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Citizens' Nuclear Information Center

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No future for Kashiwazaki-Kariwa except gradual decommissioning

1.) Introduction

At the end of September, Tokyo Electric Power Co. (TEPCO) filed an application for safety inspections of Units 6 and 7 at its Kashiwazaki-Kariwa Nuclear Power Station (KKNPS) in Niigata Prefecture with the Nuclear Regulation Authority (NRA), seeking the restart of the two reactors. This is the first time that an application for safety assessments of boiling water reactors (BWR) has been submitted to the nuclear watchdog.

TEPCO insists that the reactivation of the two advanced boiling water reactors (ABWRs), with an output of 1,356 MW each, would greatly contribute to the financial rehabilitation of the power utility. Niigata Prefecture Governor Hirohiko Izumida previously criticized TEPCO for attaching greater importance to business than to safety of the prefectural residents' lives. He therefore did not approve the utility's filing of the application at the time.

The Japanese public does not support TEPCO's stance. The governor has maintained that the first thing the company should do is thoroughly examine the Fukushima nuclear accident from the dual viewpoints of equipment failure and human error.

Without completing a full-fledged examination of the nuclear accident, who can devise measures for the safe management of nuclear plants? Should a severe nuclear accident, like the one that occurred in Fukushima, happen again, how can the local residents prevent exposure to radiation, and how can they evacuate?

There has been strong criticism of TEPCO's recent move to seek reactivation of the KKNPS, not only in the groups calling for Japan's departure from nuclear power generation, but also among groups seeking the restart of nuclear power generation.

They question whether the utility has sufficient resources for reactivation of the Niigata plant amid the current plight where both disposal of the radioactive water leaking from the Fukushima plant and the clean-up operations after the nuclear accident are facing great difficulties, and the company is taking makeshift, half-measures to address these problems. The prospect of decommissioning the crippled Fukushima plant, believed to require 30 to 40 years, remains bleak. This is because the decommissioning of the Fukushima plant is an unprecedented operation that has never been experienced before.

Since the Niigata Chuetsu-oki Earthquake occurred in July 2007, residents of Niigata Prefecture have discussed the safety and resilience of the KKNPS jointly with prefectural government officials and with the help of experts critical of nuclear power generation. Of the seven nuclear reactors at the plant, Units 2, 3 and 4, are still under discussion and have been off-line since 2007.

When the Fukushima nuclear accident occurred on March 11, 2011, the four reactors at the Niigata plant that had been reactivated after the Chuetsu-oki earthquake (in order: Units 7,

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6, 5, and 1) were again shut down. Under the current circumstances, the chances of restarting the reactors at the Niigata plant, including the above-mentioned four units, is very slim and the likelihood of the plant's closure is becoming stronger.

Even if Unit 7 clears the official safety inspection, TEPCO is required to obtain consent to operate the reactor from local residents. This means that a majority of the residents of Kashiwazaki City and Kariwa Village, where the nuclear plant is located, must agree to the reactor reactivation plan in the first place, and then the mayors of the city and the village must approve the plan by reflecting the opinions of local residents. In the final stage, the Niigata Prefecture Governor must endorse the plan. The governor will make his decision based on the result of the discussions by Niigata Prefecture's technical committee on the safe control of nuclear power plants, the committee's consent being a prerequisite for the governor's endorsement.

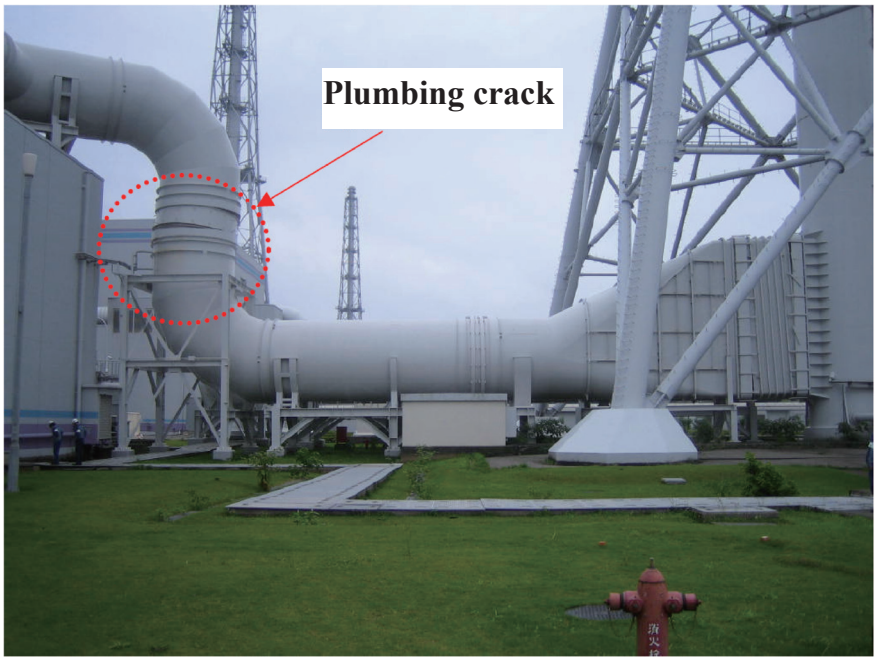
2) Unique Niigata Method

Niigata Prefecture has three technical committees that are evaluating the safety of KKNPS. The above-mentioned technical committee is comprised of 17 members and was organized in the summer of 2002, in the wake of revelations concerning TEPCO's falsification of safety inspection reports. Under this committee, there are two subcommittees, the Subcommittee on Earthquakes and Ground Conditions (six members) and the Subcommittee into Equipment Integrity, Earthquake Resistance and Safety (eight members). These two subcommittees were set up after the 2007 Chuetsu-oki earthquake. They conduct more detailed discussions and examinations than the technical committee, to which the results of their discussions are reported. The technical committee makes a comprehensive judgment taking subcommittee reports into consideration. The governor makes his decision based on the judgment of the technical committee, and from the viewpoint of protecting the lives, safety and assets of the people of Niigata Prefecture.

An important feature of the technical committee, and especially the two subcommittees, is that they include among their members some academics who are critical of nuclear power and do not belong to the so-called 'nuclear village' of people in the government, academia and the power industry. There are currently no other official committees like this in Japan. This is why it is called the Niigata Method. Behind this, there seems to be a historically-accumulated, deep-seated distrust of the central government and TEPCO among the Niigata Prefectural government employees and local residents.

In Niigata Prefecture, three organizations of local residents have been waging opposition campaigns against the KKNPS since 1968. A group seeking transparency of information on KKNPS joined the movement in 2003, and in 2008, another group was organized for protecting local people's lives and hometowns from the nuclear power plant. These two groups have been working actively and tenaciously.

KKNPS was hit hard by the Chuetsu-oki earthquake and suffered serious damage in more than 3,000 locations. Concerned about this, in August 2007 a number of scientists and engineers established a group calling for the closure of the nuclear power plant. Other experts from all parts of Japan are participating in this group, which continues to hold scientific and technological discussions on the plant from a critical point of view. The group is presenting its opinions to the Niigata Prefectural government, local residents, as well as to the national government. Even if TEPCO is eager to restart reactors at KKNPS, there is little chance of realization of this plan.



Plumbing crack at KKNPS that occurred during the Niigata Chuetsu-oki Earthquake in July 2007. Photo by TEPCO

One-meter ground subsidence at KKNPS that occurred during the Niigata Chuetsu-oki Earthquake. (Reported in the 20 questions and answers on why KKNPS must not restart.)

3) New NRA standards do not assure the safety of nuclear plants

TEPCO says it has applied for NRA inspections because it wished to have a third party check of the safety of the reactors. It is questionable whether NRA is truly a third-party organization, but let's leave this issue aside here. Even if the reactor met the NRA requirements, this does not necessarily mean that the reactor's safety was guaranteed, because the new safety rules are extremely deficient.

The most problematic point about the new NRA rules is that they do not require the plant operator to assess the plant's location. The safety rules compiled by the former Nuclear Safety Commission (NSC) provided that the cumulative radiation exposure of local residents in the surrounding areas should be held below 250 mSv annually, even if a severe nuclear accident occurred and radioactive substances were released into the local environment. To clear this requirement, the reactors should be constructed in locations far from residential areas. The NSC rules, however, did not take the release of cesium into consideration. Only discharges of noble gases were taken into account because the meltdown of the nuclear fuel in the reactor core and the destruction of the containment vessel were not assumed at that time.

NRA Chairman Shunichi Tanaka has said that core meltdown has now actually occurred in the Fukushima nuclear plant and it is therefore evident that no nuclear power plants in Japan can meet this location requirement. NRA thus worked out a new rule that the maximum permissible amount of cesium emitted from the reactor with a filtered venting system should be held below 100 terabecquerel (TBq). Although the amount, 100 TBq (10^{14} Bq), is roughly one percent of the total amount of cesium discharged from the Fukushima nuclear plant, the problem is that in the calculation of radiation exposure of local residents the new rule does not include the amount of noble gases, such as iodine, xenon, krypton, that pass through the filtered venting system.

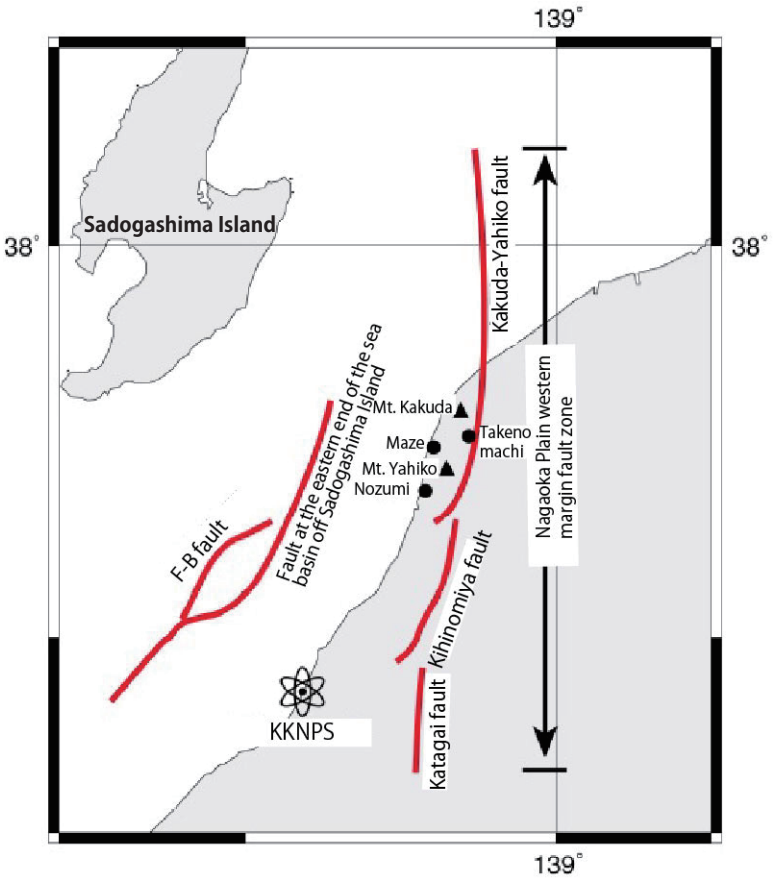
The calculation by Koichi Takitani, member of the Citizens' Committee on Nuclear Energy, has revealed that the accumulated exposure to noble gases from Unit 6 would reach 2,300 mSv annually on the border between the plant and its surrounding areas if a major accident were to occur at the plant and 100 percent of the noble gasses passed through the filtered venting system and escaped to the area outside the plant. Should such a great amount of irradiation occur, the residents in the surrounding areas would have little option but to evacuate.

4) Will residents consent to restarts despite exposure risks?

Two years and nine months have already passed since the disastrous accident at the Fukushima nuclear plant. Yet nearly 160,000 people still continue to be sheltered in uncomfortable surroundings. How many of them will eventually be forced to give up their hopes to return to their hometowns where they were born and grew up? It is also certain that another nuclear accident will occur at sometime in the future.

During the past 30 years, a total of five reactors have had severe nuclear accidents, one at the Three Mile Island Nuclear Power Plant in the U.S., one at the Chernobyl Nuclear Power Station in the Ukraine, in the former Soviet Union, and three at the Fukushima Daiichi Nuclear Power Station. This means that a severe accident has occurred, on average, once every six years. Given this situation, the new NRA rules require nuclear plant operators to install filtered venting systems in all reactors, thereby assuming that a similar severe nuclear accident would occur again.

However, to conduct emergency venting means that the residents would be exposed to radiation. Niigata Prefecture Governor Hirohiko Izumida led the anti-nuclear disaster drill on March 23, 2013, based on the assumption that such an emergency could happen again.



Major active faults near KKNPS
(Reported in the 20 questions and answers on why KKNPS must not restart.)

In the case of KKNPS, 16,500 people are living within the 5-kilometer radius of the plant from which immediate evacuation is required if a major nuclear accident occurs, 82,000 people live within a 10-kilometer radius, and 435,000 people within a 30-kilometer radius, known as the Urgent Protective Action Planning Zone (UPZ), where plans need to be made for residents to stay indoors or evacuate safely if radiation levels exceed certain levels. 1.13 million people are living within a 50-kilometer radius of the plant,.

If all the people living within the 5-kilometer radius should evacuate immediately after a severe accident, 330 large (50-seat) buses would be necessary. But it would be impossible to deploy such a large number of buses immediately. Four hundred local residents took part in the emergency drill held on March 23, and some of them were to be taken by bus to the pre-selected evacuation area 20 kilometers away However, it was difficult for them to get onto the highway due to a traffic jam, and they had no choice but to give up the drill and eat lunch in the bus. The residents returned home in the evening. Consequently, the drill was totally unrealistic.

When the nuclear accident occurred in Fukushima, local residents living within a radius of 50 kilometers were forced to evacuate. After such bitter experiences, do the local residents really approve of the reactivation of the Niigata nuclear power plant?

5) Nuclear power plant floating on 'cheese fondue'

In 1968, when the plan to build KKNPS was proposed, local residents were sharply critical, citing the fragility of the land at the planned construction site, which was previously an oil-field. They staged opposition campaigns, claiming that the plan calls for construction of a nuclear plant on land as soft as *tofu* bean curd.

In December 2008, an official meeting to explain about the status of damage in KKNPS to local residents was held in Kariwa Village. On that occasion, Chairman Haruo Yamazaki of the Subcommittee on Earthquakes and Ground Conditions said the nuclear power plant looks as if it is floating on 'cheese fondue,' but added that it is technologically possible to construct a nuclear power plant on such soft land. His comment drew a loud chorus of boos and catcalls.

When the Chuetsu-oki earthquake hit Niigata, the reactor buildings were jolted by a quake nearly four times as strong as that assumed in the design standard. Since then, the buildings have suffered uneven, upward and downward displacements. The reason why this is happening is still unknown. Another major source of concern is that the resilience of the ABWR recycling pump motor casing was proved to be almost the same level as that of the design standard and the pump barely endured the Chuetsu-oki earthquake.

There is no guarantee that the Niigata Nuclear Power Plant could withstand the 7.5 magnitude earthquake that could occur when the fault at the eastern end of the sea basin off Sadogashima Island in Niigata Prefecture slips. If we wish to prevent a recurrence of the disastrous nuclear accident at Fukushima, there is no option but to decommission KKNPS.

(Yukio Yamaguchi, Co-director of CNIC)

The Hydrogen Explosion in Fukushima Daiichi Unit 1 Nuclear Reactor Building Occurred on the 4th Floor, Not the 5th!

—Possible Small-Break LOCA in IC Pipes from Powerful Seismic Motion—

Mitsuhiko Tanaka

Science journalist and former member of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC)

Two Important Mysteries Remain Unresolved

On August 27 of this year, I sent a letter of request titled "Regarding continuation of the investigation into causes of the accident at the Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company, and execution of the on-site inspection by the Diet centered on the 4th floor of the Unit 1 reactor building (request)" by fax and mail to Bunmei Ibuki, Speaker of the House of Representatives, and Masaaki Yamazaki, Chair of the House of Councillors. In addition, I held a press conference at the Diet Office Building with attorney Yoshinori Ito, who had, as a cooperative member of NAIIC, worked with me for half a year in the same NAIIC working group.

In fact, on February 7 of this year, Mr. Ito and I sent letters to the then speakers of both houses, requesting the Diet to conduct the on-site investigation of the 4th floor of the Unit 1 reactor building of Fukushima Daiichi Nuclear Power Station (FDNPS). This was because we knew that TEPCO had stonewalled the very investigation NAIIC was planning to perform.

However, even though we have requested an on-site inspection of the 4th floor of the Unit 1 building twice within a half year, there has been no response from the Diet, nor has the inspection been conducted.

One year has already passed since the Diet's investigation into the accident was dissolved, but there is now more reason than ever, of course, for our sticking to the 4th floor of the Unit 1 building. It appears there is a possibility that the prolonged violent seismic motion due to the earthquake (March 11, 2011) damaged the emergency isolation condenser (IC) pipes located in the 4th floor, causing a small-break LOCA (loss-of-coolant accident). The issues we are being particular about are not limited to that, however. There is one more major item. That is the matter of whether or not it was really the tsunami that caused the so-called "Station Blackout" (SBO: loss of all AC power to a nuclear plant). In fact, the results of the most recent detailed investigation and analysis by Mr. Ito into Unit 1, in particular, lend strong credence to arguments that the cause of the SBO was "something else," and not the tsunami.

The September issue of the monthly Science Journal *Kagaku* (Iwanami Shoten, Publishers), released on August 26, carried Mr. Ito's disquisition on the connection between the tsunami and SBO[(1)], and my own disquisition[(2)] on the 4th floor of the Unit 1 building. These two disquisitions constitute "our current thoughts" on the above-mentioned unresolved issues. On the basis of these two disquisitions, as stated above, on the next day (August 27), we made a request to the speakers of both houses for an on-site inspection of the 4th floor of the Unit 1 building as a continuation of the NAIIC investigation.

In an explanation and discussion of the SBO problem by Mr. Ito himself, broadcast live over the Internet by CNIC, he gave the view that the SBO at "Fukushima Daiichi Nuclear Power Station Unit 1 was not caused by the tsunami."[(3)] Due to limited space, I cannot include the details here, but regarding the above-mentioned "something else," a former GE nuclear engineer by the name of Satoshi Sato has an interesting hypothesis, in relation to which, important questions are posed regarding the new regulatory requirements.

Thus, in order to reflect the latest dispute regarding the tsunami and SBO, I will present my own hypothesis below on what occurred on the 4th floor or the Unit 1 building.[(4)]

Water Leakage Phenomena and the Possibility of an SR Valve Non-function

The NAIIC report[(5)] does not mention the possibility that the IC pipes may have broken due to seismic motion or that a loss-of-coolant accident (LOCA) may have occurred. Personally, however, during the NAIIC investigation, I was thinking that there had been a small-break LOCA with small cracks developing in the piping directly connected to the IC units on the 4th floor of the reactor building due to the prolonged violent seismic motion, which continued for several minutes, causing reactor coolant to shoot out from them (and basically, my thoughts on this have not changed). In fact, there were at least two events at the scene that would lead one to think that way.

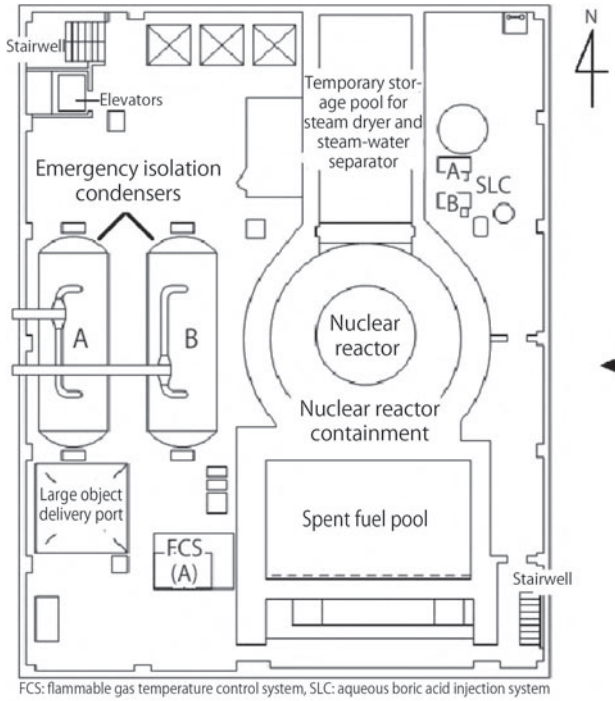


Fig. 1 *Fourth floor plan of Fukushima Daiichi NPP Unit 1 reactor building (prepared by the Citizens' Nuclear Information Center, based on figures appearing on TEPCO's website).*

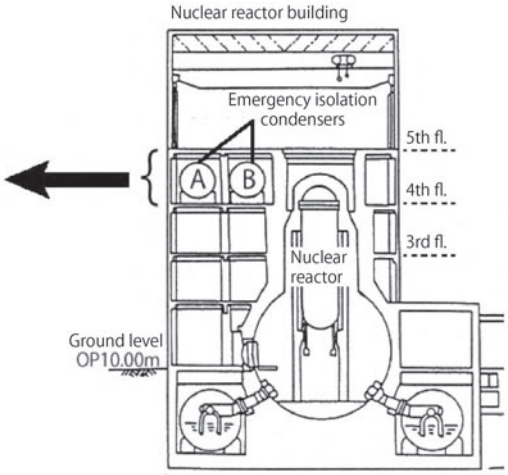


Fig. 2 *East-west elevation plan of Fukushima Daiichi NPP Unit 1 reactor building (prepared by the Citizens' Nuclear Information Center, based on figures in documents for application for permission to make changes in the arrangement of the nuclear reactor)*

The first is that "water leakage phenomena," with water suddenly gushing out from somewhere, did occur right after the earthquake on the 4th floor of the Unit 1 building, where the IC units were located. This leakage was witnessed by several employees who happened to be working on the 4th floor at that time.

The second is that there is no evidence whatsoever that the main steam release safety valves (SR valves) functioned—i.e., it is possible that they didn't work at all. An SR valve is a device for reducing pressure in a nuclear reactor by releasing steam, automatically or by manual operation, from within the reactor to the outside, but particularly in the case of the Mark I type containment vessel used in FDNPS Units 1 to 5, which has a doughnut-shaped pressure suppression chamber, when an SR valve operates, "hydraulic dynamic loading," a large dynamic force, is known to occur in the pressure suppression chamber, and I imagine that it would produce a violent vibratory noise in the chamber. In fact, in Units 2 and 3, SR valves began functioning frequently about ten minutes after the earthquake, and when they did, it sounded like the earth rumbling, audible as far away as the Central Control Room, as was learned from the testimony of several operators.

We also learned from a questionnaire survey conducted by the NAIIC that noise from the operation of SR valves could be heard at Onagawa NPS Units 1 and 3, which have an improved version of the same Mark I containment model (Unit 2 was off-line for periodic inspections).

In the case of FDNPS Unit 1, however, we learned from interview surveys with the workers during the NAIIC investigation that not one person among the workers heard the sound that an operating SR valve would have made. In the case of Unit 1, SR valves would normally have been operating repeatedly right after a tsunami, but nobody heard the sound that would have accompanied them. The hypothesis that perhaps by chance they couldn't hear them because they were drowned out by other noise nearby does not stand up to scrutiny. The plant suffered a complete loss of electrical power after the tsunami hit, and the workers testified that Unit 1 was engulfed in darkness and silence.

If any of the SR valves of Unit 1 were not functioning, it indicates that one pipe or another into or from the reactor (e.g., an IC pipe) had been damaged by the earthquake jolts, and the coolant leaking from it reduced the pressure so that the pressure inside the reactor never rose as high as would be expected, and one could surmise that as a result the SR valves did not function.

The water leakage phenomena and possible non-functioning, or lack of necessity to function, of the SR valves by themselves, however, do not provide enough evidence to lead inevitably to the conclusion that a small-break LOCA might have occurred in the IC pipes due to seismic motion. More direct evidence or further proof is needed to draw such a conclusion.

The Missing Heavy Steel Cover of the Equipment Hatch Provides Evidence that the Hydrogen Explosion at Unit 1 Occurred on the 4th Floor

Late last year I became aware that further proof of a small-break LOCA in the IC pipes had been found. During the NAIIC investigation, and after it was dissolved, I happened to see on my computer numerous times the motion videos taken by cameras surveying the interior of the 4th floor of the reactor building (videos that had all been shot by TEPCO and released on TEPCO's website), and that provide the evidence.(6)

TEPCO investigated the 4th floor of the Unit 1 building several times, and each time they recorded scenes of violent destruction of the 4th floor interior in their survey videos (Photos 1 and 2). TEPCO gave the following explanation on what could have caused such violent destruction in its final report published in May of last year.(7)

On the fourth floor of the R/B where the IC main unit is installed, there was a hole on the north ceiling due to the hydrogen explosion on the fifth floor, and removed insulation and debris were scattered on the north side of the top portion of the IC thought to be caused by the explosion's blast. The insulation on the south side of the IC was severely torn and removed on the R/B equipment hatch side (opening). It is considered that the hydrogen explosion on the fifth floor blasted through the opening and damaged the insulation on the IC. No insulation on the third or second floor was removed or scattered.(author's italics)

In other words, TEPCO's conclusion is that all of the violent destruction of the 4th floor interior was caused by the blast from the hydrogen explosion on the 5th floor.

For example, the explanation in the excerpt above says, "***The insulation on the south side of the IC was severely torn ...***" Indeed, Photo 1 shows the metal cover and insulation on the IC units (cylindrical tanks) had been violently stripped off. TEPCO adds the explanation that this occurred because of the blast from the hydrogen explosion on the 5th floor passing through the opening (equipment hatch). Such a case, however, would have been impossible, as explained below.

The opening described in the explanation is a square-shaped hatch with sides of about 5 meters each on the floor of the 5th storey (i.e., the 4th storey ceiling). This hatch is used when delivering large pieces of equipment or materials, so it is often simply called an "equipment hatch," but when it is not in use, it is covered with a steel lid (weighing about 1.5 tons), as shown in Photo 3, to prevent falls. Also, during the NAIIC investigation, we confirmed that the equipment hatch had been in use shortly prior to the earthquake, but had been closed, according to veteran workers, after the delivery operations had finished, just a little before the earthquake.

Photo 1*: The two IC units (4th fl., Unit 1 bldg.)*

Photo 2: *Immense destruction on the 4th floor of the Unit 1 building.*

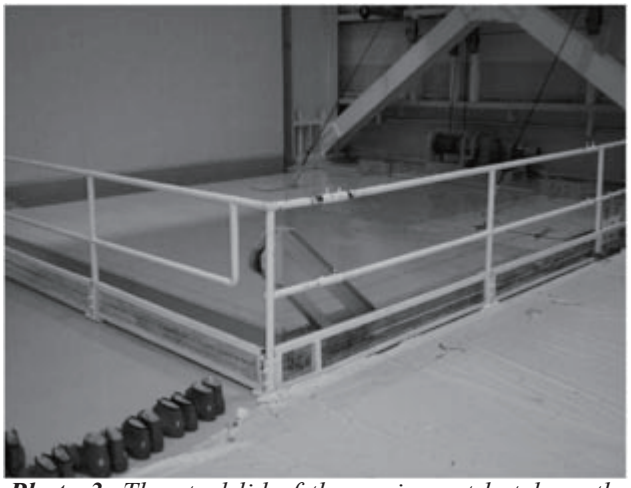


Photo 3: *The steel lid of the equipment hatch on the 5th floor of the Unit 1 building.*

Photo 4: *Looking up from the 4th floor to the equipment hatch (the steel lid blown away by the hydrogen explosion is missing, an IC unit is visible to the right).*

In other words, at about 2:30 p.m. on March 11, 2011, the equipment hatch was closed. From then on until after 3:30 p.m. on March 12, when the hydrogen explosion occurred, the hatch should have remained shut, so inasmuch as the steel hatch was not blasted downward into the 4th floor from an explosion on the 5th floor, there should not have been any blast coming through the equipment hatch and tearing insulation off the IC units on the 4th floor, and judging from the lack of any hatch being discovered on the 4th floor, it can be said that nothing of the sort happened.

On the other hand, as Photo 4 shows, it is an uncontestable fact that the steel lid of the equipment hatch has completely vanished. So, where did the hatch go and how did it vanish?

This mystery is solved easily if we say the explosion occurred on the 4th floor and not on the 5th, as TEPCO and many specialists are saying. If the hydrogen explosion occurred on the 4th floor, it would have raised the lid from below and the violent blast would have blown it away, consequently falling somewhere on the 5th floor or may even have been sent flying outside from the 5th floor.

Was the Source of the Hydrogen on the 4th Floor from the IC Pipes?

But why then did a hydrogen explosion occur on the 4th floor? What would the supply route of hydrogen to the 4th floor have been?

It doesn't take long to find an answer to this. The hydrogen would have originated from a reaction between water and zirconium in the damaged nuclear fuel rods inside the reactor pressure vessel. The hydrogen thus generated would have entered the IC steam pipes and led by them ultimately to the 4th floor of the nuclear reactor building. Therefore, if the IC steam pipes or the drain pipes beyond them (steam condenser pipes) had been damaged by the seismic motion, the hydrogen would have been leaking from them continuously inside the 4th floor.

The water-zirconium reaction occurs at above 900°C, so the hydrogen reaching the 4th floor of the reactor building would probably have been at about that temperature. The 4th floor, where the two IC units were located could be said to be a sealed space, so if hydrogen at more than 900°C was gradually building up in that space, in the course of time it would have resulted in a large-scale hydrogen explosion through spontaneous combustion.

Regarding a 5th Floor Hydrogen Explosion

I must add that I am not asserting that no hydrogen explosion at all occurred on the reactor building 5th floor. It would be natural to think that perhaps a hydrogen explosion also occurred on the 5th floor. The reason is because the hydrogen generated in the reactor pressure vessel, as many experts have pointed out, is thought to have leaked into the 5th floor from the flange joint on the top lid of the containment vessel. Then, by the time the hydrogen explosion occurred on the 4th floor it is thought that quite a large volume of hydrogen would have accumulated on the 5th floor as well.

The walls of the 5th floor of the Unit 1 building, however, were not made of thick steel-reinforced concrete like the other floors, but with simple panels stuck onto a steel frame structure, so the 5th floor would have been affected by the cold atmospheric temperatures outside along the coast in March, and it is inferred that the temperature inside was not very high. If that is the case, there would have been no spontaneous combustion of the sequestered hydrogen. If a hydrogen explosion occurred on the 4th floor, however, due to spontaneous combustion, it would have blown the hatch off from the large object delivery port on the 5th floor, and it is thought that the hot blast violently entering the 5th floor would have instantaneously caused a hydrogen explosion on the 5th floor.

[Notes]

1. *Ito, Y. (2013) Total loss of AC power at the Fukushima NPP Unit 1 was not caused by the tsunami, Science Journal Kagaku, September 2013, pp.1045-1054.*
2. *Tanaka, M. (2013) What does the violent destruction on the 4th floor of the Fukushima Daiichi NPP Unit 1 reactor building signify? –Questioning anew the possibility of an IC pipe rupture due to seismic motion, Science Journal Kagaku, September 2013, pp.1055-1066.*
3. *CNIC-Ustream of Mr. Ito on the SBO: http://www.cnic.jp/movies/5385*
4. *CNIC-Ustream related to this article: http://www.cnic.jp/movies/5373*
5. *The Diet's Report on the Investigation into the Accident can be read or downloaded at: http://warp.da.ndl.go.jp/info:ndljp/pid/3856371/naiic.go.jp/index.html*
6. *http://photo.tepco.co.jp/date/201110-j/111021-02j.html*
7. *http://ww.tepco.co.jp/nu/fukushima-np/interim/inex-j.html*

Reference Material: Japanese Inventory of Separated Plutonium at the end of calendar year 2012

The Management Situation of Japan's Plutonium was published on September 11. We republish it here in English as reference material. There was no change due to movement of plutonium since last year. There was quite a large change in the amount of plutonium stored overseas, but in the case of France, this is thought to be due to nuclear loss (Plutonium-241, with a half-life of 14 years, decaying to Americium-241). In the case of the UK, the increase of Pu cannot be explained in this way. It is clear that reprocessing has been completed and that there has been no movement of plutonium. The Atomic Energy Commission has not been able to give a clear explanation of whether this was an entry error by the Japanese power companies or an amendment by British authorities.

The number of fuel assemblies has been estimated by CNIC, those associated with Monju being the number of assemblies in the reactor core, and the remainder calculated from the actual amounts of plutonium transported.

(Hideyuki Ban)

Plutonium Data (kg, as of end of a calendar year)

1 . Japanese Inventory of Separated Plutonium

		2008		2009		2010		2011		2012	
		JAEA	JNFL	JAEA	JNFL	JAEA	JNFL	JAEA	JNFL	JAEA	JNFL
Reprocessing Facilities	Plutonium nitrate etc.	674	276	673	279	672	281	669	283	668	283
	Plutonium oxide	106	3,329	103	3,329	80	3,329	83	3,329	83	3,329
	Total Plutonium	780	3,604	777	3,607	753	3,610	752	3,612	751	3,612
	Total Fissile Plutonium	520	2,344	517	2,346	500	2,347	499	2,348	498	2,348
	Balance		-3	-3	3	-1	2	0	2	-1	1
Plutonium Fuel Fabrication Plant	Plutonium oxide	2,495		2,304		1,916		1,941		1,939	
	Plutonium in test or fabrication stage	1,047		1,008		1,026		976		978	
	New fuel etc.	78		171		424		446		446	
	Total Plutonium	3,620		3,483		3,365		3,363		3,364	
	Total Fissile Plutonium	2,515		2,420		2,334		2,333		2,333	
	Balance	-17		-8		-8		-2		1	
Nuclear Reactors and Other	Joyo	134		134		134		134		134	
	Monju	699		161		31		31		31	
	Commercial Reactors	415		1458		1600		959		959	
R&D facilities	Critical experiment etc.	444		443		444		444		444	
	Total Plutonium	1692		2196		2208		1568		1568	
	Total Fissile Plutonium	1247		1589		1549		1136		1136	
Total Plutonium		9696		10063		9936		9295		9295	
Total Fissile Plutonium		6625		6871		6730		**6316**		**6315**	

2. Overseas Inventory of Separated Plutonium

Held Overseas	Recovered in UK					17,055		17,028		17,052	
	Recovered in France					17,970		17,931		17,895	
	Total Plutonium					35,025		34,959		34,946	
	UK: Fissile Plutonium	11,380		11,531		11,643		11,616		11,622	
	France: Fissile Plutonium	13,832		12,599		11,730		11,692		11,655	
	Total Fissile Plutonium	25,212		24,130		23,373		**23,308**		**23,277**	

3. Separated Plutonium in Use

Supply	Separated Plutonium	0	1582	0	0	0	0	0	0	0	0
Used	for Monju	284		191		412		0		0	
Loaded	Reactors	0		1,345		1,462		640		0	

Distribution of Stored and Loaded Plutonium in Nuclear Reactors and Other Facilities

Name of Reactor etc.		End of 2012				
		Stored Plutonium		Loaded Plutonium		Number of fuel assemblies
		Separated Plutonium		Separated Plutonium		
			Fissile		Fissile	
		kgPutot	kgPuf	kgPutot	kgPuf	
Japan Atomic Energy Agency	Joyo	134	98	261	184	-
	Monju	31	21	1,533	1,069	198
Tokyo Electric Power Co.	Fukushima Daiichi Unit3	-	-	210	143	32
	Kashiwazaki-kariwa Unit3	205	138	-	-	28
Chubu Electric Power Co.	Hamaoka Unit4	213	145	-	-	28
Kansai Electric Power Co.	Takahama Unit3	-	-	368	221	12
	Takahama Unit4	184	110	-	-	4
Shikoku Electric Power Co.	Ikata Unit3	198	136	633	436	21
Kyushu Electric Power Co.	Genkai Unit3	160	103	1,317	880	36
R&D facilities	Fast Critical Assembly	331	293			
	Deuterium Critical Assembly	87	72			
	Experiment Critical Facility	15	11			
	Other R&D facilities	11	9			

Main accidents and breakdowns in nuclear power facilities in FY2010

Year	Date	Facility	Overview	Report Classification
2010	April 2	Onagawa 1	Damage to a pipe joint in the standby liquid control system accumulator.	
	April 2	Shika 1	Primary loop recirculation system flow restrictor device alarm activated.	
	April 12	Hamaoka 5	In a confirmation test following re-modelling of the control rod block monitor, when the withdrawal of control rod numbers 34-03 above the fully withdrawn position (100 steps) was implemented, the "coupling" display should normally have lit up when the control rod was over-withdrawn to the 102nd step. However, at step 101, the "control rod withdrawal prevention" alarm light came on and the control rods stopped. It has been confirmed that the interlock had failed.	
	April 19	Mihama 2	Rise in the concentration of radioactivity in the primary coolant due to leaks from two fuel assemblies.	
	April 20	Mihama 5	Fractures in the welding on the moisture separator and reheater (B).	
	April 25	Mihama 2	Rise in reading on the containment exhaust gas monitor when extracting air from inside the containment. The cause was found to be coolant leaking from the primary coolant pump B.	
	April 27	Ikata 1	Damaged piping in the seawater coolant for the emergency diesel generator (B).	Law
	May 20	Onagawa 1	Discovery of a fracture, 30 mm long, 5.2 mm deep, in one location when 6 locations on the recirculating system piping welds were inspected.	
	May 31	Fukushima Daiichi 1	When measuring condensate system pipe wall thickness, a value (7.6 mm) less than the minimum required thickness (8.3 mm) was detected.	
	June 1	Fukushima Daini 1	When confirming the opening and closing of the isolation valve inside steam piping in the reactor core isolation cooling (RCIC) system during a regular inspection, a problem was experienced with the valve not opening fully. The reactor was shut down manually for an inspection.	Law
	June 2	Shika 2	Alarm activated to indicate abnormality in the detector monitoring the degree of opening of the main steam stop valve (D).	
	June 4	Hamaoka 4	Of the main turbine shaft vibrations, a slight rising trend was confirmed in the shaft vibration values in the bearings (No.7 or No.8 bearings) of the low-pressure turbine (C).	
	June 11	Ikata 1	Damage to the seawater coolant piping of the component cooling water heat exchanger (A).	Law
	June 15	Tsuruga 1	It was discovered in an inspection of a welded ferrule on the recirculation pump casing that there was a weld line on the pressure-containing section of the recirculation pump that was not shown in the blueprints and was also missing from the items on the in-service inspection.	
	June 17	Fukushima Daiichi 2	As the "generator field circut breaker trip alarm" was activated, the generator protection device was also activated causing the generator to shut down, and the turbine and nuclear reactor also automatically shut down. As the changeover to the plant's power source system did not occur and the plant's power system stopped, the emergency diesel generators were activated and a transient phenomenon occurred where the water level in the reactor was greatly reduced.	
	June 17	Shika 1	Fracture in the welding of the recirculation pump (B) outlet valve on the leak disposal system piping.	
	June 24	Shika 1	Trouble occurred when inserting one control rod after removal of all fuel from the reactor.	
	June 25	Tokai Daini	In a regular inspection of two seawater pumps (B and D) of the residual heat removal system, the value of the seawater flowmeter was found to be below the standard value. The reactor was shut down manually when it proved to be impossible to specify the cause of the low reading after dismantling and checking the pumps.	Law
	July 7	Fukushima Daini 1	An inspection tool fell into the nuclear reactor during inspection work on the Local Power Range Monitor.	
	July 7	Fukushima Daiichi	It was confirmed that the pressure reading on the device (pressure guage) system monitoring the cask sealed gas inside one of four medium-sized dry casks in the cask storage building at Fukushima Daiichi Nuclear Power Station was downscaling. Downscaling means the reading dropped to the lowest level.	

Year	Date	Facility	Overview	Report Classification
2010	July 11	Fukushima Daini 1	A foreign object was found on the baffle plate in the vicinity of jet pump No.1 in the nuclear reactor.	
	July 16	Fukushima Daini 1	While replacing valves on the residual heat removal system instrumentation system line valves, indicating patterns were confirmed on four of the valve casings when penetrant tests were performed on the welds.	
	July 28	Fukushima Daiichi 3 & 4	Gamma-emitting substances (Silver-110m, Cobalt-60, Manganese-54) were detected on sampling filters taken from the main exhaust stack between July 28 and August 4.	
	July 30	Rokkasho Reprocessing Plant	High-level radioactive liquid waste leaked into the protective pipe on the thermometer on the high-level liquid waste concentration tank in the separation building. This was due to corrosion in the lower part of the concentration tank.	Law
	August 4	Fukushima Daiichi 1	Confirmation of damage and missing parts in the support structure for the downstream piping for the return valve in the high-pressure injection system startup test return piping. Confirmation also of eight cases of damage and missing parts in the support structure in other locations.	
	August 12	Fukushima Daiichi 1	Water containing radioactive substances was confirmed to be dripping from the vicinity of the lower part of the high-pressure turbine casing to the vicinity of the feedwater heater area on the 1st floor of the turbine building (controlled area) and the reactor was shut down manually to investigate this.	
	August 21	Kashiwazaki-Kariwa 1	The degree of vacuum of the condenser declines and a variation in power output of max. 13,000 kW occurred. It was confirmed that the water box communication valve was in the fully open position, whereas the condenser (B) should normally be in a totally closed state.	
	August 23	Fukushima Daiichi 3	Subcontractor workers were polluted and suffered internal exposure when carrying out a dismantling inspection of a valve in the reactor building pressure suppression chamber area (controlled area).	
	August 26	Onagawa 3	When implementing the dismantling inspection of scram outlet valves in 137 control rod drive hydraulic system hydraulic control units, the valve shaft slide on two of the units were confirmed to be damaged.	
	August 26	Monju	While being hoisted out of the reactor, an in-vessel transfer machine was deformed when dropped back into the reactor.	Law
	September 2	Fukushim Daiichi 5	When implementing the monthly regular inspection of the reactor core isolation cooling system, a turbine in the same system automatically stopped. It was confirmed that the signal cable controlling the steam governing valve, which governs the amount of steam being provided to the turbine, was disconnected.	
	September 7	Hamaoka 5	Reheat cracks found in the moisture separator & reheater outlet pipe welds.	
	September 10	Kashiwazaki-Kariwa 7	Rise in the reading of the high-sensitivity off-gas monitor on the off-gas system. Leak confirmed from one fuel assembly.	
	September 14	Fukushima Daiichi 6	When conducting a confirmation test for leaks in one gas-side system in the flammable gas concentration control system, it was found that the test pressure could not be maintained.	
	September 25	Fukushima Daini 3	Power output fell to 380,000 kW due to the occurrence of an incident in which a large amount of seaweed etc. was taken into the intake screening device on the seawater intake for the turbine condenser coolant seawater.	
	September 27	Onagawa 3	Damage to the accumulator of one water pressure control unit of the control rod drive mechanism.	
	October 1	Tomari 2	A fluctuation of the concentration of boric acid occurred due to a disorder in the temperature control of the extraction line nonregenerative heat exchanger observation outlet.	
	October 4	Onagawa 1	An alarm was activated in the central control room indicating inability to operate devices for containment radiation detection for the containment atmosphere monitoring system monitor.	
	October 14	Hamaoka 4	Temporary operational aberration due to faulty operation of the startup range monitor.	
	November 1	Kashiwazaki-Kariwa 7	Fractures were discovered in the sheaths and tie-rods of 28 hafnium flat tube type control rods.	
	November 1	Mihama 2	During a regular inspection of the reactor containment air recirculation fan, when one of the air recirculation fans was started up the cooling water intake valve and discharge valve of the D-containment air handling device cooling coil should have opened automatically upon receipt of the startup signal, but a problem occurred in the form of the discharge valve not opening.	

Year	Date	Facility	Overview	Report Classification
2010	November 2	Fukushima Daiichi 5	During work to reduce power output in order to adjust the control rod pattern, the water level in the reactor core rose and fell rapidly, causing the turbine to go into automatic shutdown followed by automatic shutdown of the reactor.	Law
	November 4	Kashiwazaki-Kariwa 5	During a manual startup of diesel generators for a regular inspection of the high-pressure reactor core spray system, the alarm "HPCS diesel generator equipment failure" occurred in the central control room and the alarm "generator overvoltage" occurred at the control panel at the location.	
	November 25	Fukushima Daini 4	A fracture was discovered in one location in the base metal that had separated from the weld line of the inside of the middle shell region of the reactor core shroud.	
	December 1	Kashiwazaki-Kariwa 3	During work to restore the control rod drive mechanism, the control rod drift alarm occurred when the worker at the site operated the drive water pressure system valve for control rods 38-59. Although they should have been in the fully withdrawn position, it is thought that trouble had occurred when returning the control rods to their original position after inserting them by one notch. It is assumed that air had entered the piping of the control rod drive system.	Law
	December 1	Shika 1	Due to discovery of damage to the mechanical seal on a recirculation pump, the reactor was manually shut down to replace the mechanical seal.	
	December 7	Shika 1	A worker was sprayed with water during work to replace the mechanical seal on a recirculation pump.	
	December 8	Hamaoka 3	During the implementation of an inspection of a steam dryer, a fracture was confirmed in the proximity of a weld on the steam dryer.	
	December 10	Genkai 3	Occurrence of a rise in the concentration of iodine in the primary coolant. A leak in one fuel assembly (uranium fuel) was confirmed.	
	December 11	Global Nuclear Fuel Japan	The temperature adjustment device on a gadolinia sintering furnance (B) in operation failed to work correctly. During work to restore the device, heating ceased due to activation of the interlock for the heating limit, and operation of the sintering furnace was stopped manually.	Law
	December 13	Shika 1	During reactor startup, when the operation for the withdrawal of one control rod was implemented, the "control rod drift" alarm was activated, and the problem that the rod was withdrawn 3 notches beyond the scheduled withdrawal position of 2 notches occurred. The reactor was manually shut down for inspection.	
	December 20	Hamaoka 4	Fractures were discovered in three places in the proximity of the welds on the suspension rod and support ring of a steam dryer.	
	December 26	Fukushima Daini 4	A problem of decrease in the water level in the spent fuel pool occurred.	
	December 27	Onagawa 3	Rise in the concentration of radioactive substances in the off-gas system and confirmation of a leak in one of the fuel assemblies. Bulging was found in the cladding of one of the fuels rods in the relevant fuel assembly.	
	December 28	Monju	Damage found in seven places in the cylinder liner of an emergency deisel generator.	Law
2011	January 9	Tomari 3	One worker was confirmed as having body contamination by radioactive substances when implementing a change of filter element on the 3B-coolant demineralizer intake filter in the reactor auxilliary building, and this was confirmed to include internal exposure of radioactive substances by whole body counter.	
	January 18	Shimane 1	Regarding 69 weld locations on piping, etc, in the primary recirculation system, when implementing an inspection for damage by ultrasonic test, fractures were discovered on January 18 in one location on the weld joint on the downstream piping of the A-primary recirculation pump discharge valve, and on February 17 in one location on the weld joint on the upstream piping of the A-primary recirculation pump intake valve.	
	January 21	Shika 2	Manual shutdown of reactor due to reduction in the amount of condensation in the containment inner heat exchanger.	Law
	January 21	Hamaoka	Occurrence of control rod drift due to poor assembly of the control rod drive water pressure system accumulator.	
	January 27	Fukushima Daiichi 1	Power output manipulation due to restart of reactor water clean-up system.	
	January 31	Kashiwazaki-Kariwa 1	Departure from operation limits due to symptoms of failure in the operation of the recirculation flow control valve on the flammable gas concentration control system.	
	February 2	Fukushima Daini 3	Departure from operation limits due to inspection of equipment related to emergency deisel generators (B).	
	February 3	Shika 2	Defect found when starting power source for the drive of the control rod drive mechanism during equipment checking work while plant was in shutdown.	

Year	Date	Facility	Overview	Report Classification
2011	February 8	Mitsubishi Nuclear Fuel	Uranium dioxide powder leaked from extraction device in the conversion and processing room of the conversion factory. The leak amounted to 5.5 x 10^5 Bq. Four workers were exposed to a maximum of 4.98 mSv.	Law
	February 14	Ikata 3	As it was found that there was a delay when performing the release operation of the reactor trip breaker, the circuit was replaced.	
	February 17	Tomari 3	Damage on the solenoid valve terminal block for the cooling water flowrate changeover valve on the control air compressor.	
	February 21	Kashiwazaki-Kariwa 6	Contamination by radioactive substances on the floor of the reactor building pump room.	
	February 25	Genkai 2	Pipe wall thinning exceeding the standard was found on the inner surface of five SG tubes in the component cooling water heat exchanger.	
	February 28	Shika 1	Reactor shut down manually due to replacement of shaft seal on the reactor coolant recirculation pump (B).	
	March 7	Ikata 3	The reading of the central control room radioactivity measurement monitor temporarily rose to 60 μSv/h (alarm set to activate at 2.6 μSv/h), and the central control room ventilation system isolation was operated.	
	March 8	Higashidori 1	Damage on the pressure guage of the control rod drive mechanism pressure control unit.	
	March 11	Fukushima Daiichi	Great East Japan Earthquake: Units 1, 2 and 3 go into automatic shutdown. Later, due to loss of all alternating current power, reactor core meltdowns and hydrogen explosions occur and massive amounts of radioactive substances were released into the environment.	Law
	March 11	Fukushima Daini	Great East Japan Earthquake: Units 1, 2, 3 and 4 go into automatic shutdown. Function of pressure suppression chamber temporarily lost. Reactor core damage was closely avoided due to maintenance of one external power source.	Law
	March 11	Tokai 2	Great East Japan Earthquake: Large vibrations in turbine cause reactor to shut down automatically. Reactor core damage closely avoided due to function of emergency diesel generators.	Law
	March 11	Onagawa	Great East Japan Earthquake: Units 1, 2 and 3 go into automatic shutdown. A fire occurred in the power panel and the emergency diesel generators stopped. Reactor core damage was closely avoided due to ability to secure one external power source.	Law
	March 11	Higashidori	Great East Japan Earthquake: Down for regular inspection. Due to loss of external power source, power was supplied by emergency diesel generators	
	March 11	Rokkasho Reprocessing Plant	Great East Japan Earthquake: Due to loss of external power source, power was supplied by emergency diesel generators.	
	March 31	Hamaoka 4	Defect in one reactor pressure signal used to calculate reactor heat output. A declaration of departure from operational limits according to the Nuclear Facility Safety Regulations was declared as it was judged that there was a possibility of an error occurring in the reactor heat output.	

Main accidents and breakdowns in nuclear power facilities in FY2011

Year	Date	Facility	Overview	Report Classification
2011	April 1	Onagawa 1	Damage to field system circuit of emergency diesel generator (A).	Law
	April 7	Tomaru 1 & 2	As the Hokkaido-Honshu HVDC link (600 MW) automatically shut down due to the earthquake Off-shore of Miyagi Prefecture, reactor heat output was reduced. Because of this, the axial direction neutron flux output deviation of Units 1 and 3 differed from the standard value and deviated from operational limits.	
	April 7	Higasidori 1	The Miyagi Prefecture off-shore earthquake caused a loss of external power source and the plant deviated from operational limits.	
	April 7	Onagawa 2	Startup transformer heat radiator oil leak.	
	April 7	Onagawa 3	Automatic full open operation of the suction valve on the high pressure core spray system pressure suppression chamber was not possible.	
	April 12	Kashiwazaki-Kariwa 5	Reduction in output due to lubricating oil filter changeover on the reactor coolant recirculation system MG (motor and generator) set.	
	May 2	Tsuruga 2	A rise in the concentration of radioactivity in the primary coolant, which appeared to be caused by radioactivity leaking from the fuel. The reactor was shut down and an inspection confirmed that one fuel assembly was leaking.	
	May 14	Hamaoka 5	A rise in conductivity occurred, indicating that seawater had entered the main condenser during the time the reactor was being shut down. Of the roughly 21,000 main condenser (A) SG tubes, in an area roughly 14 m wide and 70 cm deep, 43 SG tubes were damaged and 2 deformed. The endgap of the recirculation piping of the electrically driven water supply pump, which is installed inside the main condenser (A) was severed and had fallen off. The circulation water pump and the water supply pump stopped, but it is thought that 10 tons or more of seawater flowed into the reactor core.	
	May 17	Tomari 1	Fractures (one 6 mm, one 9 mm long) found in two locations in welds on reactor vessel B loop discharge nozzles.	
	June 27	Shika 2	When inspecting 25 hafnium flat tube control rods, no fractures were found on the tie rods, but fractures were discovered on the welds of the handle and sheath of one rod and on the guide rollers of 11 rods.	
	July 7	Tokai 2	A worker involved in removal and handling operations for the control rod drive mechanism reactor coordinates 18-23 in the area in front of the pedestal in the reactor containment was exposed to radioactivity exceeding the scheduled dose (total of 3.30 mSv per day).	
	July 22	Rokkasho Reprocessing Plant	Inability to start up two safety steam system boilers in the pre-processing building.	Law
	August 3	Onagawa 2 & 3	Fastening bolts on the spent fuel storage racks in the spent fuel pool were found to the loose.	
	August 18	Takahama 4	Fractures due to stress corrosion cracking were found on one SG tube high temperature side tube plate in each of two (B and C) out of three steam generators.	Law
	August 30	Ohi 2	Deviation from operating limits due to fall in reading of a thermometer in the containment vessel.	
	August 30	Fukushima Daini 2	Cessation of the high pressure reactor core spray system component cooling seawater system.	Law
	September 6	Tomari 3	Deviation from operating limits due to inoperable central control room emergency circulation system.	
	September 13	Tokai Reprocessing Facility	During changeover work on external electricity access, the ventilation blower, dissolution off-gas blower, shearing off-gas blower for the high-level radioactive liquid waste storage tank in the separation and refining plant in the facility ceased working, making it impossible to maintain negative pressure inside the storage tank.	Law
	September 13	Kashiwazaki-Kariwa 7	Detection of radioactive iodine in sampling from main exhaust pipe.	
	September 26	Tokai 2	Missing inner part of main steam relief valve (D).	
	September 27	Tsuruga 1	Seawater leak from seawater return pipe on emergency diesel generator (A).	
	October 4	Genkai 4	Automatic shutdown of reactor due to reduction in degree of vacuum in condenser. Flaw in the procedure manual for replacement of the torque switch for the steam master valve on turbine equipment shaft seals.	Law

Year	Date	Facility	Overview	Report Classification
2011	October 8	Kashiwazaki-Kariwa 7	When implementing operational tests on each of the scram pilot valves, one out of the 103 scram pilot valves (core position 58-31/54-11) did not function correctly.	
	October 17	Fukusima Daini 4	Unscheduled exposure（1.58 mSv）during decontamination work in the containment.	
	October 19	Tsuruga 2	Internal exposure (inhalation of Cobalt-60) by worker. Measurement by whole body counter showed a reading of approximately 58,500 counts/sec.	
	October 26	Tokai 2	Water was found to be leaking from one location (core coordinates 30-51) of the control rod drive mechanism housing flange in the lower part of the reactor pressure vessel.	
	October 28	Tokai Reprocessing Facility	Through-holes due to corrosion were found in the external duct linked to the main exhaust pipe leading from the separation and refining plant.	Law
	November 4	Kashiwazaki-Kariwa 7	Defect in a valve on an emergency diesel generator.	
	November 17	Shika 1	Damage found to a cable in the control panel of the diesel generator for the high-pressure core spray system.	
	November 28	Onagawa 3	Corrosion found on discharge check valve of control rod drive water pump (B).	
	December 1	Fukushima Daiichi 1to 6	Wrongful use of alarm pocket dosimeters by workers of contracted companies.	
	December 1	Kashiwazaki-Kariwa 2	Shutdown of high-pressure core spray system diesel generator during regular inspection.	
	December 7	Mihama 2	Manual shutdown of reactor due to increase in A-pressurizer spray valve gland leak-off flow rate.	
	December 16	Genkai 3	Breakage of C charging pump main shaft.	Law
2012	January 13	Tokai	Fire in cooling tower on rooftop of solidification treatment building.	
	January 13	Onagawa 3	During implementation of repacement work for new rotor blades on a low-pressure turbine (B), a fissure was discovered on one location and damage on another location on the base of one rotor blade on the 15th stage rotor blades. After a detailed inspection, fissures were discovered on a further two rotor blades.	
	January 16	Onagawa 3	Fractures found on a steam turbine cylinder, shell plate and discharge outlet.	
	January 19	Kashiwazaki-Kariwa 5	Trouble occurred during a confirmation test on the movement of control rods during a regular inspection when control rods (14-27) were supposed to be inserted one notch from full withdrawal, but actually entered 11 notches.	
	January 27	Shimane 2	Neutron source range monitoring system inoperable.	
	March 3	Tokai 2	A water leak was found in the neighborhood of the weld on the residual heat removal system (C) low-pressure core injection system injection valve differential pressure detection pipe.	
	March 27	Fukushima Daini 3 & 4	Contamination by radioactive substances confirmed in a non-controlled area of a service building.	Law
	March 29	Takahama 3	Fracture due to stress corrosion cracking found in tube plate on high temperature side of one SG tube in C-steam generator out of the three steam generators.	Law
	March 30	Hamaoka 5	40 corroded pores were confirmed in the condensate tank lining material during an inspection in connection with the influx of seawater into the condenser system, which resulted in damage to the main condenser SG tubes on May 14, 2011 in the course of cold shutdown operations after the reactor had been shut down.	Law

Main accidents and breakdowns in nuclear power facilities in FY2012

Year	Date	Facility	Overview	Report Classification
2012	April 3	Onagawa 1	Cessation of operation of spent fuel pool water clean-up system pump.	
	April 3	Higashidori 1	Equipment abnormality alarm activated in the A system of the containment atmosphere monitoring system (CAMS).	
	April 4	Onagawa 1	Breakdown of electrical motor of the emergency cooling service seawater pump (A). Caused by the occurrence of an electrical short due to corrosion from penetration of rainwater.	Law
	May 17	Tomari 3	Water leak from controlled area auxiliary building air exhaust duct.	
	May 30	Kashiwazaki-Kariwa 5	When attempting to withdraw the control rods one notch to confirm the movement of the control rod drive mechanism after recovery of isolation of the hydraulic control unit, a problem occurred when control rods in core position 58-31 withdrew three notches. A full confirmation of the action of the control rod drive mechanism was implemented. At this time, in the action confirmation test conducted on June 12, a problem occurred when core position 02-31 control rods also withdrew two notches when the command was given to withdraw one notch. Abnormalities were found in the directional solenoid valve (valve 122).	
	June 4	Kashiwazaki-Kariwa 1	Defect in a residual heat removal system electrical valve.	
	June 7	Onagawa 1	Damage to the bearings on the reactor building overhead crane runway.	Law
	June 15	Onagawa 2 & 3	As a result of an inspection conducted on the upper part of the channel boxes of fuel stored in the Unit 2 the spent fuel pool, it was confirmed that of 1807, the clip joints on the upper part of 13 channel boxes were partially damaged (max. length approximately 1.1 cm). Of the total of 1386 boxes in Unit 3, 19 were confirmed to have similar damage.	
	June 15	Genkai	Burnout damage to lighting cable in miscellaneous solids melting treatment building.	
	July 4	Tokai 2	Fracture due to stress corrosion cracking found in proximity to weld on one of four parts fixed to a steam dryer in order to hoist it up.	
	July 6	Tsuruga 2	Damage found on water circulation piping.	
	August 1	Kashiwazaki-Kariwa 7	Main exhaust stack radiation monitor sampling pipe found to have a defective connection.	
	August 10	Tsuruga 1 & 2	As a result of an inspection conducted on the upper part of the channel boxes in the spent fuel pools, 3 of the fuel channel boxes in Unit 1 had partially damaged or missing clip joints. No damage was found in the Unit 2 channel boxes.	
	September 6	Tokai Reprocessing Facility	Contamination was found on the surface of radioactive liquid waste piping in a utility room in the analytical laboratory.	Law
	September 10	Mihama 3	Seawater was found to be leaking from the air cooling tower of emergency diesel generator B.	
	September 10	Shimane 1 & 2	As a result of an inspection conducted on the upper part (clip) of all 4381 channel boxes (798 in Unit 1, 2648 in Unit 2, and 872 in Unit 3) that were loaded into the reactor core or were being stored in the spent fuel pools, it was confirmed that there was damaged parts on the clip joints of 13 channel boxes (10 in Unit 1, 3 in Unit 2).	
	September 25	Tomari 1 & 2	A defect was found in the monitor data transfer of the discharge structure of Units 1 & 2. A defect had occurred in the transmission of data in the monitoring station.	
	October 4	Kashiwazaki-Kariwa 5	Accident involving inability to withdraw control rods (02-27) that occurred during a control rod action test as part of a functional inspection of the control rod drive hydraulic pressure system.	
	October 10	Fukushima Daiichi 5	Dropout of the minimum flowrate bypass valve on the core spray system (B).	
	October 16	Kashiwazaki-Kariwa 5	Deformation of water rods in two fuel assemblies.	
	October 26	Genkai 3	Reduction in thickness of SG tubes in component cooling water heat exchanger B.	

Year	Date	Facility	Overview	Report Classification
2012	November 3	Ikata 1	Defective reading from neutron flux detector.	
	November 3	Hamaoka 4	Of 72 rotor blades detached from the 12th stage of the generator side of the low-pressure turbine (B), bending damage was discovered on the attachment base (rotary blade side) on 4 of the blades, and fissures on the attachment base (rotary blade side) on 11 of the blades.	
	November 15	Onagawa 3	Foreign object discovered on the lower part of the first spacer of a fuel assembly.	
	November 24	Hamaoka 3	Fractures found in the attachment base of rotary blades in the 12th stage of the high-pressure turbine side and the 12th stage of the generating side of the low pressure turbine (C).	
	November 30	Tokai 2	Leakage of waste cleaning liquid outside of a controlled area.	Law
	December 3	Onagawa 1	Corrosion on the second injection isolation valve in residual heat removal system A.	
	December 12	Kashiwazaki-Kariwa 5	It was confirmed that fuel rods inside the two fuel assemblies in which deformed water rods had been discovered on October 16 had come into contact with each other and that they did not possess the necessary function.	Law
	December 17	Onagawa 1	A fracture was discovered in the attachment base of the reactor cleaning fluid pump (A) vane wheel.	
2013	January 4	Ningyo Toge Environmental Engineering Center Refining and Conversion Facility	Water containing radioactive substances found to be leaking from an exhaust duct in a non-controlled area.	Law
	January 16	Fukushima Daiichi 6	Leak from seawater sampling line of the reactor closed cooling water system heat exchanger (B).	
	February 5	Mihama 1	Damage to the turbine blade of emergency diesel generator A and bending damage to weld between the turbine blade and shaft.	Law
	February 6	Ohi 3	Divergence from the operating limits of system B emergency direct current bus.	
	February 16	Fukushima Daiichi 5 & 6	Leak in the intake chamber between the temporary tank storing retained water and the (reverse osmosis membrane type) desalination apparatus.	
	February 22	Fukushima Daini 3	Damage to the axis bearings of the reactor building overhead crane runway.	
	March 14	Onagawa 1	Divergence from operating limits due to automatic shutdown of emergency diesel generator (A) (emergency diesel generator (B) being in shutdown for inspection).	
	March 19	Kashiwazaki-Kariwa 1	Of 68 fuel assemblies that had completed tests, 6 were found with deformed water rods, and of these it was confirmed that fuel rods had come into contact with each other in one assembly, and did not possess the necessary function.	Law
	March 22	Kashiwazaki-Kariwa 4	During regular testing on the residual heat removal system (A), a problem occurred when it was attempted to open one test flowrate adjustment valve (electrical motor-operated valve) from the fully closed position, but the valve would not open.	

Group Introduction

The Organization of Religious Leaders Questioning the Nuclear Energy Administration

Member of the Bureau, Pastor Naito Shingo

Representation against restart of the Ohi Nuclear Power Plant at Fukui prefectural government office on May 30, 2012.

The Organization of Religious People Questioning the Nuclear Energy Administration is a national network of religious leaders (Buddhist, Christian, Shinto, etc.) around the country concerned about the national policy on atomic energy. In 1993, when the Monju fast breeder reactor first came close to criticality, religious leaders in Tsuruga, Fukui Prefecture, gathered together and set up the organization.

From the formation onwards, we have not appointed a representative; instead decision-making is carried out and the organization run through the consensus of 40 persons from around the country in the Facilitators' Meeting. Four persons in the bureau are mostly dealing with the daily office work. We send our newsletter to around 800 persons. The Facilitators' Meeting takes place about twice a year. Furthermore, irregularly, but once every one to two years, we organize a national meeting, usually close to the location of a nuclear power plant. For the purpose of fighting together, we want to deepen our interactions with citizens groups around the whole country.

Until now, we have made representations to operators and municipalities in regard to several locations with nuclear power plants, the reprocessing plant in Rokkasho, Aomori Prefecture, or the fast breeder reactor Monju. Furthermore, we repeatedly make representations, not only to municipalities hosting nuclear power plants but also to the state.

On our side, Buddhist monks, Christian priests and leaders of other religions list their names together and gather in different religious attire. Therefore, when we make representations to the state, it seems as if the government is considerably worried. When movement groups around the country make individual representations, the officials coming to hear their plea are normally around two to four persons. However, only because it was a representation of religious leaders, when we arrived with ten persons, the other side gathered together 22 officials including people from the Cabinet Office, MITI (Ministry of Economy, Trade and Industry), MEXT (Ministry of Education, Culture, Sports, Science and Technology) or the Foreign Ministry to defend while showing extreme stress at our questions and opinions (1st October 2008). I think that they are afraid that the religious world will rise up against them. However, I think that in general the religious world in the country has little interest in topics such as this, despite the heavy responsibility that it bears.

After the nuclear accident in Fukushima, beyond the representation actions, we are putting a lot of effort into a child recreation project. In relation to this, we are also making representations to the state and prefectures. As an urgent issue, I feel that beginning with Fukushima, the evacuation and recreation of children in areas with high radiation doses is necessary. Since the accident, we have organized the "Hokkaido Temple School Camp" each summer, and every year around 200 children and 100 guardians come together for around ten days in about 30 temples in Hokkaido. We offer a space where at least for a little while the children can recover their immune strength, and the costs such as travel expenses are covered by fundraising around the country. If you would like to know more about the content and actions of our organization, please take a look at our homepage when you have the opportunity (only in Japanese)*.

** http://mukakumuhei.com/*

NEWS WATCH

TEPCO drained contaminated water out of the barriers surrounding water tanks at the Fukushima Daiichi Nuclear Power Station, failing to follow standardized procedure

Contaminated-water tanks at the Fukushima Daiichi Nuclear Power Station are divided into groups, each group being surrounded by a barrier to prevent contaminated water from overflowing in case of tank leakages. Rainwater that accumulates inside the barriers is drained after being checked for contamination. On September 16, 2013, when a typhoon was approaching the plant, Tokyo Electric Power Company (TEPCO), the owner of the plant, was concerned that the rainwater might flood over the barriers due to heavy rain and drained the water that had accumulated inside the barriers at seven positions as an emergency measure. The rainwater, contaminated with radioactivity, was drained to the ocean by way of the drain ditch, and TEPCO was exposed to strong criticism as a result.

Accordingly, TEPCO requested a working group of Japan's Nuclear Regulation Authority (NRA) to establish a standardized procedure for the drainage of water accumulated within the barriers. On October 15, the working group decided to settle the request immediately because another typhoon was approaching the crippled nuclear power plant, and approved the water drainage procedure that had been presented by TEPCO, with some procedural steps replaced with stricter ones. On the next day, however, TEPCO neglected to follow the standardized procedure by draining water at nine positions along the barriers after measuring radioactivity concentration only onsite and finding that the contamination was below the maximum acceptable level for drainage, although the water was supposed to be measured after being transferred to a tank used exclusively for this purpose, as stated in the procedure. At two positions water was contaminated in excess of the acceptable level and urgently transferred to an unused underground reservoir because other underground reservoirs were leaking.

Without responding to criticism from the NRA and the Fukushima prefectural government, TEPCO failed to take measures during the following days when it did not rain, and kept the nearly overflowing rainwater as it was. On the 20th, there was heavy rain in the area, resulting in water flooding over the barriers at eleven positions. At five positions out of the eleven, and at one position where water was nearly overflowing, TEPCO drained water without following the standardized procedure. Flood water from two positions was transferred to an underground reservoir. The flood water included Strontium 90 at a level higher than the acceptable level for drainage out of the barriers, and water at four positions out of the eleven included Strontium 90 at a level higher than the legally established acceptable level for drainage out of the facilities. On the 24th, to be prepared for the next typhoon, TEPCO started to transfer water inside the barriers into even the underground reservoirs that were leaking and no longer used.

Japan speeding up the planned export of nuclear power plants to Turkey

On October 29, 2013, the international consortium in which Mitsubishi Heavy Industries participates (along with Japanese company Itochu and French company GDF Suez), agreed with the government of the Republic of Turkey on the outline of the commercial contract concerning the Sinop nuclear power plant project, which the Turkish government is promoting. On the same day, Japanese Prime Minister Shinzo Abe and Turkish Prime Minister Recep Tayyip Erdoğan welcomed this agreement and signed a joint declaration of cooperation between Japan and Turkey in the fields of nuclear energy and technology.

The Sinop Nuclear Power Plant project calls for the construction of four nuclear power reactors in the Sinop area near the Black Sea. This commercial contract, called a Host Government Agreement, specifies the range of cooperation and the framework of a feasibility study to implement the project. It is scheduled to be officially signed between the consortium and the Turkish Government after approval by the national assembly of Turkey. Details on such issues as the financial framework and electric power sales agreement will be decided in future negotiations.

On October 25, immediately before Japan and Turkey signed the agreement, the Japan–Turkey nuclear cooperation agreement signed in May was submitted to Japan's House of Representatives for approval, along with the Japan–UAE Agreement, which was also signed in May.

Removal of spent fuel from Unit 4 of the Fukushima Daiichi Nuclear Power Station started

On October 30, 2013, Japan's Nuclear Regulation Authority approved Tokyo Electric Power Company's plan to transfer fuel from the spent fuel pool of the Unit 4 building of Fukushima Daiichi Nuclear Power Station to a common pool in another building. TEPCO started to remove the fuel on November 18. According to the plan, the transfer of all the fuel in the pool is scheduled to be completed at the end of 2014.

Inauguration of Rokkasho Reprocessing Plant and Mutsu Interim Spent Fuel Storage Facilities postponed

The inauguration of the Rokkasho reprocessing plant (Rokkasho Village, Aomori Prefecture), owned by Japan Nuclear Fuel Limited, and the Mutsu interim spent fuel storage facilities (Mutsu City, Aomori Prefecture), owned by Recyclable-Fuel Storage Company, was scheduled for October 2013 but was postponed. On October 29, 2013, the two companies explained the postponement to the Aomori prefectural government and assembly. The notice for Rokkasho preprocessing plant was submitted to Japan's Nuclear Regulation Authority (NRA) on November 1, 2013. That of the Mutsu interim spent fuel storage facilities was submitted to NRA on November 5. The establishment of new regulations for these facilities by the NRA is expected in December, but according to the owners, since it is unknown how long it might take to investigate whether or not the two facilities satisfy the requirements of the standards, their future schedule is unknown.

Japan signs the joint statement on the humanitarian impact of nuclear weapons for the first time

At the First Committee of the United Nations General Assembly, on October 21, a joint statement on the humanitarian impact of nuclear weapons, signed by 125 countries, was announced. The Japanese government formerly refused to sign it because signing it would not be consistent with the fact that the nation is under the nuclear umbrella, but became a party to the joint statement for the first time, judging that the phrase contained in the statement that "all approaches and efforts toward nuclear disarmament" would be compatible with the the retention of a nuclear deterrent. The government has been strongly criticized by a large number of people for not having signed the statement, especially by atomic bomb survivors, and had little option but to change its stance and sign this time.

First comprehensive nuclear disaster drill exercise since the Fukushima disaster organized at Sendai Nuclear Power Plant, Kagoshima

On October 11 and 12, 2013, the first comprehensive nuclear disaster drill exercise was organized by the national government since the Fukushima disaster. The exercise simulated a full-scale emergency condition at the Sendai nuclear plant, owned by Kyushu Electric Power and situated in Satsumasendai, Kagoshima Prefecture. Roughly 2,500 officials from about 130 organizations participated in the exercise, along with 750 local residents (including 178 Satsumasendai locals). On day 1, those who reside in the five-kilometer precautionary action zone (PAZ) and need support at the time of a disaster evacuated, and on day 2 all residents in the PAZ and a part of the population living in the 30-kilometer urgent protective action planning zone (UPZ) evacuated. It was stressed that this exercise was different from past exercises before the Fukushima disaster in that participants were not informed of what would unfold during the exercise and would be trained about how to assess and deal with the situation. However, because the exercise simulated the real-time development of the disaster, idle time occurred frequently; many participants were observed to be smoking outdoors while an emergency meeting was supposed to be in progress.

While the air dose was supposed to be about 400 times as high as a normal dose, local residents participated in everyday clothes. Some waited for an evacuation bus at the designated bus stop, which was, of course, outdoors. "I was told to be here at two o'clock," said a local resident, who appeared to be participating in the exercise according to a prearranged schedule.

Generally, this exercise remained the same as past exercises in that it belittled internal exposure and lacked a sense of emergency.

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

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