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India and Pakistan's Tests Show Need for Total Abolition of Nuc. Arms



On May 20, about 50 people joined the protest march against India's nuclear tests in Tokyo.
Photo by Akira Imai

In May, two nations in Asia conducted underground nuclear tests. On May 11 and 13, India conducted its first series of underground nuclear tests since 1974. News reports on the tests - three held on the first day followed by two more two days later - shocked the world to the emergence of yet another nuclear threat. Countries around the world including Japan criticized India's conduct, which makes a mockery of the world effort toward nuclear arms reduction, and possibly opens the way for other potential nuclear countries to follow.

On May 28 and 30, less than two weeks after India's last nuclear test, Pakistan chose to "balance" its military power with India by

conducting nuclear tests. According to media reports, it exploded five nuclear devices on the first day followed by two more despite international criticism and pleas for restraint.

In response to India's testing, the Japanese government has said that it will freeze aid grants as well as new loans to India, and recall its ambassador. It also said that loans extended to India through the World Bank and the Asian Development Bank will be cautiously reviewed. These punitive measures are said to be tougher than those imposed on China when it conducted nuclear tests in 1995.

According to media reports, Japanese government officials, including Prime Minister Ryutaro Hashimoto, has continued to criticize India and urged the country to sign the Nuclear Nonproliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT). In response to Pakistan's test, it is considering freezing economic assistance as of May 29, and has asked the Pakistani government to halt all nuclear development programs immediately.

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In response to the tests, CNIC submitted together a letter of protest to the Indian and Pakistani Embassies with other Japanese anti-nuclear groups immediately after each tests. In the evening of May 12, a protest action led by the people who protested the French government's nuclear testing was held, and on May 20, a protest march of about 50 participants was held in Tokyo.

We feel that what has been proven through this series of nuclear tests, which is nothing more than an utter disappointment for anyone working for a nuclear-free world, is the weakness of the current NPT regime that attempts to control the spread of nuclear arms by allowing only the five nuclear superpowers to hold nuclear arms.

Although we see no justification in the explanation given by India and Pakistan for their need to prove their military strength, not just to the surrounding countries but to the Western nations as well, we feel that unless all nations around the world including the five

nuclear superpowers - U.S., France, Russia, China, and U.K. - make every efforts toward abolishing nuclear weapons, other potential nuclear countries such as Iran, Iraq, Israel, and North Korea may follow suit and pose further nuclear threats. If more nuclear tests are held in South Asia as a result, it will destabilize the entire Asia and Middle East.

Despite the 30 years of efforts to establish a system to control nuclear proliferation that included the set up of NPT and CTBT, India and Pakistan's tests have proven the need to shift to the idea of total abolition of nuclear weapons as soon as possible. No matter how hard the nations holding advanced nuclear technology work to prevent the export of technology from the point of view of nonproliferation, it is now virtually impossible to block the spread of such human knowledge.

CNIC also urges the Japanese Government to stop its ambitious plutonium program, which also poses serious proliferation risks.

Warning!

Plutonium Fuel Shipment May Come in February Next Year

On May 11, Kansai Electric Power Co.(KEPCO) submitted the application for the safety review for relicensing of Takahama 4 (PWR) in Fukui Prefecture to allow them to burn MOX in the reactor. This was made possible by Fukui Governor Yukio Kurita's formal approval for the utility's application.

A safety review of this kind normally takes about a year to complete, after which the prefectural government makes a formal decision to approve or reject. Once it is approved, it will allow the MOX shipment from Sellafield to Japan. The MOX fuel is now being fabricated at the MDF plant in Sellafield.

In return to his approval, Governor Kurita has already presented conditions including increased subsidies and taxes for regional development, and consensus on nuclear back-end policy (including treatment of spent MOX fuel) through discussions in the planned new nuclear policy round table.

The whole process from application of relicensing to the start of the MOX shipment should thus take more than one year. But the period required for relicensing could be shortened. There is also a possibility that the shipments will begin immediately after relicensing is approved, though it may be before formal approval of the local government. KEPCO appears to be confident of implementing the first shipment as early as in the beginning of 1999.

In view of the situation, CNIC alerts our international readers that the first large-scale long distance MOX transport by sea may take place in February 1999 at the earliest. Although nothing is known about the ship, the route, and the amount of plutonium involved, there are already discussions being held in Japan about the upcoming shipment.

In a recent press conference, Atomic Energy Commission (AEC) stated that Japan is now preparing internationally for the transportation of MOX fuel, suggesting that the government is negotiating extensively with related countries concerning the shipment. In the April 1 session of the House of Representatives, a Foreign Ministry official suggested that escort of the shipment by the Maritime Self Defense Force (MSDF) could not be ruled out. Later, Japan's biggest national newspaper Yomiuri Shimbun reported that the shipment will be escorted by a Maritime Safety Agency vessel.

We urge our readers to inform their governments and concerned groups in their countries about this matter and to protest this long-distance, large-scale shipment of weapons-usable, highly toxic material. CNIC estimates that if Japan's MOX program proceeds as planned, the shipment will be followed by 15-20 similar shipments. (see related story on p.6)

-- by Jinzaburo Takagi

Waste of Non-Japanese Origin to be Contained in Coming VHLW Shipment

It has been revealed that specification for the upcoming shipments of Vitrified High Level Waste (VHLW) from COGEMA will change.

According to a report submitted by the Japanese utilities to a February 1998 meeting of Nuclear Safety Commission (NSC), the VHLW that had been returned to Japan were produced from the waste liquid of light water reactor (LWR) spent fuel reprocessed at COGEMA's UP3 plant which only treats spent fuel from LWRs.

However, the report further explains that for the upcoming shipment, VHLW produced at UP2 plant, which in addition to spent fuel deriving from LWR, treats those of gas cooled reactors (GCR), mixed-oxide fuel (MOX) for fast breeder reactor (FBR) Phenix in France, and MOX for German LWR(s) will be loaded under arrangements by COGEMA.

This, however, poses some serious problems. First of all, the reprocessing contracts between COGEMA and Japanese utilities are specifically for reprocessing of LWR spent fuel, and the ones made for UP-2 plant do not contain the so-called "return clause," which obviously means Japan has no obligation to accept any wastes treated at UP-2 plant. This fact has been confirmed through parliamentary interpellation held at meeting by the Diet Lower House.

The report also states that although the waste liquid of the different types of spent fuel will be mixed together to produce the upcoming VHLW, the end amount of radioactivity will be adjusted to the figure required under the contract, therefore, should be of no problem.

However, this argument is cunning if not careless because it neglects the fact that even if you get the same amount of radioactivity, the toxicity and half-life of each of the different types of radiation will remain unadjusted. What this means is that the coming VHLW could well contain radiation that is more poisonous. Despite this grave problem, the utilities have failed to request for explanations from COGEMA as to exactly how the calculations are made to make the adjustment. What they now

have are only the provisional figures showing the percentage of each of the different types of spent fuel, which is likely to be changed in the future.

Such a change of specification was made as a result of Japanese utilities' lax attitude in accepting COGEMA's one-sided request, and is obvious that the waste will be forced onto Aomori Prefecture where storage facility is located. The root of this problem lies in the fact that neither the Japanese Government nor the utilities have worked to get a full picture of how Japan's spent fuel is being treated at COGEMA, and to keep track of the types, specifications, and number of the emerging waste.

-- by Masako Sawai

Table1 : Reprocessing at UP2 Plant

Reprocessing year	Amount Reprocessed (ton)			
	LWR	GCR	FBR	MOX
1968-1975	0	2406	0	0
1976	15	218	0	0
1977	18	351	0	0
1978	38	372	0	0
1979	79	265	2(2.20)	0
1980	105	253	1(1.47)	0
1981	101	250	2(2.18)	0
1982	154	226	0	0
1983	221	117	2(2.02)	0
1984	255	185	2(2.12)	0
1985	351	109	0	0
1986	333	76	0	0
1987	425	68	0	0
1988	346	0	0	0
1989	461	0	0	0
1990	401	0	0	0
1991	311	0	0	0
1992	220	0	0	5(4.5)
1993	354	0	0	0
1994	576	0	0	0
1995	758	0	0	0
1996	862	0	0	0

() shows figure from WISE-Paris

Table2 : Reprocessing at UP3 Plant

Campaign	Amount Reprocessed (ton)	Campaign	Amount Reprocessed (ton)
90-2	125	94-1	443
91-1	189	94-2	257
91-2	162	95-1	473
92-1	258	95-2	328
92-2	190	96-1	561
93-1	384	96-2	257
93-2	218		

Plans for Central Intermediate Storage Facilities for Spent Nuclear Fuel

Amounts of spent nuclear fuel stored at Japanese reactor sites have increased rapidly in recent years. As reported in past issues of NIT, the nation's utilities have taken various measures such as re-racking spent fuel pits in order to secure storage capacity. But since site-by-site measures will not be adequate for the increasing demand for storage capacity, the Ministry of International Trade and Industry (MITI), Science and Technology Agency (STA), and the utilities recently launched a joint project to extend a construction program of central "intermediate" storage facilities for spent nuclear fuel.

The decision to launch such a project was made after a report issued in April 1998 by the Investigation Panel for Spent Fuel Storage Measures stressed the need to construct central storage facilities. The Panel was organized in March 1997 by MITI, STA and the utilities.

Before reviewing the report, a sketch of the amount of spent fuel to be discharged from Japanese nuclear power plants and stored on site would be useful. The table below shows the amount of spent fuel expected to be discharged (loaded) annually, the cumulative amount in storage, and storage capacity for each commercially operated nuclear power plant. All are light water reactors (LWR). Tokai I which was permanently shutdown for decommissioning in March, and Fugen and Monju which are not commercial plants, are not included in the Table.

Commercial operations of LWRs in Japan started in 1970. At the end of 1997, a total of 124,940 tons HM of spent fuel has been discharged. Of this amount, 940 tons was sent to the Tokai Reprocessing Plant, and 5,600 tons to European reprocessors. The remaining 6,400 tons is being stored at on-site storage facilities.

Spent Fuel Stored and Storage Capacity in Japanese LWRs

(as of the end of Dec. 1997)

Power Utility	Plant	Reactor Type	Full Core Loading(tU)	Yearly Reloading(tU)	Spent Fuel Stored(tU)	Storage Capacity(tU)
Hokkaido	Tomari	PWR	100	30	170	550
Tohoku	Onagawa	BWR	160	40	100	570
Tokyo	Fukushima I	BWR	580	150	790	2,680
	Fukushima II	BWR	520	140	1,000	1,880
	Kashiwazaki-Kariwa	BWR	960	250	900	2,850
Chubu	Hamaoka	BWR	420	110	500	1,390
Hokuriku	Shika	BWR	60	20	20	180
Kansai	Mihama	PWR	160	50	170	510
	Takahama	PWR	290	100	620	1,490
	Ohi	PWR	360	120	440	1,320
Chugoku	Shimane	BWR	170	40	200	600
Shikoku	Ikata	PWR	170	60	240	700
Kyushu	Genkai	PWR	270	100	240	1,430
	Sendai	PWR	140	50	470	760
JAPCO	Tsuruga	BWR&PWR	140	40	360	630
	Tokai II	BWR	130	30	170	420
	Total		4,630	1,330	6,390	17,960

This means that about half of the cumulative spent fuel generated in Japan has remained at plant sites. The amount is expected to increase as indicated in the Panel's report which states the accumulation rate has become higher than was originally expected.

The report predicts that the amount of spent fuel will increase in the future. Current operating nuclear power plants, totalling 45GW, discharge about 900 tons HM of spent fuel annually. This amount will grow to 1,400 tons by 2010 and 1,900 tons by 2030.

CNIC believes that the report's projection may certainly be an over-estimation because it assumes an unrealistically high growth scenario of 70 GW in 2010 and 100 GW in 2030 estimated as the total capacity of Japanese LWRs. However, the accumulation of spent fuel, no matter how fast or slow it may pile up, will pose a serious problem in the foreseeable future. Furthermore, it should be noted that decommissioning of a reactor will require full core unloading.

Because the Tokai Reprocessing Plant has remained out of operation since March 11, 1997 after the fire and explosion accident at its LLW bituminization facility, not much can be expected in the improvement of its storage capacity. Spent fuel to be reprocessed in Europe has mostly been transported to European reprocessors, with only 10 tons awaiting to be transported by the end of 1998.

Therefore, if no new contracts are made between European reprocessors and Japanese utilities - this possibility can not be ruled out but has not yet been placed on the table - the only future possibility to store spent fuel, in addition on-site storage, will be at JNFL's planned Rokkasho Reprocessing Plant.

At Rokkasho Reprocessing Plant, however, although its 3,000 ton spent fuel storage pool was completed in October 1996, it has not received any spent fuel yet because Aomori Governor Morio Kimura has not signed the safety agreement to be made between local governments and JNFL.

Although the Rokkasho Plant may start operating in 1998, it will be no time before the pool is saturated because of limited capac-

ity. Furthermore, because construction of the reprocessing facility at Rokkasho is far behind schedule, it is widely believed that the official plan to begin operations in 2003 is most unlikely to be met. Even if the Plant were to begin operating at full capacity, its 800 ton/y throughput cannot absorb all the annual spent fuel.

Consequently, as the Panel report concludes, central intermediate storage facilities have to be constructed to overcome the expected shortage of storage capacity. The report suggests the need to construct two or more facilities in order to meet the total away from reactor (AFR) storage capacity of 6,000 tons by 2010 and 15,000 tons by 2020. The report recommends using methods such as water-cooled pool and dry cask.

The construction of such storage facilities itself may not seem so difficult. However in reality, it will be extremely difficult for the central government and nuclear industry to find local governments that will accept the construction of such facilities where high level nuclear wastes will be stored. In anticipation of difficulties waiting ahead, the Panel has devised a queer word "recycle fuel resource" to replace "spent fuel," and refers to a spent fuel storage facility as a "recycle fuel resource storage facility." Such phrases have been invented in the hope that new wording will make the facility more acceptable to the local residents.

Despite the queer naming of the storage facility, the implication of the report cannot be over-exaggerated. The report, which opens a way to large-scale intermediate spent fuel storage, is the first public acknowledgment by the nuclear industry of the shift from an all-reprocessing policy, and could even be interpreted as the beginning of a change in basic policy presented however in a typically vague Japanese way.

Naturally, the government and utilities will never admit to making any changes in Japan's basic policy, and the report states that the spent fuel will be "stocked until the uranium supply becomes tight." But this means virtually that spent fuel will be stored indefinitely until it is sent to a final repository.

-- by Jinzaburo Takagi and Baku Nishio

MOX Utilization Plan

Developments in Fukui and Fukushima

In February 1997, the Japanese Cabinet approved the mixed-oxide utilization plan followed then by an announcement by the 11 utility companies. (See NIT No.58) Since the announcement, discussions between the pros and cons have become intense in Fukui, Fukushima, and Niigata Prefectures that are subject to the plan.

On February 23, Kansai Electric Power Co. (KEPCO) submitted a "request for preliminary consent" to Fukui Prefecture and the local Takahama Town for approval of MOX use in reactors 3 and 4 in Takahama. This is based on the "safety agreement" made between KEPCO and Fukui Prefecture and Takahama Town. If Fukui Prefecture approves the request, Fukushima and Niigata Prefectures will likely follow. Because of this, the tension among the local groups fighting against the plan in each Prefecture is rising.

On April 16, Yasuhiro Inagawa, Director of the Agency of Natural Resources and Energies asked Fukui Prefecture for cooperation on this matter. Fukui Governor Yukio Kurita responded by making six proposals, including programs to stimulate the local economy and measures to take spent fuel out of Fukui. On May 8, Fukui Prefecture and Takahama Town agreed to KEPCO's submission of an application for safety review for relicensing of Takahama 4 for MOX use. The final decision by the prefectural government on the "request for preliminary consent" will be made after the relicensing safety review is completed and the February session of the Fukui Prefectural Assembly next year is closed, according to media reports.

Meanwhile in Fukushima, a rally by local citizens opposing the MOX plan was held on April 25 at Ohkuma-cho where the reactors are located. On April 23, Tokyo Electric Power Co.(TEPCO) held a meeting with the local citizens in a nearby city of Koriyama to explain their plan, followed by a symposium sponsored by the central Government on April 28 in Ohkuma-cho. The media reported that the latter meeting was nothing but a formality with hardly enough discussion. The Fukushima Pre-

fectural Government is still very cautious, but it is reported that TEPCO is planning to submit the request for preliminary consent as early as the beginning of May.

The Japanese Government, as well as the utilities, has so far conducted about 10 meetings in each of the concerned prefectures to explain their future plans. All these meetings and symposia sponsored by the Government or the utilities have been used as an opportunity to reiterate their explanation that using MOX is "safe" and "necessary." The actual details of the MOX plan is never revealed beforehand which makes it difficult for people to raise questions. Overall, the effort to provide local citizens with a full and accurate picture of the plan is no way satisfactory. This is obvious by the fact that no discussion meetings sponsored by the prefectural governments have been held, except for the one "explanation" meeting held in Fukui.

In addition to the danger of MOX utilization, local citizens have also been concerned about the issue of what to do with the spent MOX fuel that is likely to be left at the site. This is because the capacity of the spent fuel storage facility at the site is expected to become full around 2010. However, the Government has not been able to find a location away from the site that might become a candidate for building a new storage facility.

Now that Fukui Prefectural Government have agreed to let KEPCO go ahead with the relicensing procedure despite opposition of local citizens, we must remain alert regarding any further actions in not only Fukui Prefecture but also in Fukushima and Niigata Prefectures.

Although the Government and utilities seem desperate in pushing through the plan, there still remains strong opposition against the idea of the plan which is necessitated only to get rid of excess plutonium resulting from the reprocessing policy. A move to reverse Government policy will no doubt continue.

-- by Hideyuki Ban

Electric Utility Reorganization

-- Move to Consider Only Short-Term Economic Benefit

Changes are afoot in Japan's electric power industry. Talk of reorganizing electric utilities has come about owing to a congruity of demands by the domestic and foreign business communities, as well as the lowering of Japan's electricity rates, which are higher than those of other countries.

The discussions over deregulation of electric power in Japan appears to be proceeding in a dangerous direction because proponents are considering only short-term economic benefit while attempting to maintain the structure of Japan's economy in its present form. It is also evident, however, that while Japan's electric utilities have been sustained by the 10 utilities' regional monopolies, the introduction of competition through market entry by new power producers will encourage improved efficiency and the formation of a highly responsive electric power system.

Outcome of Reorganization

Japan's electricity rates are higher than those of most other countries. Most of the activity behind this electric power reorganization comes from industry, which can no longer cope with the high cost. Many of the energy-intensive industries such as the heavy and chemical industries make use of cogeneration, which makes combined use of in-house power and the heat that is generated at the same time. Industry knows from its own experience that the utilities' rates are high and if they could sell their self-produced power outside, it might mean new business for them. Companies that handle natural gas, which could very well be the next energy mainstay, are also aggressively pushing this electric power reorganization.

The current discussion aims to ultimately separate and deregulate production, transmission, and distribution (retail sales) of electricity. The electric power industry is putting up firm resistance, and discussions in the Electricity Utility Industrial Council's Sub-committee on Basic Policy, an advisory body of the Minister of International Trade and Industry (MITI), center arguments by industry and MITI who are pressing for reorganization only in terms of economics, and resistance to this by the elec-

tric power industry, which wants to preserve its monopoly.

A comprehensive report of these discussions will be released on May 27. Based on the discussion up until now, the emphasis on deregulating retail sales to large-scale buyers will not change. If large-scale buyers are able to purchase electricity under better conditions than they can from the regional utilities, they will probably do so. The utilities have grudgingly accepted that in such case, they will let independent power producers (IPPs) use the utilities' power lines to transmit electricity -- although at this time it does not look like the utilities will be required by law to open their power lines for others' use. If such sales become possible, it will be the first time that ordinary (non-utility) companies will be able to sell electricity.

Reorganization of Electric Power and Nuclear Energy

As has become evident in countries where market principles have been applied to the electric power industry, if such deregulation is realized in Japan, building new nuclear energy plants will become impossible. Moreover, if the overall costs of nuclear power generation are subject to such competition, it will probably become difficult even to continue operating existing plants.

The Japanese government's pledge to increase the use of nuclear energy as a way to curb global warming, gives electric utilities the ideal argument against deregulation. They say that if deregulation were continued, nuclear energy would not be able to survive. But trying to reduce carbon dioxide emissions without nuclear energy would leave only the energy-saving option to fill the gap, something which would be economically unfeasible. So with this potential outcome, they say, would the government still continue to push for deregulation?

As we see it, nuclear energy is not only a convenient rhetorical device to use in support of maintaining current regulations, but its actual existence promises to effectively prevent deregulation. Since nuclear power is generated at a rated, unchangeable level of output, even

if the industry were deregulated and electricity became purchasable at the lowest price offered, electricity from nuclear plant would have to be specially designated by the government for priority use. This means that with high percentage of nuclear power supply, there would be little room for competition.

In other words, if electric utility reform is to be seriously considered, it would be necessary for the government to avoid turning nuclear power into a sacred preserve.

Japan's Electric Power Industry

Japan's electric power industry consists of 10 regional utility companies located in Hokkaido, Tohoku, Hokuriku, Tokyo, Chubu, Kansai, Chugoku, Shikoku, Kyushu and Okinawa. These utility companies are permitted a monopoly in their respective regions, where each controls all aspects of production, transmission and distribution of electricity. Under the current structure, it is impossible for new competitors to enter the industry.

For 31 years after the "Electric Power Law" establishing the industry was ratified in 1964, the business interests of these utilities were protected without any major reforms until 1995. At that time, however, the law was amended so that it was no longer necessary to receive MITI authorization to make wholesale sales of electricity to the utilities, plus it enabled IPPs to freely participate in such sales through a bidding process.

It also became possible for IPPs to directly sell electricity to consumers in limited areas targeted for redevelopment and rent power lines which fall under the jurisdiction of certain utilities and to use these power lines to transmit electricity to other distant utilities. A reassessment of the electricity rate system was carried out at the same time, making the utilities somewhat more accountable for being efficient.

However, these changes were not far reaching enough. For example, under the bidding system, stiff competition among IPPs can push the final price down as far as 40% below the offer price set by the utilities. But since the bidding is not required by law, most of the utilities do not call for bids. This leaves IPPs without a guaranteed buyer for their electricity and often results in utilities having surpluses purchased at unusually low prices. Another problem is that most of the IPPs who respond to requests for bids use residual fuel or coal, in

other words "cheap and dirty" materials, to produce their electricity.

Appropriate Direction for Utility Reform

Despite the current unresolved issues, further utility reform seems inevitable. Therefore, our hope is for this reform to go in as favorable a direction as possible. More than anything, we would like to see the demand for electricity itself be controlled rather than just to see decreases in electricity rates (especially from the IPP side) due to demand effects resulting from deregulation.

If retail sale of electricity is completely deregulated and it becomes possible for consumers even at the household level to choose their own electricity providers, this could lead to the creation of alternative electric companies which cater to decreased demand and use renewable energy. It might also be possible to develop a flexible rate system that allows for diverse configurations of electricity supply in response to individual consumer needs, including dispersed power sources, energy-saving and increased efficiency, and other options.

The potential environmental effects brought on by market competition must also be considered. Some ways that environmental impacts might be held in check include: adopting renewable energy to a fixed percentage, evaluating costs by taking into account environmental burdens of each option, and fortifying regulations concerning emissions of pollutants and radiation. While this whole process is called "deregulation," there are some specific regulations that need to be tightened or those which should be newly established. It also seems necessary to enforce purchases of surplus renewable energy, such as that produced by solar panels, at high rates.

While actual reforms continue to be discussed and finalized, our role as consumers is to think about what these reforms will mean to us.

Recently, the government released a gist of the "Outlook for Long-term Energy Supply and Demand" (see News Watch) drawn up by the MITI's Advisory Committee for Energy. In order to lead the discussions for the finalization of the new "Outlook" in a greener direction, it is important for us to participate in these discussions based on our understanding of the need for sustainable energy sources.

-- by Mika Ohbayashi

Report on Health Conditions of Decontamination Workers at Chernobyl

By Tetsuji Imanaka, Research Institute, Kyoto University

Let me share with you an interesting report on the health of the so-called "liquidators" who are workers that took part in the decontamination of Chernobyl accident. The report is titled "Effects of radiation exposure of the Chernobyl decontamination workers based on the Ryazan State rehabilitation center's long-term data and recommendations for countermeasure."

The 34-page report is based on the research by the Ryazan State Government and a biophysics institute on the health condition of liquidators who live in Ryazan State (located 200 km south-east of Moscow with a population of 1.3 million). The research was conducted between 1986 and 1993 (partly until '94). The number of workers studied was 1,886 who took part in the decontamination work between 1986 and 1989. The number is very small compared to the total number of liquidators estimated to be somewhere between 600,000 to 800,000. However, the small number made it possible for researchers to conduct a thorough examination.

Object

92% percent of the liquidators studied were aged between 18 to 40 at the time they participated in the decontamination work. The combined percentage of those who worked in 1986 and 1987 is 91.2%, and the number for each year is about the same. Among them, data on the 96 people who worked between April and June, 1986 should be highlighted in this report.

Result

Mortality Rate: As shown in <Table 1>, the total number of deaths between '86 and '93 was 87. When we compare the mortality rate for each year, we notice that the highest mortality rate was found among the liquidators who worked in '86, and the rate begins to surge in 1991. Among the 856 who worked in '86, 55 died within the next eight years (one out of 16), which is very high considering that most of them were in their early 30s at the time they were working. Although the age group and other factors for those who worked in '87 were similar, the mortality rate of the '86 group is still twice as high as the '87 group. This means that the contamination levels were extremely high in '86. The causes of death are divided into the following categories: 1. accidents, toxication, suicide - 39.4%; 2. respiratory diseases; 3. unknown; 4. malignant new organisms. Unfortunately, no further detailed data are presented.

The cumulative death rate among all the liquidators studied in this report is 4,613 per 100,000 and is small compared to the average death rate of 7,116 for male of the same age group living in Ryazan. However, considering that these liquidators were healthy people in the beginning, and the method used to compare the death rates of different age groups is unclear, one should be careful when comparing the data in this report with the average figures for the whole Ryazan State.

Cancer Rate

<Table 2> shows the data on cancer rate. The cumulative cancer rate in eight years is 14.9 cases per 1,000 persons, but it is 18.7 among those who worked in '86. This indicates the significant relation between the rate and the working year. The risk is especially high among the 96 workers who worked between April and June of the same year, where seven cases of cancer were found; that is one out of every 14. The organs which contracted cancer were thyroid, brain, and eyes - all of which are rare types of cancer.

The Ryazan State's average cancer rate for males of the same age group during the same period was 24.2 per 1,000 which is higher than that of the liquidators, but again the validity in comparing these two figures is quite doubtful.

Invalids

The liquidators who are considered "invalid" are those who have been officially recognized as being unable to do ordinary work because of physical disabilities and/or general weaknesses. These people are categorized in three different groups: level I-III, depending on the degree of invalidity, which determine the level of social assistance. Out of the 1,886 liquidators, 454 or 24.1% were recognized by 1993 (2 in level I, 327 in level II, and 125 in level III). This is about four times as high as the average figure in each of the States that were part of the case study.

Similar to the study on death rate and cancer, there is a definite relation between the rate and the work period. The earlier the work period, the higher the rate becomes. Among the liquidators who worked from April to June '86, the rate is as high as 93.8%, showing that almost everyone in this work periodsuffers from the symptoms. A sharp rise in the number of recognized people which begins in 1991

shows the same tendency as the study on mortality rate. Considering this, it is clear that the same factor is causing the increase of the mortality rate, cancer rate, and illness rate. In other words, these results can be seen as the aftereffect of radiation exposure during work at the site of the Chernobyl accident.

Other Effects

1,068 people out of the 1,886 were given thyroid examinations and as many as 601 people (56%) were found with enlarged thyroid or tumor. This figure was 1.7 times as high as the State average. Among them, 59 were found to have severe case of thyroid disease such as thyroid tumor, self-immune thyroid inflammation, and thyroid toxication, which was 10 times as high as the State average.

Between '87 and '94, 171 children were born from the entire group of liquidators studied in this report. The birth rate within the eight-year period among the child bearing age (18 to 35) group was one third of the State average.

Table 1. Number of Death and Mortality Rate According to Work Year

Work Period	Cumulative 1986-1993		Number of Deaths									Average Age of Death
	No.Death	Mortality Rate*	'86	'87	'88	'89	'90	'91	'92	'93		
1986	55	6425.2	2	2	6	3	6	4	15	17	38.5	
1987	28	3236.9			3	2	1	6	7	9	37.5	
1988	3	2205.9						2	1	1	42.3	
1989	1	3448.3								1	42	
Total	87	4612.9	2	2	9	5	7	12	23	28		
State Average		7116**										

* per 100,000 persons

** state average for male of same age group

Note: Difference in total number of death on right and accumulated total on left is same as original.

Table 2. Number and Types of Cancer Case

Work Period	Cumulative 1986-1993		Number of Different Types of Cancer							
	No.of Cancer Cases	Rate*	Digestion Organs	Thyroid	Lung	Pharynx	Brain	Liver	Eye	Others
1986 (April-June)	16 (7)	18.7 (72.2)	4 (3)	2	3 (3)		1	2	1 (1)	3 (1)
1987	10	11.5	3	2		3	1		1	
1988	2	14.6					1			1
1989	0	0								
Total	28	14.9	7	4	3	3	3	2	2	4
State Average		24.2								

* per 1000 persons

NEWS WATCH

Cover-up on Loss of Radioactive Metal Fragments Revealed

Careless management of radioactive substances has once again shocked the Japanese public. On April 7, an anonymous letter delivered to the Science and Technology Agency (STA) revealed the usual cover-up ploy played by the nuclear industry. According to the letter, back in 1995, 24 metal fragments that had been irradiated at Tokyo Electric Power Co.'s (TEPCO) Kashiwazaki-Kariwa 5 reactor in Niigata Prefecture were sent to Nippon Nuclear Fuel Development Co., Ltd. (jointly owned by Hitachi and Toshiba) in Oarai, Ibaraki Prefecture to test the effect of radiation on the strength of metals.

Although it is required by regulation that these test pieces be stored in a storage pool after any testing, they were left in the laboratory until December 1997 when someone noticed that 19 of them were missing. Secret investigations were being conducted when finally someone decided to notify the STA.

After receiving the letter, STA conducted investigations at the firm and confirmed that the allegations were true. Ibaraki Prefectural Police Headquarters searched the company on the charge that the company failed to report an accident, an obligation stipulated in the Law concerning Prevention from Radiation Hazards Due to Radio-Isotopes, etc.

Later on March 20, Japanese media reported that all of the missing fragments were found inside a tightly sealed, high-level waste container stored at the firm's facility. The firm will continue investigating exactly how these fragments reached the container without any reports. The Prefectural Police have also decided to send papers to the Public Prosecutor's Office. The case has shown the firm's lax control measures on the management of radioactive substances.

Preliminary Calculations for Clearance Levels Presented

Preliminary calculations have recently been presented by the Government to be used for the so-called

"clearance levels" which divide radioactive wastes into two groups: those considered as "radioactive" and those considered as "ordinary (nonradioactive) waste". The figures and the basic calculations were presented on April 24 at a meeting of Nuclear Safety Commission's sub-committee on radioactive waste safety standards. Calculations were made by a working group that reported to the sub-committee. Final approval of these figures will be made sometime within this year, after being examined by the sub-committee and opinions from the public are received.

The clearance levels for concentrations of radionuclides in the waste will be set so that the public exposure is limited to 10 micro Sv or less. Radioactive concentrations for each nuclide were calculated in order to keep the exposure level due to underground disposal or recycling below the same limit. Calculations were made by positing various potential exposure routes.

The report explains that as a result of the calculations, the clearance levels of iodine-129, chlorine-36, technetium-99 and tritium have been lowered by two orders of magnitude than those suggested by IAEA. On the other hand, those of manganese-54 and zinc-65 were raised by factor 10. It is explained that the difference from the IAEA levels was caused because calculations "were based on the food intake data of Japanese people." Still, the fact that a difference can become as large as orders of magnitudes just by changing parameters poses a question regarding the validity of such calculations.

AEC Drafts Report on Int'l Coop.

On April 27 the Atomic Energy Commission's (AEC) sub-committee on international nuclear power co-operation drafted a final report on ideal methods and measures for co-operation. The report will be approved after collecting and incorporating opinions from the public. However, no significant changes in the report can be expected.

The report suggests various measures in two

geographical areas; Region 1: the neighbouring Asian region; and Region 2: countries of the former Soviet Union, and Middle and Eastern Europe. For the countries and regions included in Area 1, the Report states that co-operation will be made according to levels of nuclear development. The point that co-operation should take place on the securing of safety is also referred to in discussions regarding Region 2.

The biggest problem in measures suggested for Region 2 is the disposal of plutonium produced from dismantled nuclear warheads, where technological assistance for use of plutonium in MOX is specifically suggested in the report. Though the authors boast about the "contribution for nuclear arms reduction," Japan's involvement in disposition of military plutonium would conflict with the fact that the nation's nuclear development is legally limited to "peaceful uses." Similar conclusions can be drawn regarding the fact that the report proposes a joint study with Russia and Ukraine concerning fast breeder reactors.

Summary of Long-term "Outlook" Released

Gist of the new "Outlook for Long-Term Energy Supply and Demand" was released on May 11 at a meeting of the Supply and Demand Sub-committee which comes under Ministry of International Trade and Industry's (MITI) Advisory Committee for Energy. The last issue of the "Outlook" currently being reviewed was issued in June 1996. The Outlook has been the basis of Japan's energy policies of all kinds.

The recent review had been conducted in

response to the set up of target reduction rate of 6% (as compared to the 1990 figure) of CO₂ and other greenhouse effect gas to be achieved between 2008 and 2010. Such targets are required in the Protocol adopted by the 3rd Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3) held in December last year in Kyoto.

According to the new Outlook, the amount of electricity generated in fiscal year (FY) 2010 by general electric power companies will be 1.06 million GWh, 43% up from FY1990 and 20% up from FY1996. In terms of actual power sources, dependency on petroleum will be reduced by a shift to natural gas. However, the ban on the new construction of petroleum thermal power plants will be lifted, while the share of cheap coal will increase. For new energy sources, waste power generation will be mainly promoted, and generation by photovoltaics, solar thermal and wind power are expected to increase slightly.

It is obvious from this Outlook that the emission of CO₂ will increase. What the Government expects to do in order to achieve the reduction goals is to promote even further nuclear power, which is considered "clean" in terms of CO₂ emission. The Outlook states that if construction of 20 more nuclear plants under the current target cannot be achieved, the facility usage rate will be raised to 83%. A Mid-term report is expected in the middle of June.

Correction:

In the map of HLW facilities on p.4 of NIT No.64, the word "operation" in bracket for Mizunami's underground research facility should be changed to "plan."

SUBSCRIPTION

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