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Fault directly beneath Tsuruga Unit 2 reactor officially recognized as active

-Nuclear Regulation Authority's responsibility is grave-

On May 22, 2013, the Nuclear Regulation Authority (NRA) approved a report by a panel of experts investigating the fracture zones at Japan Atomic Power Co.'s (JAPC) Tsuruga Nuclear Power Station stating that Unit 2 is sitting above an "active fault that should be taken into consideration in Seismic Design."(1)(2) The Seismic Design guidelines for nuclear power plants, formulated in September 2006, define an active fault that should be taken into consideration in Seismic Design as a fault that has undeniably moved in or after the Late Pleistocene (120,000-130,000 years ago). The NRA's recognition of the active fault has increased the likelihood that the reactor will never be restarted and will eventually be decommissioned.

Photo
Urazoko Fault trench (by Masako Sawai, April 2008)

Changes in the evaluation of the Urazoko Fault

An active fault, named the Urazoko Fault, runs northwest to southeast through the Tsuruga Nuclear Power Station site about 200 to 300 meters from the reactor buildings (Figure 1). JAPC consistently claimed that this fault was not active when the company applied for official permission to construct Unit 1 (October, 1965), Unit 2 (March, 1979) and Units 3 and 4 (March 2004). The government approved this assessment each time.

In February 2005, however, the Nuclear and Industrial Safety Agency (NISA) ordered JAPC to re-investigate the Urazoko Fault as an additional requirement for approving construction of Units 3 and 4. The company therefore carried out a large-scale investigation by digging trenches. In its report issued in March 2008, JAPC acknowledged for the first time that the Urazoko Fault was active. Furthermore, it was discovered that this fault had moved repeatedly since the Late Pleistocene, the

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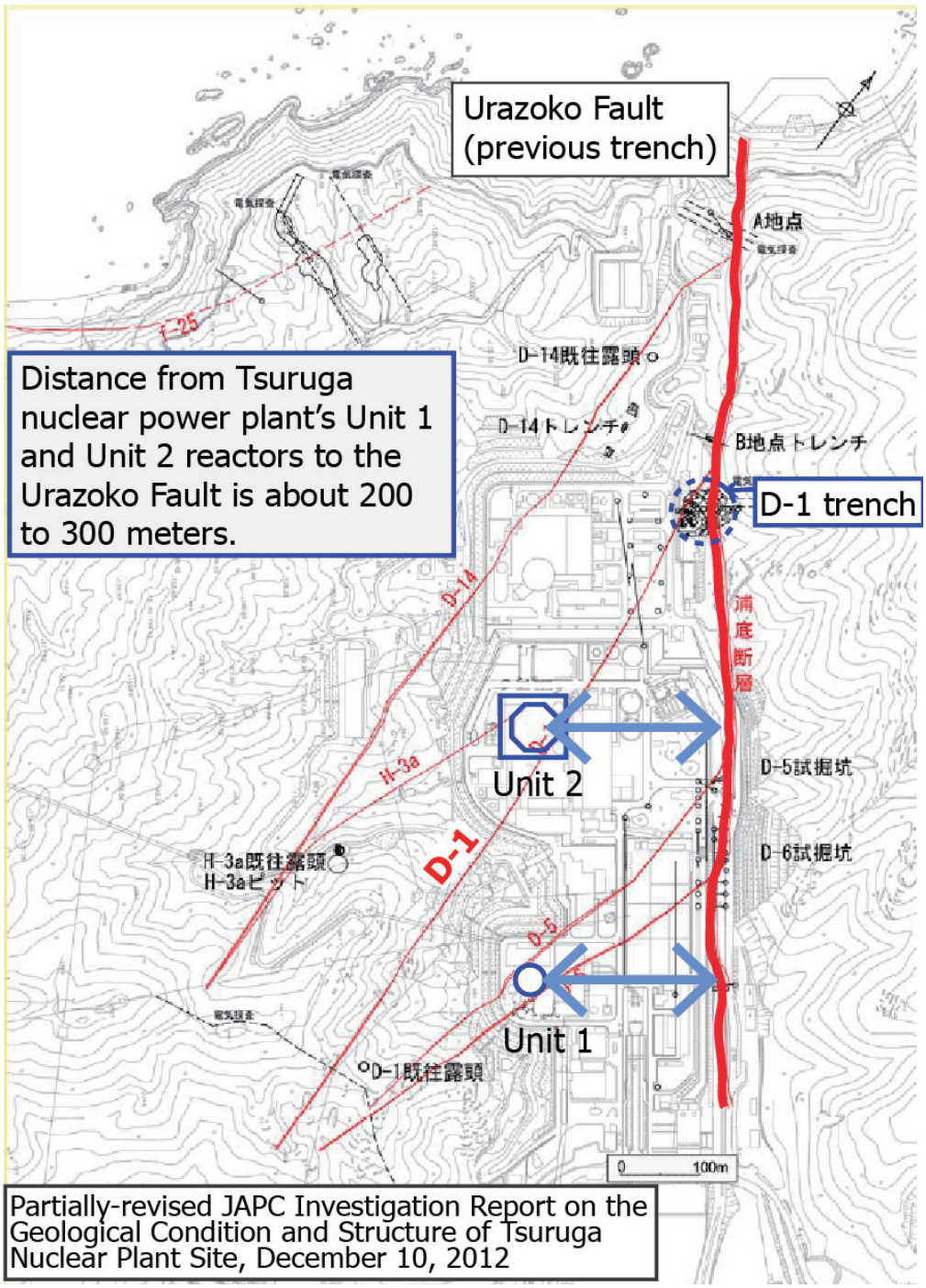

Figure 1.
Locations of Unit 1 and Unit 2 reactor buildings and Urazoko Fault (partially-revised NRA map)

latest movement occurring within the past 4,000 years. As a result, it became scientifically certain that the Urazaoko Fault, which exists in close proximity to the reactor buildings, is a very active first-class fault (see photo page 1). Regarding the number of fractural zones (faults) that exist in the plant's premises, JAPC repeatedly asserted that these faults would not move together with the Urazoko Fault, based on the results of its own computer simulations.

D-1 fracture zone is an active fault

The first thing revealed by the panel's investigation was that the D-1 fracture zone, a branched fault (secondary fault) running beside the Urazoko Fault (main fault), passes underneath the Unit 2 reactor building. Moreover, two other faults, G and K, were discovered at the location of the "D-1 trench," indicated in the figure. This discovery served as the main reason why the faults underneath Unit 2 were officially recognized as active. The existence of the two faults remained totally unknown until this time.

The panel says it is highly possible that these newly-discovered faults are part of the D-1 fracture zone, because the K fault appears to have moved simultaneously with the Urazoko Fault, or after the Urazoko Fault had moved, and it is"an active fault that should be taken into consideration in the Seismic Design." In addition, the K and G faults are both located very close to the extension of the D-1 fracture zone, and the line of strike and inclination of their strata are quite similar to the D-1 fracture zone. Evaluating these factors comprehensively, the panel has concluded that the D-1 fracture zone running beneath the Unit 2 reactor building is an active fault that should be taken into consideration in Seismic Design, and predicts that it will move together with the nearby Urazoko Fault. The panel warns that the important facilities above the fault may be damaged if this happens.

What is the mission of the NRA?

The government has repeatedly insisted that it will "not build (nuclear power plants) above active faults." It has explained that it had "avoided active faults based on the results of various types of investigations, such as literature searches and air photos, and had confirmed the absence of active faults by conducting geographical investigations and drilling explorations."[(3)] However, in the case of Tsuruga Unit 2, an active fault that has moved recently runs 200 to 300 meters from the reactor core. Moreover, fracture zones of the same structure as the active fault run immediately beneath the reactor. This shows the clear and grave fact that the government's safety examination was faulty or very deficient. The NRA holds a great responsibility for this. The Japanese nuclear watchdog should acknowledge that the safety investigation was defective and cancel the construction permit of the Tsuruga nuclear power plant (permission for alteration in the case of Unit 2).

In the eye of the law, it seems possible for the NRA to refer to its right to examine and cancel the reactor construction permit under its own authority when the safety requirements are not met, even though there are no provisions to this effect in the Nuclear Reactor Regulation Law. With regard to the Tsuruga nuclear plant, it has become clear that the faults that should be taken into consideration in Seismic Design exist directly underneath the reactor buildings and the location of the reactor itself is questionable from the viewpoint of preventing nuclear accidents. Having approved construction of the Tsuruga nuclear plant in the first place, it is unconscionable of the NRA to now demand that JAPC apply to decommission the nuclear reactor. What the NRA should do is first make an admission of the previous regulatory authority's deficiencies by cancelling the reactor construction permit.

New nuclear power regulations cannot be established without seriously reflecting on the traditional safety investigation procedures and the limitations and problems of the previous probes. The NRA should fulfill its responsibility and mission in accordance with the conclusion the NRA itself has reached.

(Masako Sawai, CNIC)

(1) "Evaluation of fracture zones in the site of the Japan Atomic Power Co.'s Tsuruga Power Plant" Nuclear Regulatory Agency, http://www.nsr.go.jp/committee/kisei/data/0007_01.pdf
"Evaluation of the fracture zones on the site of the Japan Atomic Power Co.'s Tsuruga Power Plant"
http://www.nsr.go.jp/committee/kisei/data/0007_02.pdf

(2) For more information on the panel of experts and the investigations into the fracture zones, see "How the investigation of active faults will be conducted" by Chihiro Kamisawa, Citizens' Nuclear Information Center Newsletter No.464. (Japanese)

(3) Seismic Safety Design for Nuclear Power Plants, Resources and Energy Agency of the Ministry of Trade and Industry, October 1999

Tokyo, June 27, 2013

Statement issued by the NPO Citizens' Nuclear Information Center
Co-directed by Yukio Yamaguchi, Baku Nishio, and Hideyuki Ban

MOX fuel should not be loaded into reactors but disposed of as waste

We protest against Kansai Electric Power Company's recent transportation of uranium-and-plutonium mixed oxide (MOX) fuel to Japan. The electric power company should withdraw from spent fuel reprocessing and plutonium utilization in this country. Regarding the plutonium already extracted from spent fuels, the company should discontinue the pluthermal project, which loads MOX fuel into reactors, and pursue the treatment and disposal of plutonium as waste.

The recent MOX fuel transportation to Japan was once postponed "in consideration of the conditions following the earthquake off the Pacific coast of Tōhoku" (Kansai Electric Power Company (KEPCO) press release). We suspect that the reason why KEPCO has changed this policy and carried out the transportation is that Japan's Nuclear Regulation Authority's new regulation standards are scheduled to take effect soon, in July, and the company intends to push for the restart of its Takahama Nuclear Power Station, where MOX fuel is planned to be loaded. However, agreements necessary to restart Takahama have not yet been signed. It would be egregious and totally unacceptable if the company restarted Takahama in an unreasonable, high-handed manner, as it did when restarting the Ohi Nuclear Power Station without settling the dispute concerning faults.

The Fukushima Daiichi accident nullified past safety evaluation results and the agreements with local governments concerning the pluthermal project. We believe that the project should be discontinued, but if KEPCO intends to continue it, the company should request the reimplementation of the safety evaluations, and obtain agreements from local governments based on the new evaluation results. The pluthermal project should be properly positioned in the renewed safety measures strengthened after the Fukushima accident, and severe-accident countermeasures should be established in consideration of loaded MOX fuel.

That KEPCO shows no sign of taking these minimal actions, but is proceeding with the pluthermal project in the conventional manner, is proof that the company regards the Fukushima Daiichi accident as someone else's problem and is making no attempt to learn from the accident. What KEPCO is doing is an act of barbarism.

In addition, the method for treating and disposing of spent MOX fuel emanating from the pluthermal project is unknown. Constructing a second spent fuel reprocessing plant in addition to the Rokkasho reprocessing plant is utterly unimaginable. The spent MOX fuel will need to be disposed of without reprocessing. MOX fuel disposal is also more difficult than spent uranium fuels and would need to be placed under control for far longer than spent uranium fuels. As a company that will produce such spent nuclear fuels, KEPCO is required to handle the cumbersome spent MOX fuel under its own responsibility, but no such intention can be seen from the company's attitude. In fact, KEPCO is even attempting to pass the responsibility on to the Japanese government in a repeat of truly irresponsible behavior

If KEPCO took the unprecedented nuclear accident of March 2011 seriously and made a cool assessment of the countermeasures to be taken and the responsibilities faced in the case of a severe accident of a reactor loaded with MOX fuel, KEPCO should understand that the loading of MOX fuel is a totally irrational act. The loading of MOX fuel into nuclear reactors is something that should never happen.

Report on the 82nd CNIC Public Research Meeting What are the Problems with the Nuclear Regulation Authority's New Safety Standards?

Speaker: Mr. Satoshi Sato (Director and Vice-President of Master Power Associates Co., Ltd., and former General Electric nuclear power plant engineer)

The Nuclear Regulation Authority (NRA) accepted public comments on its new safety standards for nuclear power reactors during the 30 days from 11 April to 10 May.[1] To stimulate the interest of citizens in this public comment opportunity, CNIC invited Mr. Satoshi Sato, a former nuclear power plant engineer who is very well versed in the details of global nuclear power plant safety standards, to give a commentary on the new draft safety standards at a public research meeting on 26 April.[2] Below is a report on the talk given by Mr. Sato.

1. A short deliberation period on a wide-ranging topic

In February this year (2013), the NRA solicited public comments on the Draft Framework for Safety Standards (design criteria, severe accident countermeasures, and earthquake/tsunami countermeasures), allowing three weeks for comments. In fact, these documents were nothing more than a rehash of the General Criteria prepared by the US Nuclear Regulatory Commission (NRC) in 1967. The period allowed for public comments for the General Criteria was two months.

This time, the NRA has set a period of 30 days for comments on the Draft Safety Standards, 27 documents consisting of over 3,000 pages, based on one part of the NRA Draft Framework for Safety Standards. Included in these are the regulations for research reactors such as the fast breeder reactor Monju.

Management capabilities at Fukushima Daiichi Nuclear Power Station have been deteriorating on a daily basis, leading to a situation where the management has even been made to look like a fool by a rat.[3] Does the NRA truly have the time to deal with safety standards for Monju and reprocessing in a situation like this? The NRA should be aware of the concerns about nuclear power that are spreading among the citizens of this country.

In spite of this, the regulations relating to research reactors have been prepared at the same time as those for commercial nuclear power plants. It can only be thought that the NRA is attempting to dilute the public comments. I feel very strongly the differences in safety culture between Japan and the West.

2. The limits of safety standards and safety culture

Safety standards are one part of the regulatory infrastructure, and even if reactors pass the reviews and inspections these do not necessarily guarantee their safety.

The safety review of nuclear power plants should not consist only of the screening of documents; an onsite inspection is also absolutely necessary. The NRC, for example, carries out reviews in its Maryland headquarters, and inspections are carried out on a continual basis by the inspector based at each nuclear power plant and each regional inspector. It is not the case at all that inspections are over after just one visit to a power plant.

Also, in the case of the US regulatory system, there are firstly laws and regulations, the details of which are indicated in regulatory guidelines, in which civil criteria and notifications are referred to. Nevertheless, however meticulous the regulatory structure may be, there are always a large number of loopholes.

The Photo of 82nd CNIC Public Research Meeting

It is therefore extremely important to build up a safety culture where those involved make a positive and collective effort to block off the loopholes.

3. The erosion of defense in depth

The basis of the safety functions of nuclear reactors are the three functions of shutting down (the nuclear reaction), cooling (the nuclear reactor) and containing (radioactive material).

Nuclear power plants are built so that in the event of a LOCA (Loss Of Coolant Accident) a large number of safety devices, such as the ECCS (Emergency Core Cooling System) operate automatically to secure these three safety functions (defense in depth). Therefore, at first glance, it appears that nuclear power plants can be operated safely.

In Japan's nuclear industry, however, the fact is that defense in depth and safety culture have continually been pushed into the background.

For instance, since the 1970s the industry has been plagued with the problem of the "stress corrosion cracking"[4] of nuclear reactor piping. Naturally, this has also occurred in Japan, but the nuclear industry has not publicized this fact, and has replaced the cracked pipes and so on under the name of preventive maintenance.

In addition, although as a general rule defense in depth is demanded "in principle," there are many cases where exceptions are allowed. Despite the suppression pool having an extremely important function for safety, once it is damaged, it cannot be replaced. The high pressure system of the ECCS is supplied with water from the condensate storage tank, but there is only one of these tanks. There is also only one fuel tank for the diesel engines.

4. Five angles for the safety regulations

1. Under previous safety evaluation guidelines, loss of external power supply, deterioration of the containment vessel, damage to the nuclear reactor building and so on were thought to be impossible from an engineering point of view and were therefore excluded from consideration. However, all the accidents that were thought to be impossible happened at Fukushima Daiichi Nuclear Power Station. Further, according to Site Evaluation Application Criteria, even if such accidents were to occur, it was thought that the amount of radioactive material released would be within a certain permissible limit and would be within the confines of the nuclear power plant site, but at Fukushima 10,000 times the assumed amount of radioactive material was released. This indicates that Site Evaluation Application Criteria and the safety evaluation guidelines are mistaken and should be reviewed.
2. Having workers take part in emergency operations under conditions that involve exposure to high levels of radiation is a breach of the Constitution and the Labor Standards Act. Despite this, everything is permitted since it is an emergency. In order to have people take part in emergency operations, informed consent and voluntarism are indispensible.
3. In the case of fire prevention, the nuclear power plant's fire fighting team is only supposed to carry out initial fire fighting activities until the local fire department arrives, but as there are many hazards in nuclear power plants it should be the power plant's fire fighting team, which is familiar with the site, that handles all emergencies rather than an external fire department.
4. In Seismic Design, in the four serious earthquakes that have occurred in Japan since 2005, tremors exceeding the standard earthquake have occurred five times. I think that the lack of an intention to change this lax earthquake resistance policy should be seen as a problem. The earthquake resistance strength is also dealt with only at the analytical level, but this is inadequate since we cannot know what is happening inside components with a complex structure, such as electronic equipment, simply by analysis; experiments should actually be carried out and earthquake-proof models accredited.
5. What ought to be the greatest source of trust at a nuclear power plant is the power company's own safety culture. Up to now, however, the power companies have shown the most enthusiasm for whittling away safety standards. Thus it is necessary to build up a culture of safety.

5. Conclusion

Nuclear power plants began with Eisenhower's "Atoms for Peace" speech. At present, however, we are rushing forward in a very dangerous direction. The next generation will face great torment if regulations are not strengthened.

Postscript

The NRA began work in September 2012. The legal basis for its foundation, the Act for the Establishment of the Nuclear Regulatory Authority, stipulates that the various safety standards for nuclear power plants shall be established by July 2013. On this basis, the NRA has been working quickly since last year to formulate the safety standards. At the 11th NRA meeting on 19 July 2013, the draft safety standards, slightly amended on the basis of the public comments, were approved and it was decided that the new safety standards would be enforced from 8 July. As Mr. Sato pointed out in his talk, the formulated safety standards

have many problems which have not been resolved even having passed through the public comments process.

In this section I would like to point out the problems of the safety standards by focusing on two points. One is the problem of the screening and assessment system and the other is a problem of the procedure for formulating the safety standards.

The first problem, that of the assessment system, is an extremely important one. In the case of the assessment system for restarting the nuclear power plants that are now shut down, the power companies make an application to the effect that they are carrying out safety measures based on the safety standards, which is then assessed by the Secretariat of the NRA and approved by the NRA Commission.

The new safety standards do not contain any criteria in the form of certain standards that have to be met. It is left to the power companies to consider what kind of protection measures to formulate and to take countermeasures. The NRA Secretariat then confirms whether or not the protection measures will be able to fully cope with the risks laid out in the safety measures, and this is finally approved by the NRA Commission. It is thought that a "safety culture" will be built up within the power companies through this process.

However, the vast majority of the staff of the NRA Secretariat have simply shifted across from the former Nuclear and Industrial Safety Agency (NISA) – just those people who have been pointed out as being "regulatory captives" in the past. It is these people, who have made scant effort to look back at the Fukushima Daiichi Nuclear Power Station accident, who will screen the documentation submitted by the power companies and carry out the onsite inspections, and it is these power companies who are now choking in red ink due to the current heavy reliance on thermal power generation, desperately screaming that all will be fine if only the nuclear power plants could be operated, and yet who at present have not a shred of "safety culture."

With no clear regulatory criteria, power companies lacking in safety culture, and a staff of "regulatory captives" who have simply shifted sideways and are continuing to carry out regulation, can we have confidence safety will be guaranteed? It is extremely doubtful.

The second point concerns the procedure of the formulation of the safety standards. During the period when the safety standards were being formulated there was absolutely no explanation to citizens, and although the opinions of the power companies were sought, those of other knowledgeable people who are critical of nuclear power were not. In addition, while opportunities to submit public comments were implemented twice, the submission periods were short and the opinions sent in were hardly reflected in the formulation process at all.

Nuclear power plants are extremely complex systems that make comprehensive use of a wide range of skills and knowledge. Yet despite the fact that after the experience of March 11, 2011 three accident inquiry commissions, the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, the Japanese Government Investigation Committee on the Accident at the Fukushima Nuclear Power Stations, and the (private) Independent Investigation Commission on the Fukushima Nuclear Accident, all pointed out that there were great flaws in the existing regulatory procedures, the formulation of the new safety standards, which according to the NRA Commissioner Toyoshi Fuketa "would normally take five years," were completed in a mere ten months and almost entirely by interested parties. This is a huge problem.

Given the large number of criticisms of the safety standards, even if there is a statutory limit on the formation of the standards, should the law be amended to allow careful and thorough consideration of their formulation?

As the new safety standards are enforced, the power companies submitted their applications for restarting nuclear power plants. Applications for 12 nuclear power plants have already been handed in: Hokkaido Electric Power Company's Tomari Nuclear Power Station Unit 1-3, Kansai Electric Power Company's Ohi Nuclear Power Station Unit 3 and 4, Takahama Nuclear Power Station Unit 3 and 4, Shikoku Electric Power Company's Ikata Nuclear Power Station Unit 3, as well as Kyushu Electric Power Company's Genkai Nuclear Power Station Unit 3 and 4, Sendai Nuclear Power Station Unit 1 and 2.

A staff of 80 in three teams in the NRA Secretariat will screen the applications, a process which is expected to take at least six months.

(Hajime Matsukubo, CNIC)

1: http://www.cnic.jp/5083
2: http://www.cnic.jp/movies/5090
3: Nuke Info Tokyo 154 News Watch
4: Stress Corrosion Cracking is the cracking induced from the combined influence of stress and a corrosive environment.

Newly Required Functions		Countermeasure Examples (Measures of at least equivalent effectiveness will be required)	
Earthquake resistance and anti-tsunami functions (only main items to be strengthened are shown)	No loss of safety from a reference tsunami	Formulation of a reference tsunami, construction of a tsunami barrier and floodgate	
	Tsunami protection facilities must have high earthquake resistance	Secure earthquake resistance of tsunami barrier and tsunami surveillance facilities within power plant site	
	(When necessary, seismic fault evaluation will extend back 400,000 years)	When necessary, survey in detail the seismic activity of faults	
	(Subsurface structure must be known three-dimensionally to formulate a reference earthquake)	Subsurface structure survey using an earthquake simulation vehicle	
	(Buildings, etc. important for safety must be constructed on ground where there is no seismic fault outcrop)	(Buildings, etc. important for safety must be constructed on ground where there is no seismic fault outcrop)	
Functions (design standards) that should be secured by design in order to prevent a severe accident (only main items to be strengthened are shown)	No impairment of safety from volcanoes, tornadoes, external fires, etc.	Evaluation of impacts from volcanoes, tornadoes, external fires, etc., necessary reconstruction, upgrading of procedural documentation, drills	
	No impairment of safety from internal flooding	Evaluation of impacts from internal flooding, necessary reconstruction, upgrading of procedural documentation, drills	
	No impairment of safety from internal fires	Prevention of occurrence of fires, detection and extinguishing, necessary reconstruction, upgrading of procedural documentation and drills for reducing impacts	
	Securing of reliability of safety-critical functions	Duplication of safety-critical piping, etc.	
	Securing of reliability of electrical system	Two independent external power lines, securing of earthquake resistance, etc. for switching station and emergency DG (Diesel Generator) fuel tank.	
	Physical protection of systems for conveying heat to final heat sink	Physical protection, etc. of seawater pumps	
Functions necessary for responding to a severe accident (all new regulatory requirements) 1/2	Reactor shutdown functions	Equipment of injecting boric acid solution, upgrading of procedural documentation and drills	
	Cooling function when reactor coolant is at high pressure	Maintenance and upgrading, etc. of batteries for operation of valves necessary to start RCIC (Reactor Core Isolation Cooling system), etc., upgrading of procedural documentation and drills	
	Pressure-reducing function for pressure boundary of reactor coolant	Maintenance and upgrading, etc. of batteries for operation of pressure-reduction valves, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Cooling function when reactor coolant is at low pressure	Installation of permanent water injection equipment, deployment of portable water injection equipment, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Function of securing final heat sink in measures to prevent an accident developing into a severe accident	Deployment of vehicle-mounted substitute final heat sink, upgrading of procedural documentation and drills	

It is requested that all necessary functions are in place at the time of scheduled enforcement in mid-July

The backup measures for reliability improvements are requested by five years following scheduled enforcement in mid-July

(Extension of application for five years after enforcement)

Newly Required Functions		Countermeasure Examples (Measures of at least equivalent effectiveness will be required)	
Functions necessary for responding to a severe accident (all new regulatory requirements) 2/2	Function for cooling, pressure reduction and lowering of radioactive materials in the interior atmosphere of the containment vessel.	Upgrading of substitute water injection equipment for containment vessel spray, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Function for prevention of overpressure damage in the containment vessel	Installation of containment vessel filter vent equipment (BWR; Boiled Water Reactor), upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Function for cooling molten core that has dropped to the lower part of the containment vessel	Installation of water injection equipment for lower part of containment vessel, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Function for prevention of hydrogen explosions inside the containment vessel	Installation of equipment to control the concentration of hydrogen (PWR; Pressured Water Reactor)*, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure*
	Function for prevention of hydrogen explosions in the reactor building, etc.	Installation of equipment to control the pressure of or vent hydrogen, and to monitor hydrogen concentration, upgrading of procedural documentation and drills	* Only in PWR reactor models that require this
	Functions for securing the cooling, shielding and non-criticality of spent fuel pools	Installation of portable substitute water injection equipment and portable spray equipment, upgrading of procedural documentation and drills	
	Water supply function	Securing of water source, transport route, materials and equipment for transportation, upgrading of procedural documentation and drills	
	Electricity power supply function	Deployment of permanent and portable substitute AC power supply, strengthening of (existing) permanent DC power supply equipment, deployment of portable DC power supply equipment, upgrading of procedural documentation and drills	Installation of (third system of) onsite permanent DC power supply equipment as backup measure
	Control room function	Evaluation of exposure at time of reactor core damage and necessary equipment and materials, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure
	Emergency countermeasures site function	Securing of an emergency countermeasures site that will not be affected by earthquakes and tsunamis, exposure evaluation, securing of materials and equipment, etc.	
	Instrumentation function	Maintenance and upgrading, etc. of means of estimating plant state in the case that ability to grasp plant state has been exceeded	
	Monitoring function	Deployment of portable substitute monitoring equipment, upgrading of procedural documentation and drills	
	Telecommunication function	Deployment of telecommunications equipment that can be powered from substitute power supply, upgrading of procedural documentation and drills	
	Function for suppression of the scattering of radioactive materials outside the site	Deployment of portable water cannon equipment, upgrading of procedural documentation and drills	
	Function for carrying out water injection, etc. during large-scale damage to the plant due to large-scale natural disaster or terrorism such as the deliberate crashing of an aircraft, etc. into the plant	Deployment of portable water injection equipment in locations unlikely to be affected by earthquakes, tsunamis or the deliberate crash of an aircraft into the plant, dispersed deployment of power supplies, water cannon equipment, etc., preparation of multiple entrance gates, upgrading of procedural documentation and drills	Installation of specific safety facilities (tentative name) (permanent) as backup measure

It is requested that all necessary functions are in place at the time of scheduled enforcement in mid-July

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Japanese nuclear watchdog's order to ban restart of Monju reactor indicates how disorganized the operator is

It has been decided that the Japan Atomic Energy Agency (JAEA), the national research institute that operates the Monju prototype fast-breeder reactor in Tsuruga, Fukui Prefecture, will be ordered to rebuild its maintenance and safety management systems. This order was issued by the Nuclear Regulation Authority (NRA) following the agency's failure to conduct nearly 10,000 inspections on reactor devices and equipment and sloppy measures taken by JAEA after the failure came to light.

This order prohibits JAEA from engaging in preparatory work, such as reloading the nuclear fuel, to resume reactor operations. Inspections for ensuring safety of the reactor are excluded from this order. The order will be effective until the agency revises its maintenance and management systems, and the regulator verifies the agency's reports on the improvements. The harsh order was issued in response to the agency's skipping of inspections, changing inspection intervals without taking proper procedures, and their failure to take appropriate measures even after this sloppy management was made public. JAEA President, Atsuyuki Suzuki expressed his intention to step down on the day when the order was issued. He can hardly escape the charge that he hastily resigned to dodge possible severe condemnation from the public.

The report JAEA submitted to the NRA on January 31, 2013 said its analysis on the fundamental cause of these questionable practices was carried out in accordance with the "systematic procedures of human-error analysis developed by the great Tokyo Electric Power Co. based on human-factor technology for the purpose of effectively analyzing accidents and other problems."

However, this analysis, described in such pompous and vainglorious language, did not make any mention of JAEA's (1) lax management, (2) insufficient checking functions, (3) inadequate efforts to improve its safety management program, (4) lack of communication between the management and front-line workers, (5) weak corporate safety culture, and other problems. This indicates that the analysis reveals nothing of importance and is therefore worthless.

The JAEA leadership came to know about the skipped inspections after the regulator pointed out the irregularities. The report revealed that JAEA failed to carry out a full-fledged analysis into the cause of such slipshod practices. NRA member Kunihiko Shimazaki sharply criticized JAEA, saying that the agency had attempted to make a short-term fix by compiling a report full of empty jargon, and the fact that such a questionable organization is allowed to exist is a problem in itself. His remarks seem to have hit the nail on the head.

JAEA has thus far carried out seven analyses into fundamental causes of accidents and problems that have occurred at its facilities. The first was conducted following the 1995 leaking of sodium coolant during the trial operation of Monju, causing a fire. Other cases include trouble involving a sodium leakage detector, and a 2010 accident in which a fuel exchanger fell into the reactor. (See Nuke Info Tokyo 126, 134, 138, 139)

JAEA nevertheless continued to make similar, off-the-point comments in its reports on these accidents. Why is it that the agency repeats this inexcusable practice again and again? This question should have also been included among the targets of its fundamental-cause analysis. The agency has been putting inspections of equipment under the charge of the manufacturers and also entrusting dealers with the work of managing inspections. It has been revealed that the intervals between inspections were managed and recorded manually by officials of the sections concerned, and that the unified, computerized management was not carried out. These facts, however, had already been brought to light in previously published analysis reports, and yet JAEA did nothing to improve the situation. What a disorganized, slipshod organization JAEA is!

In the JAEA Tsuruga office that controls the Monju project, the officials charged with the development of the project during the 18 years since Monju has been shut down due to the sodium coolant leakage accident have already retired and few people have full knowledge of the whole system. Moreover, the representatives of the suppliers of parts and equipment have also been replaced by the younger generation. Monju has not operated for any length of time since the 1995 sodium coolant leakage accident and fire. With the passage of time, the outlook for commercialization of the fast-breeder reactor is receding into the distance, and we can now consider that it has effectively disappeared.

To date, one trillion yen has been spent on the Monju project and an additional 55 million yen is being spent on maintenance each day. Which one of the JAEA staff in charge of taking care of the facilities of the stalled Monju reactor believes that the reactor will experience trouble-free operation after being restarted?

The indications are that Monju is becoming old and antiquated while lying idle, rather similar to JAEA's Tsuruga office.

(Hideyuki Ban, Co-director of CNIC)

Resumption of discussions by government working group on nuclear wastes

The working group on nuclear wastes, organized under the nuclear energy subcommittee of the electric power industry committee of the Ministry of Economy, Trade and Industry's Advisory Committee on Natural Resources and Energy, restarted its discussions on May 28, 2013, after a reshuffle of committee members. I was chosen as a member of the working group. The main purpose of the discussion was to review the government's efforts concerning the final disposal of nuclear wastes. The group held its second meeting on June 20, but its review policy still remains unclear. This article will take up the development of the situation pertaining to the final disposal of nuclear wastes and the government's efforts on this issue, which are to be reviewed by this group.

In 1999, a law concerning the processing and disposal of high-level nuclear wastes in Japan, the Designated Radioactive Waste Final Disposal Act, was enacted. This was primarily based on the geological disposal of high-level vitrified wastes. The law provides that vitrified nuclear wastes are buried deep underground, deeper than 300 meters from the surface, and calls for the establishment of an organization in charge of procuring the necessary funds and carrying out this disposal project. The law proposes that the disposal site should be selected through an open application system.

This law was put into effect in 2000, the Nuclear Waste Management Organization of Japan (NUMO) being established on the basis of the law. NUMO is charged with selection of potential disposal sites and the final disposal of nuclear wastes. In 2002, in accordance with the law, NUMO called on 3,000 local governments across the nation to apply for selection as host to a disposal site.

The selection of the disposal site will be conducted in three stages. In the first stage, the districts for brief investigation are chosen through bibliographic surveys. In the second stage, sites for in-depth probing are selected and the overall investigation of each site and its environment is conducted by using exploratory boring and other methods. In the third stage, possible construction locations for disposal sites are selected and detailed investigations carried out by building the necessary underground facilities.

NUMO presumed that the number of local governments applying for selection to host a disposal site would total around ten, of which two would be selected as the sites for detailed probes in the third stage. In the final stage, one of the two sites would be chosen as the final disposal site.

However, it would become necessary to use both sites in the future if the use of nuclear power continues, although no one talks about this possibility openly. The reason for this is that the capacity of the disposal site is estimated at about 40,000 blocks of vitrified nuclear waste, which is equivalent to the total number of spent nuclear fuel rods that would be produced by the year 2020. This means that two or more disposal sites would become necessary if the use of nuclear power continues beyond 2020.

Nevertheless, no local governments applied even for selection to host a site for brief investigation in the first stage. In March 2007, it was revealed that the mayor of Toyo Town in Kochi Prefecture secretly applied without obtaining consent from the town assembly. The town residents stood up, called for a recall election, and demanded enactment of an ordinance that would ban the entry of nuclear wastes into the town. As a result, the mayor resigned, and the recall election was held in April. The newly elected mayor withdrew his town's application. In the wake of this scandal, the then Governor of Kochi Prefecture criticized the government's nuclear energy policy. He said the government cannot obtain local residents' consent by distributing money like water. The government promised to pay two billion yen to each local government if it applied for selection to host the disposal site. Originally, the central government set the amount at 200 million yen, but increased the amount ten-fold to two billion yen after it became clear that no local governments were going to apply.

Following the scandal in Toyo Town, the central government revised a relevant law to obtain the right to directly ask local governments to apply for selection. The government was set to implement the revised law and ask local governments to apply in 2011 when the nuclear disaster occurred at the Fukushima Daiichi Nuclear Power Station. The government was thus forced to suspend this move.

Meanwhile, the Japan Atomic Energy Commission (JAEC) asked the Science Council of Japan (SCJ) in September 2010 to deliberate on the government's efforts concerning the disposal of high-level radioactive wastes. The main points of the deliberation were 1) how the government should explain to the public, local governments that applied or to which a direct request was made to

apply for disposal site selection, and how it should provide them with related information, and 2) to assign NUMO the task of presenting technical reports on this project.

In response, SCJ set up a panel in September 2010 and commenced discussions on these issues. About six months later, the nuclear accident occurred at Fukushima Daiichi Nuclear Power Station and the circumstances surrounding nuclear energy changed dramatically. Reflecting this, the contents of the SCJ report on its discussions also changed drastically.

SCJ has pointed out that there are three problems involving the selection of the nuclear waste disposal site. 1) To try to create a local community consensus for selection to host a high-level radioactive waste disposal site without first creating a national consensus on the nation's nuclear power policy was going about the matter in the reverse order. 2) Measures against possible, extremely long-term radioactive contamination around the disposal site should be devised. 3) Ways should be developed to narrow the wide gap between the advantages to be enjoyed by the consumers in urban areas and the disadvantages to be suffered by the residents in the sparsely-populated district that ends up hosting the nuclear waste disposal site.

Considering that the nuclear disaster in Fukushima was caused by a massive earthquake, SCJ has come to the conclusion that the basic assumption on which the traditional nuclear waste disposal technology was developed has substantially collapsed. Thus it has raised fundamental questions on the open application system for selection of the nuclear waste disposal site and the disposal technology itself. Based on these perceptions, SCJ has presented the following six recommendations.

1. The conventional high-level radioactive waste disposal system should undergo a drastic review (A national consensus on future energy policy should be created first).

2. There is a limit to the government's ability to predict major earthquakes, the movement of geological strata, such as active faults, and other types of disasters, and it is necessary to establish a professional and independent panel capable of discussing such issues openly.

3. A policy framework mainly concerning the "interim storage" of nuclear wastes for periods from several tens of years to several hundreds of years should be created, and "total-volume management" of nuclear wastes (with two different meanings; one is determination of the volume to be created, the other is reduction of the volume created per unit of power generated) be carried out

4. Fairness should be secured in shouldering burdens involving nuclear waste disposal,

5. Discussion meetings should be organized to create a popular consensus on the multistage selection system, and

6. It is necessary to establish the awareness that this project requires tenacious long-term efforts.

JAEC received this report but refused to comply with the recommendation that the total volume of nuclear waste to be stored at the disposal site be set at a fixed amount. However, the government took SCJ's recommendations seriously. The result of this was the establishment of the working group on nuclear wastes.

Although the government is taking the recommendation seriously, it is shelving the procedure to create a national consensus on energy policy (this is not part of the remit of the working group), and is concentrating its efforts solely on devising new ways of tackling high-level radioactive wastes. Under the current circumstances, no matter how many times the government asks local governments to apply for selection as a disposal site, its efforts collapse due to strong opposition from local residents. Confronted with this situation, the government seems to have gained the perception that the first thing it has to do is to forge an environment where local governments can apply more easily. This means that the government is not moving to comply with recommendation 1 to review the reversed procedure of the open application system. I will do my best to help solve this problem. As things stand now, the working group has no choice but to hold small-scale, insignificant discussions.

(Hideyuki Ban, Co-director of CNIC)

Japanese Inventory of Separated Plutonium at the end of fiscal year 2011

Here is the delayed report on Japan's Plutonium data as of the end of fiscal year 2011, prepared by CNIC based on data published by the Japan Atomic Energy Commission in September 2012.
Total fissile plutonium now held by Japan inside and outside the country is 29.6 tons and this has fallen by 0.5 tons since last year.

Plutonium Data (kg、as of end of fiscal year)

1 . Japanese Inventory of Separated Plutonium		2007		2008		2009		2010		2011	
		JAEA	JNFL	JAEA	JNFL	JAEA	JNFL	JAEA	JNFL	JAEA	JNFL
Reprocessing Facilities	Plutonium nitrate etc.	675	865	674	276	673	279	672	281	669	283
	Plutonium oxide	120	1,747	106	3,329	103	3,329	80	3,329	83	3,329
	Total Plutonium	795	2,612	780	3,604	777	3,607	753	3,610	752	3,612
	Total Fissile Plutonium	531	1,721	520	2,344	517	2,346	500	2,347	499	2,348
	Balance	-2			-3	-3	3	-1	2	0	2
Plutonium Fuel Fabrication Plant	Plutonium oxide	2,764		2,495		2,304		1,916		1,941	
	Plutonium in test or fabrication stage	895		1,047		1,008		1,026		976	
	New fuel etc.	303		78		171		424		446	
	Total Plutonium	3,962		3,620		3,483		3,365		3,363	
	Total Fissile Plutonium	2,761		2,515		2,420		2,334		2,333	
	Balance	8		-17		-8		-8		-2	
Nuclear Reactors and Other Facilities	Joyo	126		134		134		134		134	
	Monju	367		699		161		31		31	
	Commercial Reactors	415		415		1458		1600		959	
R&D facilities	Critical experiment etc.	444		444		443		444		444	
	Total Plutonium	1,352		1,692		2,196		2,208		1,568	
	Total Fissile Plutonium	1,007		1,247		1,589		1,549		1,136	
Total Plutonium		8,721		9,696		10,063		9,936		9,295	
Total Fissile Plutonium		6,019		6,625		6,871		6,730		6,316	
2. Overseas Inventory of Separated Plutonium											
Held Overseas	Recovered in UK							17,055		17,028	
	Recovered in France							17,970		17,931	
	Total Plutonium							35,025		34,959	
	UK: Fissile Plutonium	11,332		11,380		11,531		11,643		11,616	
	France: Fissile Plutonium	13,886		13,832		12,599		11,730		11,692	
	Total Fissile Plutonium	25,218		25,212		24,130		23,373		23,308	
3. Separated Plutonium in Use											
Supply	Separated Plutonium	77	1,650	0	1582	0	0	0	0	0	0
Used	for Monju	51		284		191		412		0	
Loaded	Reactors	23		0		1,345		1,462		640	
4. Total Plutonium											
All Plutonium (involve non fissile plutonium)	In Japan	8,721		9,696		10,063		9,936		9,295	
	Overseas							35,025		34,959	
	Total							44,961		44,254	
Fissile Plutonium	In Japan	6,019		6,625		6,871		6,730		6,316	
	Overseas	25,218		25,212		24,130		23,373		23,308	
	Total	31,237		31,837		31,001		30,103		**29,624**	

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

Name of Reactor etc.		End of 2011				
		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			

Group Introduction

Fukushima Poka-Poka Project

OKANO Mika,
Coordinator of Fukushima Poka-Poka Project

The Fukushima Daiichi nuclear disaster in 2011 contaminated many areas in Fukushima Prefecture, Japan. The national government adopted the policy of attempting to decontaminate these areas by removing radioactive substances. The areas include densely populated parts of Fukushima City, which are severely contaminated but have not been officially designated as mandatory evacuation zones.

"We sincerely wish that at least children could evacuate to a safe place and stay there until the decontamination work starts and its effects become apparent." In response to such voices from local residents, the Fukushima Poka-Poka Project (named after a Japanese onomatopoeia indicating warmth) was established as an organizer of getaway programs which took the families, both parents and children, living in relatively high-dose areas in Fukushima Prefecture to the Tsuchiyu Hot Springs and Tsuchiyu Tōge Hot Springs resorts, both of which are located in Fukushima Prefecture but have a low air dose. The programs received favorable comments from the participants, who said they enjoyed staying in the relaxed, low-dose environment. Due to the geographical proximity of the resorts from the contaminated areas where the families lived, participants could easily make the round trip to the resorts by car over a weekend, and thus traveling fatigue was low.

In addition to the short-stay programs in Fukushima Prefecture, we organized collaboration programs with the citizens' group Minami-Bōsō Youth Camp in Chiba Prefecture. Using the summer and winter school vacations, we organized short-stay programs of four days and three nights in Minami-Bōsō City. Children from Fukushima were able to play freely outdoors and enjoy the natural beauty of Chiba. The total number of participants in our programs has exceeded 3,000. To provide information, we also organize informative lectures on an as-needed basis.

A short-stay program using a shared house located in Inawashiro Town, Fukushima Prefecture, is currently underway. The house is located in a less contaminated area. During the previous programs in the Tsuchiyu Hot Springs resorts, participants were able to enjoy leisurely stays in hot-spring inns. At the shared house in Inawashiro Town, the program is slightly different. Unlike stays at inns, lodgers at the shared house prepare their meals together. Therefore we request program participants to join in with the meal preparation and dish washing. In the programs using inns, only a part of the food ingredients used for meals was selected by us. At the shared house, however, the meals are prepared entirely from ingredients

Inawashiro nature tour

we have selected. The joint meal preparation and dish washing provides a good opportunity for friendly exchanges among participants, and some participants say that children look forward to cooking together, which we are pleased to hear. Thanks to support from local residents in Inawashiro Town, we put on nature tours, including a visit to Lake Inawashiro, which participants also enjoy very much.

The Fukushima Poka-Poka Project makes continued efforts to organize better short-stay programs. Currently we are making preparations for a short-stay program in Chiba Prefecture in August. Applications for participation are coming in for the summer program as well as autumn programs. We also plan to organize short stays at hot-spring inns during the winter.

The Fukushima Poka-Poka Project is made possible through donations from the general public. We would very much appreciate your kind support by asking you to donate any sum that you can easily afford.

Please send your donations to our bank accounts at:

Beneficiary Bank: THE TOHO BANK,LTD.
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Name of Payee Account Holder: WATARI THUCHIYU POKA POKA PROJECT Daihyo KANNO Yoshihiro
Payee Address: 101, Soleado I , 95-2, Iwasaki-cho, Watari, Fukushima-Shi, Fukushima 960-8141, Japan
Payee Telephone Number: 090-3982-6393

Fukushima Poka-Poka Project Blog (in Japanese)
http://ameblo.jp/pokapro/

Please write to us at ***pokapoka.watari@gmail.com*** if you would like to receive more information.

NEWS WATCH

Decommissioning of Fukushima Daiichi's four reactors rescheduled to be completed earlier than originally planned

On June 27, 2013, the Japanese government's Council for the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station (chaired by the Minister of Economy, Trade and Industry, Toshimitsu Motegi) adopted the revised version of the mid-and-long-term roadmap toward the decommissioning of Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station Units 1 to 4. The media reports that, compared with the original roadmap established in December 2011, at the earliest the four reactors are planned to be decommissioned between one and six months ahead of the originally scheduled date.

The revised roadmap does not in fact simply shorten the period required for the decommissioning. In consideration of the condition of each reactor, the revised roadmap sets out multiple plans with differing target dates for the completion of each stage of the decommissioning process, such as the relocation of fuel from the spent fuel storage pools and the removal of molten fuel debris (mixed with molten control rods and other components). The completion of decommissioning may be delayed beyond the originally scheduled date depending on the plans that are actually selected.

The debris removal is planned to be performed with the containment vessels filled with water, partially to reduce worker exposure to radioactivity. (Other alternative debris-removing methods will also be studied because filling the containments with water may be problematic in terms of earthquake resistance.) The decommissioning plan for the reactor equipment itself will be mapped out in detail after the fuel has been relocated from the spent fuel storage pools, the debris removed, and the water remaining under the reactor buildings is disposed of.

On June 28, the Nuclear Regulation Authority was given an explanation about the revised roadmap. One commissioner, Toyoshi Fuketa, criticized the plans by saying, "This looks like apple pie in the sky. Resolving the problems at hand must come first, rather than this final decommissioning process [such as debris removal]."

Radioactive leak at the Japan Proton Accelerator Research Complex (J-PARC)

On May 23, 2013, an accident involving the leakage of radioactive materials occurred at the Japan Proton Accelerator Research Complex (J-PARC), Tōkai Village, Ibaraki Prefecture. In the complex operated by the Japan Atomic Energy Agency (JAEA), researchers and graduate students who were conducting an experiment in the radioactivity-controlled area were exposed to radiation, and the radioactive materials were leaked outside the complex.

J-PARC is jointly run by the JAEA and the High Energy Accelerator Research Organization (KEK), Tsukuba City, Ibaraki Prefecture. On the day when the accident occurred, the researchers and students were conducting an experiment to generate elementary particles by irradiating a gold object with a high-energy proton beam. When the energy of the beam became excessively high, the gold object was fused and evaporated, generating radioactive substances. These substances spread, exposing 34 researchers and students to a radiation dose of 0.1 to 1.7 millisieverts. The researchers handled the accident in an absurd manner: They reset the alarm device and continued the experiment while causing the radioactive material to spread outside the building through a ventilation fan.

The report of the accident to the Nuclear Regulation Authority and Ibaraki Prefectural Office was delayed. It was finally reported 36 hours after the occurrence of the accident. The ventilator fan continued to spin for nearly three days.

Japan Nuclear Fuel Ltd. and Areva issue a statement of cooperation

On June 7, 2013, Japanese Prime Minister Shinzo Abe and French President François Hollande agreed on and released a joint statement to promote comprehensive cooperation in the field of nuclear power. In step with this, Japan Nuclear Fuel Limited (JNFL) and Areva released a Joint Statement on the Future of Nuclear Fuel Recycling. Areva says in the statement that it will support JNFL concerning all the facilities of the Rokkasho Reprocessing Plant, including the high-level liquid radioactive waste vitrification furnaces, in addition to those covered in past technical transfer agreements.

Vitrification tests end at the Rokkasho Reprocessing Plant

The Rokkasho Reprocessing Plant, Aomori Prefecture, performed a high-level liquid radioactive waste vitrification test on furnace A of the vitrification facility from May 8 to May 26, 2013. The test on vitrification furnace B was completed on January 3. "All tests required before pre-operational inspection by the authorities have been completed," says Japan Nuclear Fuel Ltd. (JNFL), the operator of the plant.

The Nuclear Regulation Authority plans to perform the pre-operational inspection on the plant after the new regulation standards take effect in December 2013. JNFL has not withdrawn its official stance that the plant would be completed in October 2013, but seems to understand the probability of a further delay in plant completion. At a press conference, the JNFL president, Yoshihiko Kawai indicated that completion in October would in fact be difficult.

Fukushima Prefecture renews demands for the decommissioning of all nuclear power plants in the prefecture

Yuhei Sato, governor of Fukushima Prefecture, handed a written request to Prime Minister Shinzo Abe on June 12, 2013 demanding that all nuclear power plants in the prefecture be decommissioned. The governor made the same request to Naomi Hirose, president of Tokyo Electric Power Company (TEPCO), on June 28. At the TEPCO shareholders' annual meeting held on June 26, the governor favored a shareholder proposal demanding that the Fukushima Daini Nuclear Power Station be decommissioned. It was the first time that the Fukushima governor had approved of a shareholder proposal against nuclear power generation. (The proposal was voted down by a slim majority.) The representatives of Shirakawa City and Minami Soma City, Fukushima Prefecture, were also in favor of the proposal. Furthermore, Shirakawa City favored a proposal demanding that the Kashiwazaki-Kariwa Nuclear Power Station in Niigata Prefecture be decommissioned. (This proposal was also voted down.)

Contradicting the election pledge of the LDP Headquarters, the Fukushima Chapter of the ruling Liberal Democratic Party has adopted the pledge for the July 21 Upper House election that all nuclear power plants in the prefecture be decommissioned.

"Frozen soil method" to prevent the inflow of groundwater

To prevent the inflow of groundwater into the Fukushima Daiichi Nuclear Power Station premises, the plan is to create a shielding wall made from frozen soil around the plant. On May 30, Minister of Economy, Trade and Industry, Toshimitsu Motegi, directed Tokyo Electric Power Company President Naomi Hirose to construct a frozen soil wall. Doubts are being voiced about the effects of a wall created by this method, which actually sounds very beneficial to general contractors.

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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