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Five Killed in Mihama-3 Accident

Mihama Nuclear Power Plant across the bay (Photo by Noboru Kobayashi)

As most people will be aware from reports in the mainstream media, on August 9th, the 59th anniversary of the bombing of Nagasaki, there was a serious accident at the Mihama-3 reactor, located in Fukui Prefecture. Serious? Yes, in the commonly understood sense of the word, though it was only awarded a 0+ rating on the International Nuclear Event Scale (i.e. between 'no safety significance' and 'anomaly'). No doubt it would have been swept under the carpet as just another minor steam leak if it weren't for the inconvenient fact that eleven people were hospitalized, five of whom died.

So how serious was it and why was it given a rating of only 0+ on the INES scale? These and other questions will be addressed below, but first a brief run-down of what actually happened.

What actually happened?

At 15:22 a fire alarm went off in the turbine building of Kansai Electric Power Company's (KEPCO) Mihama-3 reactor (PWR, 826 MW).

CONTENTS

Mihama-3 accident 1-6
Data: Plutonium inventory 7
JCO 5 years on 8-9
Group Intro: Nagano Soft Energy Resource Center 10
News Watch 11-12

A main condensate pipe in the secondary coolant system(1) had ruptured (see figure 1). The pipe(2) contained water heated to 140 degrees Celsius under 9.5 atmospheres pressure. When the pipe ruptured, this water spewed out in the form of steam, severely scalding the unfortunate workers who happened to be in the room. The thickness of the wall of the pipe at the point where it ruptured was down to around 1mm, compared to the original thickness of 10mm and the regulatory minimum of 4.7mm. It had never been checked during the entire 28 years that the plant had been operating.

The sequence of events from there on can be summarized as follows:

Time	Action
August 9th	
15:26	Operators begin to manually turn off of the generator
15:28	Reactor trip due to shortage of feedwater to loop A steam generator(3)
15:28	Auxiliary feedwater pumps activated (both turbine-powered and electric motor-powered pumps)
15:35	Hot shutdown stability confirmed
15:44	Dearator valve closed (upstream of ruptured pipe)
15:58	Injection of boric acid(4) into reactor coolant system
16:05	Main steam isolation valve closed (downstream of generator)
16:26	Feedwater isolation valve closed (upstream of generator, downstream of ruptured pipe). The leakage of steam and water continued until this moment.
16:55	Water level in steam generator at 33%
17:12	Turbine-powered auxiliary feedwater pump stopped. (Electric pump continues to operate.) Its outlet flow control valves (A, B, and C) were shut manually.
17:13	Operators tried to reopen these control valves to 60%, but valves A and C did not respond.
August 10th	
19:05	Cold shutdown achieved

KEPCO's estimate is that a total of 800 tons of water escaped. The basis for this estimate is not yet clear, but apparently around half of this was from the secondary coolant system and half from the auxiliary feedwater system. There had been 1,100 tons in the secondary coolant system to start with.

Who was in the building?

At the time of the accident the plant was operating at full power. One hundred an five workers were in the turbine building making preparations for a periodic inspection that was to begin on August 14th. By carrying out preparatory work while the plant was still operating, KEPCO hoped to minimize downtime and reduce costs. The building itself has three floors, so not all of the people in the building came into direct contact with the steam. Also, over a hundred other workers, who had been in the building shortly before the accident, were taking a break outside. The eleven people who were hospitalized were all employees of Kiuchi Instruments, a subcontractor whose job was to maintain measuring instruments, such as pressure gauges and thermometers. Four of the injured workers were dead on arrival and a fifth died on August 25th.

How serious?

Let us now return to the question of how serious the accident was and why it was only classified as a 0+ accident[5]. To deal with the latter question first, KEPCO claimed that monitors recorded no radiation. This appears to have been the principal criterion considered. We have no grounds to challenge KEPCO's claim regarding the recording on its radiation monitors, but we would assume that a small amount of radioactivity would have been released, even if the monitors didn't detect it. In particular, we would expect some tritium to have escaped with the steam and water, although the quantity may well have been very low. The reason for a minimal release of radioactivity is that the secondary coolant system of Pressurized Water Reactors (the type used at all KEPCO nuclear power plants) does not pass directly through the reactor itself. Instead, heat from the reactor is carried by the primary coolant system to the steam generator, which acts as a heat exchanger. There the heat is transferred to the coolant in the secondary system. This is then forced through the turbines in the form of steam. This is the principal difference between Pressurized Water Reactors (PWR) and Boiling Water Reactors (BWR). In the latter case, water flows through the reactor, where it is converted to steam, which is sent directly to the turbines. Consequently, the radioactivity of the steam passing through the turbines in BWRs is much greater than in PWRs.

However, despite the fact that little radioactivity escaped, this was indeed a serious accident. The loss of life is only one of several reasons for passing this judgment. Other reasons include the dangers inherent in the loss of coolant, even if it was 'only' secondary coolant, and the dangers associated with the woefully inadequate nuclear safety system in Japan, revealed once again through this accident.

Loss of coolant

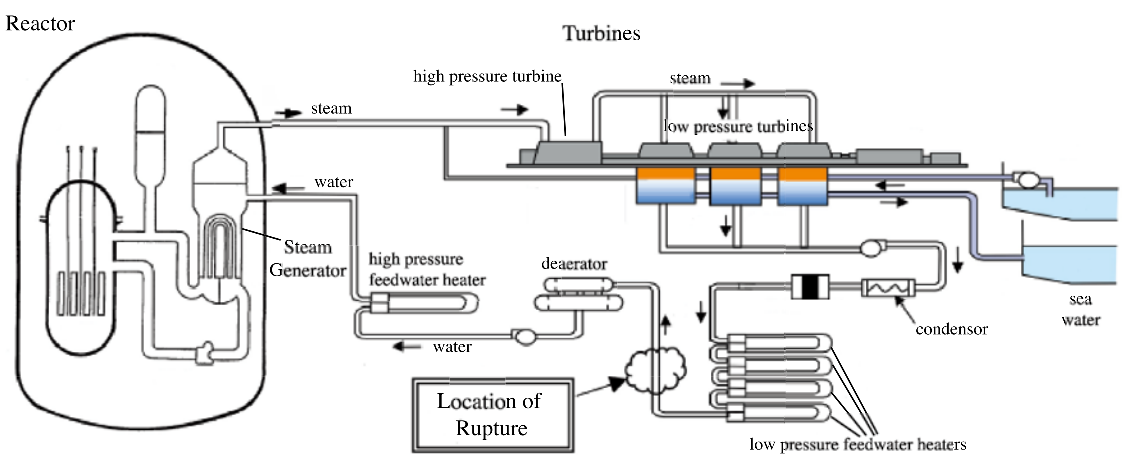
The problem with a loss of coolant accident (LOCA) is that it could lead to a reactor meltdown, as occurred in the 1979 Three Mile Island (TMI) accident. The most serious case is where there is a loss of primary coolant, since it is this which directly cools the reactor. However, if there is nowhere for the heat from the primary coolant system to go, the heat in the reactor will continue to build up. The secondary coolant is there to remove this heat and channel it off to produce electricity. That is the theory behind the fear of a LOCA. The comparison with TMI is instructive, because like Mihama-3 it was a PWR and like Mihama-3, the problem started with a fault in the secondary coolant system. In the TMI case, a valve failure in the condensor prevented the secondary coolant from circulating. Hence, it was no longer able to remove heat from the primary coolant. This was compounded by a series of other failures, which led to a loss of primary coolant and core meltdown. In the Mihama case back-up systems worked (more or less) and the primary system, including the reactor core, did not overheat. Ironically, after the situation had been stabilized, the auxiliary feedwater pump was turned off and then its outlet valves were tested once again (see time-line above). On this occasion two of them failed. One hates to think what might have happened if they had failed when they were needed in the first place. Catastrophes occur when failures in one component of the system are compounded by failures in other components. But the word 'catastrophe' doesn't appear on the INES scale (not a word the nuclear industry likes to use). The highest classification, level 7, of which Chernobyl is an example, is 'Major Accident'. However, if we choose to employ labels in accordance with their commonly understood meanings, then I think everyone will agree that Chernobyl was a catastrophe and Mihama-3 was a serious accident.

In the Mihama-3 case, perhaps even more serious than the accident itself was the proof that it provided that the nuclear safety system in Japan is woefully ineffective. To understand this we need to take a look in some detail at the history behind the accident.

History

Mihama-3 is an old reactor. When it commenced operations, back in 1976, little was known about erosion and corrosion of the piping in nuclear power plants. The feedwater pipes in the secondary coolant system were expected to see out the life of the reactors (nominally 40

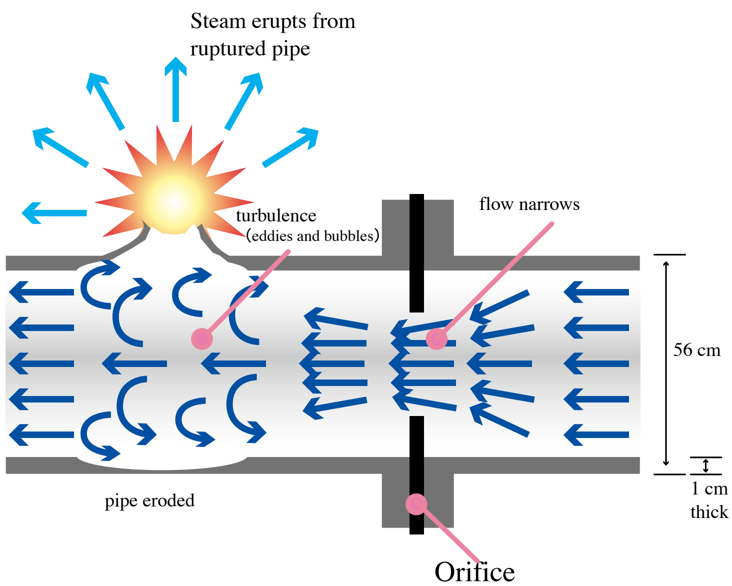
Figure 1
Mihama-3 condensate pipe rupture



years). However, a very similar accident to the Mihama-3 accident, which occurred in 1986 at the Surry-2 reactor, and the discovery in 1987 of serious thinning of pipes in the Trojan reactor (both in the USA) showed that this complacency was unjustified. The response of the Japanese nuclear industry and regulators, citing various differences between the situation in Japan and the US, was to say that it couldn't happen here. Nevertheless, the industry developed guidelines for checking pipes in the secondary coolant system.

These guidelines came into operation in 1990, although their implementation is voluntary, reflecting the low priority accorded to the secondary coolant system. The guidelines recommend various locations that should be checked. Of particular relevance to this case, they include locations within a distance of twice the pipe diameter from potential sources of turbulence. One such source is a so-called 'orifice' flowmeter (figure 2). The Mihama-3 pipe ruptured at almost exactly 2 diameters downstream from one of these. The orifice narrows the space through which the water flows and the pressure difference upstream and downstream of the orifice is used to measure the flow. However, it is recognized that the turbulent flow caused by the orifice increases the rate of pipe erosion, so the thickness of the pipe should be checked more regularly than other areas.

Figure 2:
Erosion/Corrosion induced Rupture downstream of Orifice



All PWRs in Japan were manufactured by Mitsubishi Heavy Industries (in partnership with Westinghouse). At the time the above guidelines were drafted Mitsubishi was also the prime maintenance contractor. Mitsubishi compiled a list of locations that it thought should be inspected, but for some reason the location where the pipe ruptured at Mihama-3 was not included on the list. Investigations since the accident have revealed that this same location was left off the list at four other reactors, including reactors owned by KEPCO, but also including reactors belonging to other power companies. It seems likely that the oversight at Mihama-3 was a generic problem with Mitsubishi's maintenance program. However, in the case of KEPCO, the problem was exacerbated by the fact that they changed the maintenance contract for all their nuclear power plants to their subsidiary, Nihon Arm Co Ltd, in 1996. (Other power companies continued with Mistsubishi.) By changing contractors they managed to achieve a considerable reduction in the contract price and in the outage time for periodic inspections, but subsequent developments suggest that the quality of service suffered.

Belatedly, Mitsubishi noticed that pipe wall thinning was proceeding more rapidly than expected in some locations and it warned Nihon Arm of this in 1999. Nihon Arm had already noticed in 1998 that the location in question had been left off the list at Takahama-4 and it picked this up at Mihama-1 in 2002, but it didn't notice at Mihama-3 until April 2003 and didn't alert KEPCO until November of that year. KEPCO evidently didn't see this as a priority, since it decided to keep the reactor running until the next periodic inspection. Unfortunately the pipe didn't quite make it.

A further irony is that in July of this year serious wall-thinning was found in pipes at another KEPCO reactor. Main feedwater pipes in the secondary coolant system of the Ohi-1 reactor had thinned to less than the regulatory limit. A report was provided to the regulatory body, the Nuclear and Industrial Safety Agency (NISA), which duly accepted KEPCO's explanation and gave it their rubber stamp. The location in question at Ohi-1 was actually not amongst those specified in the 1990 guidelines. This is just one of several pieces of evidence that the guidelines are inadequate. Nevertheless, the discovery at Ohi-1 should have been seen as a warning.

Lessons

If this is the history, what are the lessons that can be learnt from it? The first lesson is that NISA and the Japanese power companies don't learn lessons, certainly not ones that are likely to cost them money. Profits are consistently given greater priority than safety. One would expect this tendency to be even more pronounced in a competitive electricity market. This isn't to say, of course, that an absence of competition is preferable. Rather, it indicates how out of place nuclear energy is in a people-friendly, environmentally-friendly economy.

Most other lessons also ultimately impinge on cost. For example, inspections are based on the principle that 'sampling' (i.e. testing a representative sample of the total plant) can ensure safety. It would be prohibitively expensive to regularly inspect the total length of the piping (a few thousand kilometers). However, follow-up investigations from this case have revealed that (a) the rate of thinning is different in identical pipes in different reactors and in different sections of the same reactor, and (b) the rate of thinning is not consistent over time. Under these conditions the only 'safe' solution would be to inspect them all, but power companies and regulators balk at this suggestion. Indeed there is probably some truth in their argument that inspecting everything leads to a reduction in the quality of the inspections.

There are also many lessons to be drawn about institutional failure. The refusal to respond to warnings would seem to be an instance of such a failure with both specific and less readily definable causes. It has emerged that KEPCO draws up its inspection program at least six months in advance and is unwilling to alter it, even when new information comes to light. One reason is that obtaining new parts takes time. Obviously they don't want long and costly outages while they wait for new parts to arrive. This is a very specific and understandable, albeit unforgivable, failing. But few doubt that there are more amorphous cultural failings at work as well. There are no doubt national cultural issues involved, but presumably more significant is the culture of the 'nuclear club' and of the companies themselves, KEPCO, Nihon Arm and Mitsubishi (compare Mitsubishi Motors). We should be wary, however, of concluding that simply choosing better companies will solve the problem.

Some failures which could be thought of as institutional are perhaps better described as systemic failures, because they apply across the whole nuclear industry. One such example is the Japanese nuclear industry's subcontractor system. In the Mihama-3 case, around 400 subcontractors, sub-subcontractors, etc. were to be involved in the periodic inspection that was due to begin on August 14th. The employer of the injured workers, Kiuchi Instruments, was a sub-subcontractor. But there is nothing unique about KEPCO in this regard. Workers from sub(sub...)contractors to nuclear power companies are exposed to the dirtiest and most dangerous work. It is they who receive the highest radiation doses (97% of the Japanese nuclear industry's total dose), while the power companies do everything they can to avoid liability for damages incurred (see NIT 98 article re workers' compensation case). Clearly this system is a major problem. The question of how to address it is too big to deal with here, but suffice to say that simply shifting to a system where power companies do everything in-house is unlikely to solve all the safety, communication, and other problems associated with the subcontractor system.

The final failure that I will address is the area of regulatory failure. Again this can be considered as both an institutional and a systemic failure. The principal regulatory body, NISA, rubber-stamped KEPCO's report on pipe wall thinning at Ohi-1. Its parent, the Ministry of Economy Trade and Industry (METI), when it was still MITI, before NISA was created, concurred with the industry view that the problems discovered at Surry and Trojan couldn't arise in Japan. One might ask what the regulators are there for if all they ever do is endorse the industry view. I would argue that their real function is to provide an illusion of oversight to reassure the public, in order that the nuclear industry can continue to exist. That may seem cynical, but after this case, and considering the many other failures that have come to light in the recent past, the evidence justifying such a conclusion is there for all to see. The onus is on NISA and METI to prove that this conclusion is wrong, rather than on us to prove that we are right. I will go further. I will be so bold as to suggest that NISA has neither the skills nor the resources to adequately regulate and monitor the nuclear industry. If someone were to ask it now to conduct a thorough review in order to guarantee safety in the nuclear industry, it would be unable to do it.

Recommendations

There is still much that we don't know about the Mihama-3 accident. KEPCO refuses to publicly answer questions on the grounds that it is under criminal investigation. In this regard, we note that so far the only clear statement to the effect that charges will be laid relates to a breach of worker health and safety legislation. Penalties that may be incurred under this legislation are trifling. KEPCO should be tried for matters carrying heavier penalties, including professional negligence resulting in death and injury. This was a serious accident that resulted in death and injury to workers. It had the potential to lead to catastrophic damage and it was a result of serious (we believe criminal) negligence. The penalty should be accordingly severe.

Some other recommendations that logically flow from the above discussion include the following:

- In all reactors, inspect all pipes where serious wall-thinning could conceivably have occurred, not limiting the inspection to locations covered by the 1990 guidelines;
- Shut down reactors before sending workers in to make preparations for periodic inspections;
- Abandon the 'allowable defects standard', which came into effect last year in order to keep reactors operating, despite the fact that cracks have been discovered;
- Close down all old reactors.

But even if all these things were done, as long as the power companies prioritize profits over safety (which they always will do, because that's what keeps them in business) and as long as regulators are more committed to ensuring the future of nuclear energy than to ensuring safety (which they always will be, because they know that nuclear energy would become prohibitively expensive and technologically impossible if they really tried to make it safe) it still wouldn't be enough. So we are left, as usual, calling for an end to nuclear energy. In doing so, we find grounds for hope in the fact that the public's distrust of nuclear energy continues to grow, and we pray that people won't get panicked into choosing nuclear energy as a solution to global warming.

Philip White (Editor of NIT)

(1) The secondary system is associated with the turbine, as opposed to the primary system, which is associated with the reactor itself.
(2) The pipe which ruptured was made of carbon steel. Its external diameter was 560mm and it was located between the fourth low-pressure feedwater heater and the de-aerator, on the second floor of the turbine building.
(3) Altogether, there are three steam generators (A, B and C).
(4) Boron acts as a neutron absorber. By absorbing surplus neutrons it helps to prevent the reactor from going critical again.
(5) In fact, Japan is the only country to append '+' and '-' signs to its INES ratings. It only does this in the case of '0' ratings. INES ratings are determined by the country in which the accident occurs.

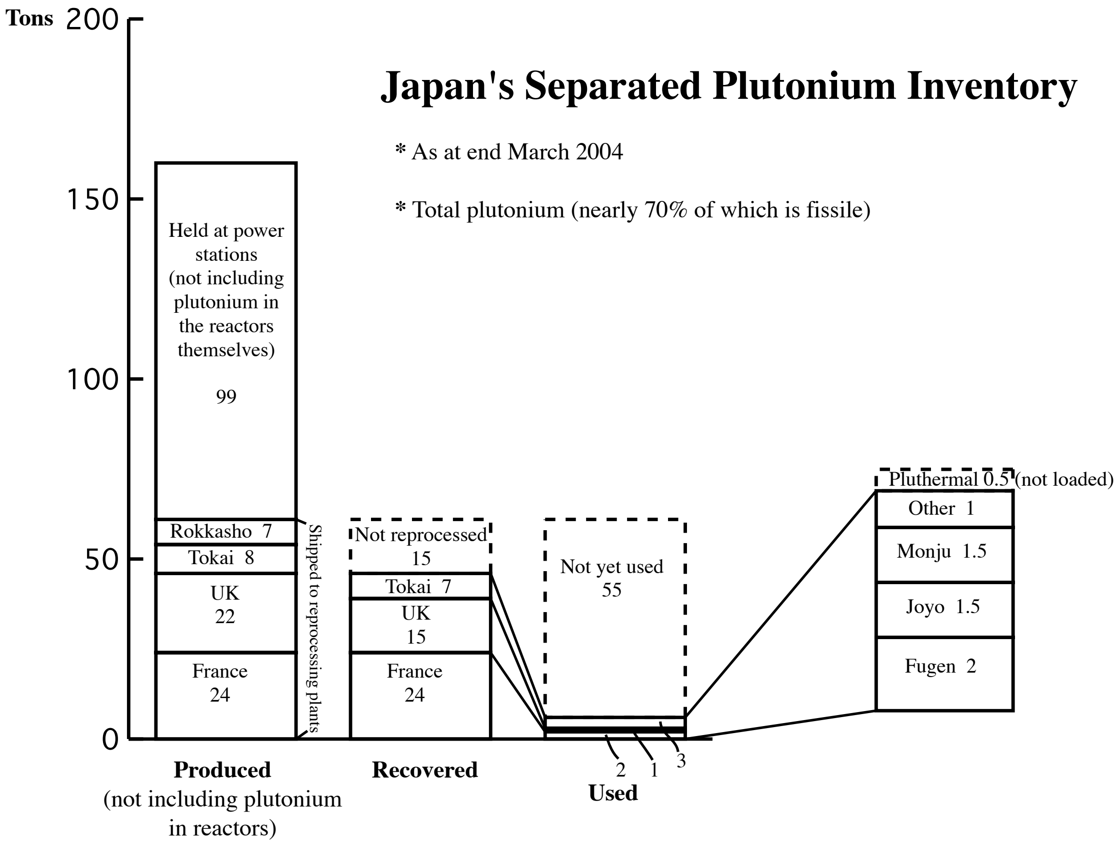
Data: Japan's Separated Plutonium Inventory

The data presented here is based on documents obtained by Tetsuo Inami, a Member of the House of Representatives. The data is for the 2003 business year (ended 31 March 2004). As long as data on plutonium has been published, CNIC has printed the data for calendar years (a different basis from this year's data) published by the Atomic Energy Commission, but the 2003 data isn't yet available.

The data was always published in July, but last year it wasn't published until September 2nd. This year it still isn't available as at mid September. Since 9.11, national emergency legislation has been proceeding apace and, as part of Japan's terror response policy, restrictions have been placed on visits to nuclear facilities by the general public. On the principle that seeing is believing, industry had actively promoted public tours, but now they can no longer do this. The delay in the publication of plutonium data must be related to this. In the past plutonium holdings at each plant were listed, but no doubt the publication of this type of detail is under review. The government had been open in reporting its use of plutonium, on the grounds that transparency would underwrite Japan's program of using nuclear energy for peaceful purposes. When the government publishes the latest data, we will be able to see what it is thinking about.

A scandal has arisen about South Korea's extraction of a few milligrams of plutonium twenty years ago. By comparison, a glance at this table will show that Japan has 7 tons of extracted plutonium at the Tokai plant, while 39 tons of Japanese uranium have been recovered overseas. The error in these figures is probably in the order of kilograms and at the moment there is no concrete plan for using this plutonium. Inevitably Japan's reprocessing policy will lead to increased tension in the Middle East and North East Asia. The Rokkasho Reprocessing Plant is currently scheduled to commence operations in 2006.

Hideyuki Ban (CNIC Co-Director)



JCO Criticality Accident: Five Years On

Five years have passed since the JCO criticality accident at Tokai Village. Two people died, compared to the five people who died in the Mihama-3 accident. At the time of the JCO accident Tokyo Electric Power Company (TEPCO) said it had nothing to do with them. Then came the TEPCO scandal (NIT 92 Nov./Dec. 2002). On that occasion it was Kansai EPCO which said it had nothing to do with them. But what everyone now knows is that the nuclear safety system leaks like a rusty bucket. We keep hearing that everything is OK because the government has rules in place and the power companies obey the rules, but it was all false, not just for JCO, but for TEPCO and KEPCO too.

Investigations into the Mihama-3 accident have only just begun. We won't know the details of the sequence of events that led to that accident for some time. However, in the case of the JCO accident, the investigations and the court case have finished (NIT 94, 97) and it is now possible to read the record of the investigations that were carried out and the evidence that was presented. The people quoted are mostly JCO workers and former workers, but workers from Japan Nuclear Cycle Development Institute[(1)] (JNC) are also quoted. Besides these records, there are also various documents from JCO, from the Science and Technology Agency, from JNC's predecessor the Power Reactor and Nuclear Fuel Development Corporation (PNC), and so on. The majority of these documents were not published during the Nuclear Safety Commission's investigations and this article picks up things that we have found out from reading them.

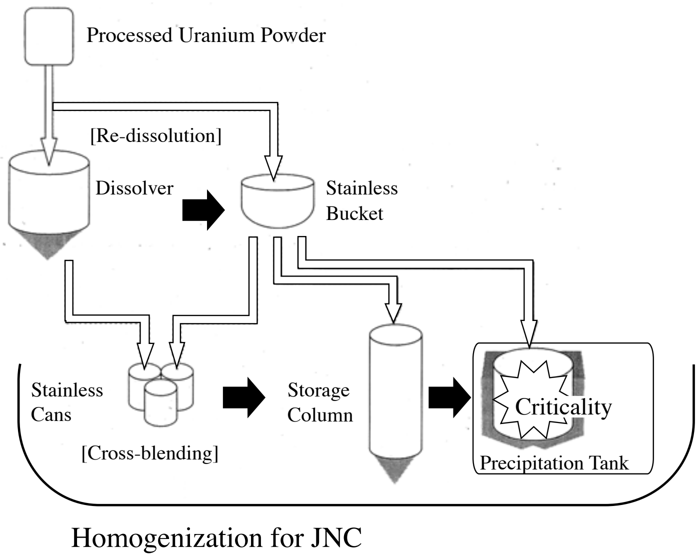
First I will deal with the safety screening process. The Conversion Test Plant, where the accident occurred, was built in 1979. Originally it was only used to produce uranium powder. In 1983 JCO applied for permission to raise the enrichment level and to produce a solution, whereas previously it had only been producing a powder. (It was while producing this solution that the criticality accident occurred.) It wanted to make this solution for PNC, but it turns out that the Science and Technology Agency (STA) officer in charge of the screening process was not really an STA man at all. He was a PNC man who had been seconded to STA for two years. In 1984, immediately after he approved JCO's request, he returned to PNC. One gets the feeling that he went to STA for the specific purpose of handling this case.

Only the raised enrichment level of the powder was considered during the screening process. The issue of producing a highly enriched uranium solution was not examined. It was stated in the application that a solution would be produced, but the production method was not mentioned. The Conversion Test Plant was designed to produce the powder form. It had no equipment for producing a solution. Therefore it was necessary to use equipment designed to produce a powder, even though the high uranium concentration of the solution meant that it was likely to go critical[(2)]. But this is what the government (STA) approved. The workers wouldn't have used equipment meant for a powder if proper equipment had been available. They wouldn't then have been forced to resort to irregular procedures.

This uranium solution (uranyl nitrate) was used to make fuel for PNC's Joyo. It was mixed with a plutonium solution from the Tokai Reprocessing Plant, then removed from the nitrate solution and made into MOX (mixed oxide) fuel. Joyo was an 'experimental' reactor that was used to perform experiments for the Monju prototype reactor. If experiments burning fuel in Joyo were delayed, the schedule for Monju would also be delayed[(3)]. So the abovementioned safety screening process was rushed and a thorough investigation was never done. From the point of view of safety, approval would never have been given. The key issue then was this Monju-Joyo-JCO hierarchy.

The safety inspection was carried out in the early '80s, but in the early '90s JCO was again influenced by Monju. The MOX fuel for Joyo and Monju was produced at the same factory, so fuel couldn't be made for Joyo at the same time as fuel was being made for Monju. PNC first made fuel for Monju in 1989. However problems arose which doubled the time taken to produce the fuel.

Transition to Catastrophe



*Based on a figure by Nuclear Safety Commission

As a consequence the schedule for producing fuel for Joyo was delayed and this delay flowed on to JCO's schedule for producing the uranyl nitrate solution. It was in 1993 that JCO started using its infamous stainless steel buckets for redissolution. Then in 1995 it started to use the storage column for the homogenization process, even though the storage column was not intended to be used for that purpose. (See diagram.)

However at the time of the accident they were trying to homogenize the solution in the Precipitation Tank, instead of the Storage Column. Why? The reason wasn't understood until recently, but it now seems that it was related to STA's tours of inspection. In order to carry out homogenization in the Storage Column, given that it was not designed for that purpose, it was necessary to fit an improvised pipe. But this was illegal, so they couldn't let STA see it. By using the Precipitation Tank instead, since homogenization could be carried out without fitting a special pipe, it was possible to avoid fitting and removing the temporary pipe every time an STA inspector visited. (Of course the Precipitation Tank wasn't meant to be used for this purpose either.) This, according to the worker who survived the accident, was one of the reasons why the Precipitation Tank was used. But whereas the Storage Column was protected from going critical by geometrical control(4), the Precipitation Tank was not so protected. Thus the catastrophe occurred.

These things have come to light as a result of the court case. Finally I will touch on a problem that has arisen since the court case, namely the preservation of the equipment in the Conversion Testing Plant (see NIT 97). The site of the accident is now under threat. As long as the court case continued this equipment was protected, but it has now been returned to JCO, which plans to dismantle the Precipitation Tank and so on, load it into drum cans and dispose of it as radioactive waste. Once this happens, we will no longer be able to carry out investigations into the causes of the accident at the site itself. The Mayor says it should be preserved, but the village council supports the plan to dismantle it. They say that in place of the real site a replica will be constructed. However we believe that the site should be preserved. It is necessary to preserve the site so that people don't forget the lessons of the criticality accident. Otherwise the nuclear safety system will remain, as described at the beginning of this article, a rusty bucket.

Satoshi Fujino (CNIC)

(1) JNC (previously PNC) is the government funded research and development organization that owns the Joyo experimental fast reactor. The accident occurred while JCO was producing a uranyl nitrate solution to be used to make fuel for Joyo.

(2) It was necessary to process the uranium in small batches in order to prevent it from reaching critical mass. But JCO didn't want to do this. It only said that it would do so in the written documentation.

(3) Monju was then, and is now still, officially 'under construction'. Trials were conducted for almost two years until the 1995 Monju accident, since which time it has not operated.

(4) Geometrical control means that the dimensions of the container are designed so that it is physically impossible for the contents to go critical (assuming the enrichment level does not exceed the design limit).

Group Introduction:

Nagano Soft Energy Resource Center

'A meeting place for people thinking about and taking action on energy and environment issues.'

By Hiroshi Miwa'

Based in Suzaka City, Nagano Prefecture, the Nagano Soft Energy Resource Center was originally formed in March 1991. At the time it was called the People's Research Institute on Energy and Environment Nagano Resource Center. It was originally formed to act as a place to hold books and documents accumulated by the Tokyo-based People's Research Institute on Energy and Environment (PRIEE). PRIEE's President was the late Nobuo Matsuoka. He became friends with the late Shizuko Sakata when they were both working on nuclear energy isues and her group offered a place to house these materials. Rather than simply arranging the materials and enabling people to read and borrow them, the group decided to try to become a meeting place for people thinking about and taking action on energy and environment issues. Nobuo Matsuoka and Shizuko Sakata have both passed away, but we think of them as the parents of the Nagano Resource Center. Originally we received funding and other support from PRIEE, but we are now independent and we changed to our current name in April last year.

Our work covers the whole of Nagano Prefecture and we have members from all over Japan, but Nagano is a very big prefecture, so most participants in our activities are based in the northern part of Nagano. At the moment we have forty 'supporting members' and eighty 'cooperating members', while ten or so people handle planning and management.

Our main focus is on 'producing and using soft energy'. We are also interested in energy conservation, but our focus is on small-scale distributed renewable energy systems. We are engaged in both research and practice relating to ordinary people using energy that they have produced themselves. We share an interest in protecting the global environmental, and most of our members want Japan to give up its dependence on nuclear energy. They see shifting to renewable energy

and direct confrontation with nuclear energy as complementary approaches. Our focus on soft energy is an expression of that view.

The year after forming the group, using funds raised from members and others, we set up three home made solar panels (105W) on the roof of our office. Over the last ten years it has been possible to connect home power systems to the grid. Also there has been a government support scheme for such systems. Over that period a large number of members have set up solar panels on their homes. We have also demonstrated energy production using solar panels and solar hot water systems at environment fairs held by Nagano Prefecture, Nagano City, Suzaka City, and so on.

Renewable energy systems must be adapted to the specific conditions in the area where they are used. For this reason we see the role of local government as being particularly important. We conduct surveys of the local conditions and also of public opinion, targeting them at the prefectural assembly and local councils, and lobby them to introduce renewable energy systems. Bringing together the results of our surveys, in 1998 we produced a 'Nagano Soft Energy Map'. At the time it provided ground-breaking information. We regard it as one of our major achievements. More recently, along with other environment groups, we have held 'Soft Energy Round Table Meetings' throughout Nagano Prefecture. We also did a survey of suitable locations for micro-scale hydro systems in the Suzaka area and we plan to build a people's hydro-electric power plant.

Hiroshi Miwa is Management Committee Representative of the Nagano Soft Energy Resource Center

NEWS WATCH

Surprisingly Low Peak Demand

In Japan an unprecedented heat wave gripped the entire country this summer. On July 20th Tokyo recorded 39.5 degrees Celsius, the highest temperature since observations began. Tokyo Electric Power Company's (TEPCO) peak power demand for the summer was 61.5 GW. It was, however, not the highest ever. It was only seventh, lower by 2.8 GW than the 64.3 GW recorded on 24 July 2001. TEPCO had estimated that peak demand during an extreme heat wave would be 64.5 GW. In fact, even though the temperature exceeded the estimate, electricity demand was far below what had been predicted.

In terms of the total national demand of the ten power companies, 20 July came in top at 174.3 GW, but this figure was still 8.1 GW lower than the 182.4 GW of three years earlier. So in spite of the heat spell and the economic recovery, peak demand did not increase. There were only three days, including 20 July, during this summer period when TEPCO's peak demand exceeded 60 GW per day.

Surprised at this strange state of affairs, TEPCO is said to be analyzing the reasons. Conceivable factors include: a 1.2 GW reduction in demand as a result of progress in deregulation of the electric power industry; lower than usual humidity during these hot spells; the spread of energy-saving appliances; and a greater awareness of energy-saving.

Peak demand has been brought under control. That is to be welcomed. However, there is a trend for power consumption at night and on holidays to not been as low as in the past. In terms of peak demand, TEPCO was unable to set a new record, but it sold 26.3 TWh of electric power in July, the highest ever for the month of July. Hokkaido Electric Power Co. saw the extraordinary situation where the highest power consumption in a single day during the summer season was not on a weekday, but on a Saturday (24 July).

This may be good news for the power companies, but from an energy-saving viewpoint, new measures are required.

High Burn-Up Fuel for Ikata Nuclear Power Plant

On August 4th and 6th respectively, 44 fuel assemblies (40 of which were Step II high burn-up fuels) were delivered to Ikata-1 (PWR, 566 MW) and 58 fuel assemblies (52 of which were Step II high burn-up fuels) were delivered to Ikata-3 (PWR, 890 MW). (Ikata Nuclear Plant is located in Ikata Town, Ehime Prefecture.) Those delivered on the 4th were from Mitsubishi Nuclear Fuel Co. Ltd.'s main plant in Tokai Village, Ibaragi Prefecture, and those on the 6th were from Nuclear Fuel Industries Ltd.'s Kumatori Plant in Kumatori Town, Osaka Prefecture. Further details of the delivery are not known. The transport itself was done secretly, without informing the local people.

The uranium enrichment level of Step II high burn-up fuels is 4.8% (Step I is 4.1% and earlier fuels are 3.4%) and the limit for the highest burn-up is 55.GWd/t (48 GWd/t for Step I and 39 GWd/t for earlier fuels). The Ikata-1 fuels will be loaded during the periodic inspection which began on 5 September. Since the effectiveness of the control equipment is lowered with the introduction of high burn-up fuel, control rods will be increased from 29 to 33 and a tank will be installed to hold the extra boric acid solution that will be needed. Also, the fuel cladding will become more prone

Cartoon by Shoji Takagi

to breaking. It is claimed that fuel cladding materials have been improved to cope with this problem.

Step II high burn-up fuels are also planned for Kansai Electric Power Company's Ohi and Kyushu Electric Power Company's Genkai Nuclear Plants. All of these reactors are PWRs, but high burn-up fuels are also being promoted for BWRs, with Step III fuels (uranium enrichment 4.9%, highest burn-up limit 55 GWd/t) already in use.

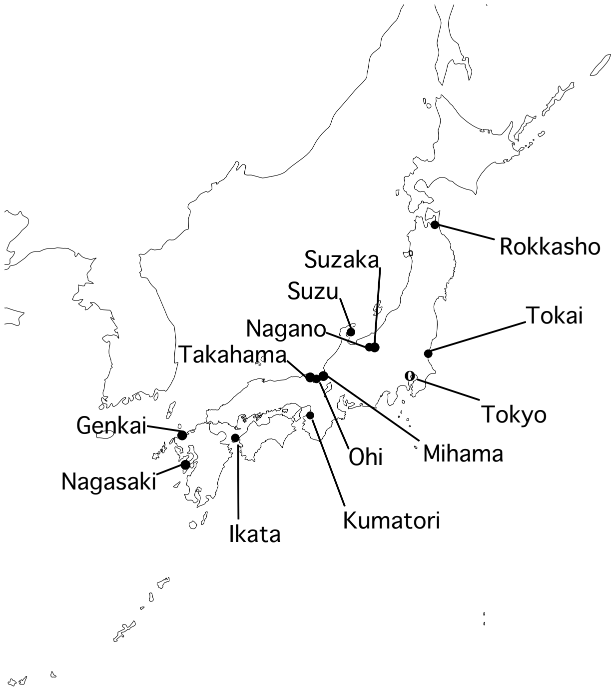
Also, the pluthermal project is progressing at both Ikata and Genkai nuclear plants. High burn-up fuels and the pluthermal project are different in their aims and details, but in regard to the technical dangers involved they have many things in common. There is a grave concern that when the risks of these two projects are combined, they will become even more dangerous.

2.7 Billion Yen "Apology Money" to Suzu City

Three electric power companies, Kansai, Chubu and Hokuriku, announced on August 27th that they would contribute a total of 2.7 billion yen (900 million yen each) to Suzu City, Ishikawa Prefecture, as 'apology money' for failing to construct planned nuclear power plants. The donation was announced under the name of a 'regional promotion fund'.

Where's that place

Map showing places mentioned in this NIT



Questionnaire: Thanks to those people who responded to our questionnaire. We value your comments highly. Some suggestions will take time to implement, but one change you might have noticed is that we have added a page to our web site with links to articles in the commercial media. Thanks to Damien Andrew for that suggestion. Most of the links will relate to Japanese or Asian nuclear issues, but sometimes we will include links on other issues. (P.W. ed.)

Nuke Info Tokyo is a bi-monthly newsletter that aims to provide foreign friends with up-to-date information on the Japanese nuclear industry as well as on the movements against it. Please write to us for a subscription (Regular subscriber - $30 or ¥3,000/year; supporting subscriber $50 or ¥5,000/year). When paying in Japan, the subscription fee should be remitted from a post office to our post office account No. 00140-3-63145, Genshiryoku Shiryou Jouhoushitsu. Due to costly processing fees on personal checks, when sending the subscription fee from overseas, please send it by international postal money order. We would also appreciate receiving information and newsletters from groups abroad in exchange for this newsletter.
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