

# Back to Fukushima

Much has been heard from nuclear industry experts since March 2011, but much less from those affected by the tragedy at first hand. I talked to a "liquidator" from the Fukushima clean-up squad and local residents. Their accounts are a chilling echo of those given by Tepco's workers ten years earlier in a survey on subcontracting in the Japanese nuclear industry.<sup>1</sup>

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**Tepco took on temporary workers from poor neighbourhoods to carry out emergency work. Tomioka (Fukushima Prefecture), 18 April 2011.**  
Image: © ZUMAPRESS



1. This is an abridged version of an article to be published in Annie Thébaud-Mony, Paul Jobin, Véronique Daubas-Letourneux, Nathalie Frigul, *Santé au travail, de quoi parlons-nous?*, La Découverte, Paris, 2011.

2. Japanese convention – surname first, given name last – is followed throughout.

3. The sievert is the unit used to measure the radiation to which the general population, workers or patients are exposed – usually of the order of a few millisieverts (mSv) a year.

4. Until 1959, the recommendations were 5 mSv per year for the general population. For workers, they were set at 460 mSv/year until 1950, coming down to 150 mSv/year between 1950 and 1956, and 50 mSv/year until 1990.

On 19 June 2011, Kimura Shinzô<sup>2</sup>, a specialised radiation protection researcher, gave a public talk in the town of Iwaki (30 km south of Fukushima Daiichi) on the state of radioactivity in the region, specifically to pinpoint the "hot spots" to avoid and report his experience with Chernobyl.

After the first explosion on 12 March, and with a decade's research experience behind him in a semi-public agency (National Institute of Radiological Sciences), Mr Kimura sought and was denied permission to go and take radiation level readings in the area. He therefore resigned and went with a group of academic colleagues to take a series of readings from 15 March which they passed on to those most at risk, bringing their specialty - radiation protection – back closer to its original purpose: protecting from the consequences of radioactivity to the extent possible.

A keenly-attentive audience of over 900 people packed the room to hear his talk and ask questions: a young father wanted to know "How long can I let my kids play outside?", while a peasant farmer asked "What do we do with irradiated vegetables? You can't burn them!", prompting a woman to react, "Take them to Tepco! But you can't because the area is off limits!"

After the talk, I encountered T.S., a worker employed for ten years by a local subcontractor specializing in nuclear work for Tepco – Tokyo Electric Company – and other power companies. He had been working

four-day alternating shifts at Fukushima Daiichi since early April. I asked why the Onagawa power station had not been more affected than that at Fukushima Daiichi (Fukushima No. 1 plant) even though situated closer to the epicentre. He said it was partly down to geography – Onagawa stands in a bay and so is less directly exposed to the ocean. But he also stressed that the plant is run not by Tepco but by the Tohoku Electric Power company which operates a hundred-day reactor unit shut-down for fuel replacement and a full system check (reactor, cooling system, turbine, generator, etc.), while Tepco bosses are wont to make their employees and subcontractors get through this critical phase for nuclear power plant safety in less than fifty days. And as T.S. points out, fifty days is just about time enough to rattle through the checks in double quick time and rubber-stamp the official documents. Since returning to Fukushima Daiichi in April, T.S. has already absorbed a body burden of 50 millisieverts<sup>3</sup> (mSv). Still young and single, he worries about his future, but does not feel among those most at risk. He fears more for those hired to recover the debris from explosions in uncontrolled conditions: "There are some places where it's seeping out at high levels, so these guys can cop for more than 100 mSv in a matter of days".

### Exceptional levels becoming permanent

On 15 April 2011, the Japanese Ministry of Labour and Health agreed to enter into negotiations with activist groups in contact with the trade unions on the working conditions and radiation exposure of personnel working at the Fukushima nuclear plant. The activists were outraged by the Ministry's 14 March decision to raise the annual exposure limits from 20 to 250 mSv, citing the state of emergency in Fukushima. Looked at this way, is radiation protection still protection, or more a way to legalize death or limit foreseeable compensation claims? During negotiation sessions which I attended in June and July, a Ministry official vouchsafed that the decision in fact came from Tepco and NISA, the Japanese Nuclear Safety Authority under the Ministry of Economy (METI). The same official also confessed that he was unable to really check the situation locally as he had so far been refused leave to go there. He pinpointed the intrinsic contradictions of radiation protection standards, not just in a crisis but also in normal times. Following the recommendations of the International Commission on Radiological Protection (ICRP), the maximum exposure limit is set at 100 mSv over five years, or 20 mSv per year. But in Japan,

exposure to 5 mSv a year is enough to ground a claim for a recognized occupational disease. It should be said that this recommended exposure level for nuclear workers is twenty times that recommended for the general public (1 mSv per year), and that these levels have steadily been revised downwards<sup>4</sup> without the appropriate measures having been taken for previously "overexposed" workers.

According to figures released by Tepco, 565 of the power generator's own employees and 3,760 employees from partner companies (subcontractors or temporary workers) – 4,325 workers in all – were engaged in radiation work between 12 March and 30 April. On 18 June, of the 3,514 workers examined by a Whole Body Counter (WBC) – a scanner-like device that measures the radiation absorbed by the body – 549 were found to have an internal body burden above 20 mSv (see Table 2) which is already a big concern for these people. But what of the uncontrolled casual workers hired through newspaper small ads or in day labourer districts? As the Ministry of Health official intimated, all these odd-jobbers hired for a few days' work and then abandoned to their fate are highly unlikely to ever get a WBC check. The official at the 26 July meeting (a different and distinctly less empathic one) went so far as to say that in any event, many workers were willing to be exposed to high doses if it meant having work. The activists' furious response was, "So what use are you if you just ignore the Labour Code? What's the point in having a Department of Health and Labour?" The last meeting in August made no more progress on the issue. So effectively, the exceptional permitted levels of 250 mSv per year are settling in as the norm over time.

### Research interrupted

While at Tokyo's Hitotsubashi University in 2002, I undertook research on maintenance in the Japanese nuclear industry which took me to the Fukushima, Hamaoka (south of Tokyo) and Shimane (which supplies electricity to the Hiroshima region) power plants to interview safety and radiation protection managers, and some subcontract workers. Now, the disaster of 11 March 2011 requires another look at the nuclear industry's black hole. What follows is my attempted, and aptly-named, initial post-mortem summary.

I had been first started off on this line of research by what since 11 March 2011 has become a near-mundane recurring question: How could the country that suffered Hiroshima and Nagasaki and is so prone to earthquakes build so many nuclear reactors (51 then, 54 now)? The flagging Japanese anti-nuclear

**Table 1** External radiation exposure of maintenance workers at Fukushima Daiichi nuclear power plant (at 18 June, since March 2011)

Dose in millisieverts (mSv)	Tepco employees	Partner firms	Total
> 250	9	0	9
200 – 250	4	4	8
150 – 199	20	6	26
100 – 149	59	22	81
50 – 99	179	109	288
20 – 49	271	352	623
10 – 19	232	523	755
< 10	650	1074	1724
<b>Total</b>	<b>1424</b>	<b>2090</b>	<b>3514</b>

Source: Tepco, 20 June 2011

**Table 2** Internal radiation exposure of maintenance workers at Fukushima Daiichi nuclear power plant (at 18 June, since March 2011)

Dose in millisieverts (mSv)	Tepco employees	Partner firms	Total
> 250	7	0	7
200 – 250	3	2	5
150 – 199	8	3	11
100 – 149	10	9	19
50 – 99	97	50	147
20 – 49	252	108	360
10 – 19	255	173	428
< 10	792	1745	2537
<b>Total</b>	<b>1424</b>	<b>2090</b>	<b>3514</b>

Source: Tepco, 20 June 2011

movement partly answers the question about nuclear industry growth. The 1960s and 1970s had been marked by an intense wave of anti-nuclear protests, which then receded along with the fortunes of its main political mainstays, Japan's socialist and communist parties. U.S. President Eisenhower's 1953 slogan "Atoms for Peace" triumphed over the anti-nuclear and peace movement headed primarily by two organizations, Gensuikyō and Gensuikin, with Communist Party and Socialist Party links respectively.

I was asked by the latter to act as guide and interpreter for a delegation of victims of French nuclear testing in the Algerian Sahara and at Mururoa, in ceremonies held on 6 August 2002 to commemorate the dropping of the atom bomb on Hiroshima. While Gensuikin was still able to organize an event of this scale, saving the abiding memory of the first "nuclear tests" of Hiroshima and Nagasaki in Japanese public opinion, it confirmed the disconnect between opposition to nuclear power plants and opposition to "atomic energy" symbolizing the bomb and nuclear weapons whose manufacture or use Japan had officially foresworn. Organizations like the Citizens' Nuclear Information Centre (CNIC) strove with some difficulty to halt the spread of nuclear power by bringing citizen oversight to bear. With the media turning a largely deaf ear to their message, these activists constantly ramped up their vigilance and technical analysis in readiness to meet media requests

for information to bring balance to industry and state propaganda. Cases in point were the criticality accident<sup>5</sup> at the Tokaimura nuclear power plant in 1999 where three workers were heavily irradiated, two of whom suffered an agonising death within months<sup>6</sup>, and at Mihama in 2004<sup>7</sup> claiming the lives of five workers, all subcontractors.

### Cover-ups, uncertain safety and market liberalization

The Japanese nuclear industry – Tepco in the lead – has been rocked by scandal for several years. In late August 2002, General Electric<sup>8</sup> engineers reported fraudulent alterations and cover-ups which the nuclear safety authority, placed under the control of the Ministry of Economy, Trade and Industry (METI), finally acknowledged. The headline-grabbing revelations came amidst the slow-to-materialize liberalization of the electricity market urged by METI since the early 1990s. The Japan Atomic Industrial Forum (JAIF) was lined up behind the idea, calling on power companies to show commitment to liberalization, streamline their workforces and work towards greater transparency, following the nuclear industry that had won back public confidence in that way. The JAIF claimed that Japanese power plants were employing twice as many workers as U.S. ones size-for-size. Multi-tier subcontracting in Japan was

5. The criticality risk is the risk of satisfying the conditions required to initiate and sustain a chain reaction where an amount of fissile material over a certain level comes together in one place and in the presence of a substance such as water.

6. Takagi, J. (2000) *Criticality accident at Tokai-mura*, CNIC, Tokyo, and Kamata, S. (2001) *Genpatsu retto o iku* (Through the nuclear power plant archipelago), Shueisha, Tokyo.

7. White, P. (2004) "Five killed in Mihama-3 accident," *Nuke Info*, No. 102, CNIC, Tokyo.

8. General Electric is behind the boiling water reactor technology used in most Japanese nuclear power plants, including the six Fukushima Daiichi reactors.

9. Thébaud-Mony A. (2011) *Nuclear Servitude: Subcontracting and Health in the French Civil Nuclear Industry*, Baywood, New York.

condemned as unnecessarily pushing up maintenance and repair times, and hence costs. The revelations by the General Electric engineers channelled by the METI therefore played into a "virtuous revolution" called for by the nuclear industry in the belief that liberalization would bring transparency of safety with lower operating costs.

The way this two-month media storm unfolded was as if what is after all the inevitable, normal wear and tear of reactor components and the labyrinth of pipework running through nuclear plants had had to be hidden from public gaze. And yet there has been no such a cover-up for conventional power plants, which need the same kind of repairs. Once again, the crux of the problem was clearly radiation and what it does to people and equipment.

While NISA publishes annual figures showing that most of the collective dose is absorbed by outside workers, the figures give no details for the power company subcontractors.

And yet for all these outside workers, their position in the tier of subcontractors is precisely what determines the dose they will inevitably be "doused" with (external radiation) or probably "swallow" (internal contamination with an even greater long-term risk). Skilled workers are mid-way up the tier, but still at frequent risk as evidenced by the post-mortem demands for recognition of a work accident. Right at the bottom stand the workers who carry out primary decontamination to limit the dose of more skilled workers, the "radiation fodder", some of whom in Japan are recruited from the most poverty-stricken groups like the urban homeless. But this does not mean that middle-level personnel – technicians and team leaders – escape scot-free. At this level, the complex web of micro-subcontractors means that a large part of the collective dose can be hidden away to reduce the cost of nuclear power to workers and society.

### Radiation protection as a management method

Work sociologist Annie Thébaud-Mony<sup>9</sup> has shown that subcontracting in France was used to counter the rising labour costs of maintenance while ensuring that exposure limits were not exceeded. What she describes as "job management by dose" consists in spreading the collective dose over a large number of casual workers, so diluting it to the point of making it socially invisible. As power plants age, they become "leakier", requiring more workers to perform maintenance tasks. And despite the claims of many experts, the testimony of workers suggests that radioactivity does

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contribute significantly to wear and tear on the facilities. It is then down to maintenance workers operating in a (radioactive) controlled area to manage this immense contradiction between the requirement for workers to be safe and protected and the economic imperatives of cost management. In June 2002, I visited the Fukushima Daiichi power plant. Tepco executives gave me a polite welcome, but a request for their subcontractor list to allow me to conduct systematic interviews with the workers who actually did the bulk of the maintenance work met with an embarrassed refusal. I was nevertheless able to interview a technician employed by a Kobe subcontractor working for the big three Japanese manufacturers (Hitachi, Toshiba and Mitsubishi) who was responsible for checking and repairing the pumps that are a key part of the cooling system. He told me that some nuclear power plants, including Fukushima Daiichi, now needed twice as many workers as ten years earlier to do the same repairs. He said that for the past two years, the aimed-at unit outage time had been cut to 45 days, following the example of France. This meant more maintenance workers in a shorter time period. The permissible doses of radiation (maximum of 0.1 mSv per day per worker) means that cutting unit outage times forced workers either to skip certain repairs which are essential to the safety of nuclear installations or carry on working at the cost of their health. This leaves it up to each worker to "manage" his radiation protection armed with his dosimeter and dose passbook.

This risk individualization partly explains the initial contradiction in the legislation establishing a total dose of 5 mSv as sufficient to ground an application for recognition, while the maximum exposure limit is 100 mSv in "ordinary circumstances" or 20 mSv per year over 5 years. And it is true that NISA figures show very few workers exceeding 20 mSv per year (see Table 3). But broken down by plant, these statistics do not give the real picture for all the casuals who go from one plant to the next. And the fact of not having their own dose passbook makes it harder for workers to "manage" their dose.

### Representative cases of recognition

Information published by the Ministry of Labour and Health reports only fourteen cases of recognised occupational diseases among nuclear power workers in the history of the Japanese nuclear industry. The first is the posthumous case of M.K. in 1991, who died of leukaemia at age 31, after absorbing a total body burden of 40 mSv for work at Fukushima Daiichi between November 1978 and September 1980; the disease had onset in 1982. His family lodged a claim for recognition as an occupational disease after his death in 1988.<sup>10</sup>

The best documented cases are those that resulted in a public battle, some ending in victory. The first recognized and publicized case, whose name was released by the family, is that of Shimahashi Nobuyuki, who died of leukaemia at age 29 having worked from 1981 to 1988 for a subcontractor for the Chubu electricity company which owns the Hamaoka power plant, south of Tokyo. Assigned to the reactor building when periodic checks were done on the three reactors, he had absorbed a body burden of 50 mSv. The company offered his parents three million yen by way of consolation and pay-off. Appalled and wracked with guilt at having urged their son to carry on working

despite his evident fatigue, his parents applied for recognition. They subsequently discovered that on the very day of his death, the company had falsified his dose passbook. When the company tried to dissuade the parents from applying on the grounds that they would be used by the antinuclear movement, his mother replied, "No, we'll use them!" The Shizuoka labour bureau found in their favour in 1991.<sup>11</sup>

In 2004, Nagao Mitsuaki was granted recognition for myeloma, the first non-leukaemia case (barring the three severely irradiated Tokaimura workers); but he too achieved that result only with large-scale direct action and a nationwide petition of support.

But some cases are off the radar due to family fears of attracting company or community opprobrium and the shame of being the parent of an irradiated child. In 2000, for instance, the Tomioka office also recognized the case of E.T. who had worked for a Tepco subcontractor as a welder at the Fukushima 1 and 2 power plants since 1988, and died of leukaemia at age 46 in November 1999. His family said he had been exposed to a total of 75 mSv. In two other cases, according to documents shown to me by a Tomioka labour bureau employee, "the total radiation dose was below the protection standards" but with no mention as to how reliable the dosimeter levels were or reference to any impact of low doses.

During my investigation, I met Mr. Yokota, the head of a small firm handling radiation protection for subcontract workers for General Electric, Hitachi, Toshiba, Mitsubishi (Japan's four nuclear reactor manufacturers). Mr. Yokota had cancer, and was now out of work because of it. So disgusted was he by Tepco's attitude that he explained to me in detail how he had been complicit in systematic falsification that no-one, least of all Tepco, really believed. He showed me the fake "NAD" (no abnormality detected) stamp he used to falsify the radiation passbooks of workers under his responsibility, for example, after the regulation annual medical check-up if the doctor had found

**Table 3** Number of workers per site (nuclear power plants and other nuclear industry facilities) and average radiation amounts (in 2009)

Number of maintenance sites	1	2	3	4	5	>6	
Dose in millisieverts (mSv)	Number of workers						Total
<5	54 666	11 028	3 386	1 039	358	137	70 614
5–10	1 366	1 119	551	214	89	–	3 359
10–15	459	505	306	129	45	–	1 444
15–20	176	183	102	69	16	–	546
20–25	–	1	1	5	2	–	9
<b>Total workers</b>	<b>56 667</b>	<b>12 836</b>	<b>4 346</b>	<b>1 456</b>	<b>510</b>	<b>137</b>	<b>75 972</b>
<b>Rounded percentages</b>	<b>75 %</b>	<b>17 %</b>	<b>6 %</b>	<b>2 %</b>	<b>0,7 %</b>	<b>0,2 %</b>	<b>100</b>
<b>Average dose (mSv)</b>	<b>0.6</b>	<b>2</b>	<b>3</b>	<b>3.8</b>	<b>3.8</b>	<b>2.9</b>	<b>1.1</b>

Source: CNIC from the National dose registry for radiation workers (Hōshasen jūjisha chūō toroku sentā)

disturbances in blood composition indicating a risk of leukaemia.

But what is the basic strategy of those in charge of the nuclear power installations: turning a blind eye to falsification in order to limit the official amount of radiation to which these workers are officially exposed? Or actually trying to maximize the doses really received to blinker the public perception of the danger of "low doses"? The answer is probably a judicious blend of the two.

### Epidemiology led astray

Radiation protection developed out of studies of the Hiroshima and Nagasaki victims has over the last forty years become the cornerstone of a sophisticated system which, unable to truly protect, is apt to minimize the effects of ionizing radiation on human health through a framework of standards that has been continuously revised downward since its creation, or, by playing down the complexity of carcinogenicity. The workers are the first casualties of this. And others have followed, as witness the tearful resignation on 29 April 2011 of Prime Minister Kan Naoto's adviser on radiation protection Prof. Kosako Toshio for failing to talk the Department of Education out of considering 20 mSv per year as a maximum possible exposure for the children of Fukushima. He was anything but an opponent of nuclear power, but presumably the intrinsic contradiction of radiation protection hit him that day with full force.

Alongside radiation protection, epidemiology can also be led astray from its original purpose to be added to the armoury of means for playing down the effects of radiation on human health. In March 2010, the Japanese Radiation Effects Association handed the Ministry of Science an epidemiological study based on an impressive cohort of 212,000 people from a total of 277,000 people who worked in the nuclear industry between 1990 and 1999.<sup>12</sup> The study found a significant increase in mortality for one type of leukaemia, but considered that for other cancers, there was no difference with

**At a loss how to deal with the scale of the disaster, the governor of Fukushima Province, Yuhei Sato, meditates before a makeshift altar. Namie (Fukushima Prefecture), 15 May 2011.**  
Image: © MAXPPP



the rest of the population. As noted by CNIC activist Watanabe Mikiko, the big problem with this study, like its predecessors, was to look only at mortality and ignore morbidity, i.e., people who already had cancer but were still alive at the survey date. Since April 2011, initiatives have already taken shape in Fukushima around local parent-teacher associations, as well as the measurements taken by Kimura Shinzô's team, as well as foreign organizations like Greenpeace and the Commission for Independent Research and Information on Radioactivity (CRIIRAD). These measurements are already being used by local residents to dismiss government and nuclear safety authority reassurances and protect themselves as best they can from contamination hazards. In the future, they could also provide a starting point for a citizens' epidemiological study to identify victims of the disaster. ●

#### Read more

Jobin, P. (2006) *Maladies industrielles et renouveau syndical au Japon*, Éditions de l'EHESS, Paris.

Jobin, P. (2010) "Les cobayes portent plainte. Usages de l'épidémiologie dans deux affaires de maladies industrielles à Taiwan", *Politix*, vol. 23, No. 91/2010, p. 53-75.

10. Fujita, Y. (1996) *Shirarezaru genpatsu hibaku rodo* (The unknown worker: irradiation in nuclear power plants), Iwanami, Tokyo.

11. Fujita, *op. cit.* and Shimahashi M. (1999) *Musuko wa naze hakketsubyô de Shinda no ka* (Why did our son die of leukemia?), Gijutsu to ningen, Tokyo.

12. Hôshasen eikyô Kyôkai (Radiation Effects Association) (2010) *Genshiryoku hatsuden shisetsu nado hôshasen gyomu jyûjisha nadi ni kakaru ekigakuteki chôsa; dai 4 ki heisei 17-21 nendo* (Epidemiological study of personnel assigned to radiation work in nuclear and other facilities. fourth period, 2005-2009).

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