimentary error.

The reactor is equipped with three SGs. All pipes of these SGs used to be checked in earlier periodic inspections, but after the SGs were replaced by new ones in 1997, only one was checked at each regular inspection. Luckily, the damage was found because the particular SG containing the chips happened to be the one due for periodic inspection. Otherwise, the damage may have become more serious, leading to pipe severance.

### Kashiwazaki City Council Calls for Safety Confirmation on MOX Fuel

On 18 September 2000, the City Council of Kashiwazaki, Niigata Prefecture adopted a statement calling for disclosure of quality control data on the MOX fuel to be used at Kashiwazaki 3 (BWR, 1100 MW). The MOX fuel, manufactured by Belgonucleaire (BN), is scheduled to be transported by sea in the near future. See pp. 4-5 for questions on the quality control data for BN's fuel.

### Additional Construction of Sendai 3 Proposed

On 8 September 2000, Kyushu Electric Power Co. informed Kagoshima Prefecture and Sendai City of its intention to conduct an environmental impact assessment to investigate the feasibility of the construction of Sendai 3 (APWR, 1,500 MW). People opposed to the plan carried out a sit-in at the front of the prefectural office building to protest. On 18 September three fishing cooperatives from Kushikino City, which is adjacent to Sendai City, submitted a joint petition opposing the plan to the Kushikino City Council.

Citizens' Nuclear Information Center is largely supported by domestic and international subscribers, members, and donations. However, there are many of those abroad who are not able to contribute to the subscription. Our aim is to provide information on Japanese nuclear energy to as many people as possible. But no activity can be sustained without financial assistance and we would certainly not deny any offers for a little winter holiday present! Should you feel like giving a little donation to CNIC, please do so by sending us a postal money order in yen. (Unfortunately we cannot accept personal checks and international bank checks due to the costly processing fee.) We thank you very much in advance for your support.