

NUCLEAR MONITOR

A PUBLICATION OF WORLD INFORMATION SERVICE ON ENERGY (WISE)
AND THE NUCLEAR INFORMATION & RESOURCE SERVICE (NIRS)

wise
World Information Service on Energy
founded in 1978



MARCH 15, 2013 | No. 758

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Editorial

Dear readers of the WISE/NIRS Nuclear Monitor,

This issue of the Monitor focuses exclusively on the aftermath of the Fukushima disaster. Meri Joyce from Peace Boat discusses a range of citizens' action that have sprung up in response to the disaster. Hideyuki Ban from the Citizens' Nuclear Information Center details unfolding debates over energy policy in Japan. Greg McNevin from Greenpeace International talks about the lack of responsibility nuclear reactor suppliers have in the event of a nuclear accident. Nuclear Monitor editor Jim Green discusses some of the research into the long-term cancer death toll from radioactive fallout from Fukushima. We summarise some of the hundreds of world-wide events commemorating the second anniversary of the 3/11 triple-disaster. And the 'In Brief' section summarises reports on a range of issues arising from the Fukushima tragedy – the difficult and contentious clean-up operations within and beyond the reactor site, food contamination, the ongoing suffering of evacuees, and the diminution of media freedom.

In the next edition of the Monitor, M.V. Ramana from Princeton University and author of 'The Power of Promise: Examining Nuclear Energy in India', will update us on the development of fast breeder reactors in India, Diane D'Arrigo from the Nuclear Information and Resource Service will write about ill-advised plans for 'radioactive recycling' in the USA, and we have lots of international nuclear news to catch up on. Feel free to contact us if there are issues you would like to see covered in the Monitor.

Regards from the Nuclear Monitor editorial team
Email: monitor@wiseinternational.org

Fukushima – Citizens' Actions, Two Years On

*Meri Joyce
International Coordinator, Peace Boat (Tokyo, Japan)*

The second anniversary of the March 11 triple-disaster was marked in Japan and around the world by quiet reflection, looking back on the immense damage and suffering the triple disaster has caused, remembering the thousands of lives lost, and considering the deep impact made on the very foundations of Japanese society. Forty thousand people in Tokyo and many more around the nation also gathered the weekend before to call for an end to Japan's reliance on nuclear power, and for the Abe government to respect the majority wishes of the citizens for a nuclear phase-

out – demonstrated for example in the huge turnouts at regular weekly demonstrations, and the tens of thousands of public comments submitted as part of the policy consultation process.

The real damage caused by the Fukushima disaster is not only that which can be simply measured numerically such as radiation doses, but also the more complex and ongoing social impacts. While it is true that at this stage there are no cases of deaths or diseases proven to be caused directly by radiation damage, any appearance

of cancers and other diseases caused by radiation is likely to take several years and the future situation cannot be predicted.

The Japanese Government's Reconstruction Agency announced in August 2012 that more than 1,600 people passed away from "disaster related deaths" such as decreased physical condition following the disaster. Of these, almost half were from Fukushima Prefecture, demonstrating the extreme hardship local citizens were forced to bear as a result of the nuclear crisis. Many farmers and others who lost their livelihoods following the disaster have committed suicide. And even today, there are approximately 160,000 people living in evacuation both within and outside of Fukushima Prefecture, forced to live as internally displaced persons, with even their basic human rights neglected.

Such social and economic damage caused by the disaster is enormous, and difficult to fathom, let alone calculate. Little is known about the situation of workers at the nuclear power plants; agriculture, fisheries and dairy farming were dealt a devastating blow; and food safety is now a serious concern for all of Japan. On top of this, the financial and human costs for stabilising and decommissioning the Fukushima Daiichi Nuclear Power Plant from now on will reach unprecedented amounts. These must all be understood as costs of the nuclear power plant accident.

Yet amidst these overwhelming difficulties, many individuals and citizens groups both in and outside of Fukushima have been struggling tirelessly to address these issues. While immediate activities were focused on emergency relief such as supporting evacuation centres, food provision and so on, the main focus now is on programs for the protection of children, radiation measuring and monitoring, health support, and information dissemination.

The misinformation, deception and confusion following the nuclear disaster has led to a deep-rooted lack of trust amongst citizens towards the government, and serious difficulties still exist regarding access to timely, accurate information. For this reason, groups of citizens have been coming together attempting to monitor and understand the actions of the government and other international agencies active in Fukushima, and ensure that their needs and demands are sufficiently reflected.

For example, in 2012 the International Atomic Energy Agency (IAEA) announced that it would establish a research centre in Fukushima in 2013 focusing on decontamination and health management, and hold a Ministerial Meeting on Nuclear Safety in Koriyama City, Fukushima Prefecture on December 15-17, 2012. Upon hearing this, a group of citizens from various backgrounds and different parts of the prefecture established the Fukushima Action Project (npfree.jp/english.html), which aims to: "raise awareness about these facts, and to ... enable those affected by the TEPCO Fukushima Nuclear Power Plant disaster to monitor the IAEA plans in Fukushima, and ensure that their demands are delivered and that the IAEA research activities are conducted to be for the benefit of the people."

Launched in October 2012, the Fukushima Action Project has held several public events together with international experts to share information about the background and track record of the IAEA, produced information booklets, and successfully lobbied the Japanese Government to hold information sessions for residents before the Ministerial Conference and display messages of local citizens at the conference venue, and meet with IAEA officials to convey their demands. While their capacity and resources are limited, such actions are serving the important purposes of demonstrating the importance of local agency, raising public awareness both amongst local residents and in the rest of Japan – in a situation where it is still very difficult for citizens from Fukushima to raise their voices critically – and finally, working towards acting as a watchdog for the IAEA and Japanese Government activities in the future.

Other significant examples include citizens' groups holding regular health consultation sessions, monitoring the activities of the Radiation Medical Science Centre for the Fukushima Health Management Survey, based at the Fukushima Medical University (www.fmu.ac.jp/radiationhealth), including seeking outside expert analysis and evaluation of the survey design and results, observing and broadcasting live online the committee meetings, and helping to provide opportunities for second opinions and medical check-ups for children and their concerned parents.

Since the first reports of radiation, citizens – despite having no prior experience or knowledge in such matters –

also began to measure the air radiation level in Fukushima, followed by measurements of food items such as rice and vegetables. The Citizens' Radioactivity Measuring Station, established in July 2011 in Fukushima, has played a leading role in this and the health related efforts, continuing to conduct training, measurements, and provide information on internal and external exposure. There are now at least 26 such stations in Fukushima, and many have also been launched in other parts of Japan. Such efforts have also helped to lead the government to provide monitoring services for citizens and also called attention to discrepancies and problems to do with official measurements, and despite resource related and other difficulties continue to provide a vital service to the people of Fukushima. These efforts are largely conducted through the support of outside donors, many from overseas.

External support has, and continues to be, crucial for the citizens of Fukushima. A rural agricultural area, the region was not home to many civil society organisations or NGOs prior to the accident. Furthermore, radiation concerns meant that very few outside organisations, whether from other parts of Japan or overseas, could enter the area to provide aid and relief following the disaster. This issue continues today, where groups which have mobilised large numbers of volunteers to help in recovery activities are not able to conduct similar programs in Fukushima due to radiation contamination and health concerns.

Such limitations highlight the continuing urgent need for outside support, both in relation to resources but also provision of information, independent analysis, and solidarity for the people of Fukushima – both those still resident in the prefecture and also evacuees who have since moved to other parts of Japan. With the ongoing confusion surrounding information, including how to understand radiation and its effects, continued communication and interaction is crucial.

Furthermore, there is also a need to disseminate more information from Fukushima and Japan to the world, in order to enable such engagement to take place in a meaningful way. One effort towards this is the online portal "Fukushima on the Globe" (fukushimaontheglobe.com) set up earlier in 2013 by the Japan NGO Center for International Cooperation (www.janic.org/en), one of the few outside NGOs to set up

a headquarters in Fukushima since the accident and which continues to play a lead role in coordination, communication and linking Fukushima citizens with individuals and groups in both the rest of Japan and around the world.

NGOs are also working to support Fukushima citizens in efforts to tell their stories throughout Japan and internationally. One such example is Mr Hasegawa Kenichi, a dairy farmer from Iitate Village, which was entirely evacuated following the nuclear disaster. Mr Hasegawa is this week in Australia for a speaking tour coordinated by Peace Boat and local Australian organisations.

Mr Hasegawa says: "I hope that hearing my story is an opportunity for people

to understand more about the ongoing situation in Fukushima. It is important to make sure that what is happening in Fukushima is not forgotten. Two years have passed, but nothing has changed. We are still struggling not knowing what will happen in our future. And we are worried about the children. We are still living in evacuation. Will we be able to return in a few years from now? Ever at all? We have no idea. We must prevent any other place from suffering as Fukushima and Japan have. Human beings have opened a Pandora's Box which should not have been touched, and taken out this thing from uranium. Yet this was something which humans could not control. We need to work together to close this Pandora's Box."

While the media and public interest may be fading, the radiation and concerns of citizens are not. Although two years have passed, continued support and solidarity from medical and radiation experts, human rights advocates, and everyday citizens around the world is needed to deal with the ongoing situation in Fukushima, to protect the lives and health of the citizens there, and to prevent such a disaster from ever occurring elsewhere.

Contact: Meri Joyce, Peace Boat, email meri@peaceboat.gr.jp, web www.peaceboat.org.

Post-Fukushima Japanese Nuclear Energy Policy

Hideyuki Ban

Co-Director, Citizens' Nuclear Information Center (CNIC), Tokyo.

Establishment of the Nuclear Regulation Authority

The accident at the Fukushima nuclear power plant led to reflection on the inadequacy of nuclear safety regulation. Both the Nuclear and Industrial Safety Agency (NISA), which was an external bureau of the Ministry of Economy, Trade and Industry (METI), as well as the Nuclear Safety Commission (NSC), which was under the Prime Minister's Office, were shut down and the new Nuclear Regulation Authority (NRA) was established. Moreover, the NRA was put under the Ministry of the Environment (MoE). At long last, nuclear power regulation is an independent system separated from the promotion of nuclear power.

The NRA, which was founded in September 2012, has the authority to grant and withdraw permits and approvals related to nuclear power. Furthermore, the legislation establishing the NRA states that new scientific knowledge can be applied retrospectively to existing nuclear power stations.

As a response to the Fukushima accident, the NRA is in the process of deciding on new guidelines related to nuclear disaster prevention, new nuclear safety standards, and seismic

safety standards. A decision on the new standards will be made by July 2013. Then, based on the new standards, each nuclear power plant will be investigated. After the investigations by the NRA are completed, and if approval from local governments is received, operation of the nuclear power plants can resume.

The NRA has focused on two points. One is whether or not as a counter-measure for severe accidents, a base-isolated building and a vent filter should be installed as a condition for the restart of the nuclear reactors. The power companies strongly demand that these conditions be omitted. With these conditions in place, the resumption of operation within the next three years would become impossible.

The other point is the problem of active faults. The Japanese government originally stated that there were no active faults within nuclear power plant sites. However, the evaluation regarding active faults changed in 2006. Whereas once it was sufficient to trace back 50,000 years, it was decided that the evaluation should go back 120,000 years. And now it has changed again to trace back 400,000 years in cases where a clear judgement cannot be made by tracing back 120,000 years.

At the same time, the government permitted active faults if they do not cross the important facilities of the nuclear power plant. If an active fault crosses a major facility, the NRA will not allow the nuclear power station to resume operation. At present, at several nuclear power plants (Ohi, Tsuruga, Shika, Monju Kashiwazaki-Kariwa, and Higashidori), it is being re-evaluated whether or not some major facilities cross an active fault. So far, investigations have been conducted at the Ohi Nuclear Power Plant and the Tsuruga Nuclear Power Plant. The experts in charge of the investigations acknowledge that there is the possibility of active faults crossing the plants. Despite strong opposition from the power companies, there is the possibility that due to the judgement on active faults several nuclear power plants will be decommissioned.

The attitude of local governments

In April 2012, TEPCO officially declared that it had permanently shut down the four reactors at the Fukushima Dai-ichi Nuclear Power involved in the accident. However, TEPCO still has not decided on the phase out of reactors 5 and 6 at the plant. In opposition to this, the local government and municipalities of Fukushima are demanding that all 10

nuclear power reactors in Fukushima, including the four at the Fukushima Daini plant, be decommissioned.

At the Hamaoka Nuclear Power Plant, in Shizuoka Prefecture, the mayor and council of the neighboring municipalities strongly oppose the resumption of operation of the reactors. The local government, Omaezaki City, welcomes a restart of operation – but since the opposition of neighbouring municipalities is continuing it is difficult for Chubu Electric Power Company to ignore these voices. Meanwhile, Murakami Tatsuya, Mayor of Tokai, declared that he will not approve the restart of the Tokai nuclear plant in Ibaraki Prefecture.

Tokai and Hamaoka both have great problems with emergency planning. The NRA decided to expand the evacuation area to 30 kms radius in the event of a serious accident. Thus Ibaraki governor, where the Tokai nuclear plant is located, has to make evacuation plans for 930,000 people, but the governor states that this is impossible. For Hamaoka an evacuation plan for 740,000 people has become necessary.

The failure of the Basic Energy Plan

The current Basic Energy Plan was worked out by the government in October 2010, half a year before the accident at Fukushima. The Plan was made obsolete by the 3/11 nuclear accident. The 2010 Plan was an outlook to 2030. It highlighted "placing nuclear energy as a key resource and promoting the nuclear fuel cycle". The plan was to achieve Japan's international CO2 reduction commitment by promoting nuclear power as a key energy source.

This plan was due for revision in 2013, but because of the nuclear accident the revision process was started in 2011. Under the Democratic Party of Japan (DPJ) Government, the Energy and Environment Council (EEC) was in charge of this. First, the EEC conducted a verification of the cost of nuclear power. Unlike previous calculations, the Council added costs such as accident treatment costs and research and development costs. Together, these amounted to 8.9 Yen/kWh. However, this number underestimates some costs.

In regard to the revision of the Basic Energy Plan, the EEC consulted with METI about the selection of energy alternatives and with the Japan Atomic Energy Commission about the selection of alternatives for a nuclear fuel cycle.

The selected alternatives were the basis for a national debate.

Energy alternatives

The Fundamental Issues Subcommittee was established within METI and the 25 nominated members started to discuss the energy alternatives in October 2011. The author of this article was elected as a member and took part in the discussion within the Subcommittee. The question of how much electricity should be supplied by nuclear power became the centre of discussion.

After 27 meetings of the Subcommittee, three "Scenarios" were selected, based on the percentage of electricity generated by nuclear power by 2030: 0% (Zero-Scenario), 15% (15-Scenario) or 20-25% (20-25-Scenario). The percentage of renewable energy and thermal power was included in the Scenarios as well. The expectation was that economic growth will be 1% for the next 10 years and 0.8% for the following 10 years. It was assumed that electric power consumption in 2030 will be reduced by up to 10% from 2010. In the Zero-Scenario the ratio of renewable energy will rise to 35%, in the 15-Scenario to 30%, and in the 20-25-Scenario to 25-30%. The rest will be covered by thermal power generation.

National debate

The EEC, which received the report containing the three Scenarios from METI, presented the alternatives to the public and began a public comment program in June 2012. The national debate, which took place in July and August, included public comments, public hearings in 11 places throughout Japan hosted by the government, a deliberative poll, and participation of the government at meetings held by NGOs, industry groups, etc. Several mass media companies also conducted public opinion polls and these were taken into consideration as well.

The total number of public comments was 89,214. Of the comments received, 87% supported the Zero-Scenario and a total of 78% called for an immediate phase-out of nuclear power. At the public hearings, 68% of the participants supported the Zero-Scenario. Further, the result of the deliberative poll was that the more participants considered the issues the more they tended to support the Zero-Scenario. The opinion polls conducted several times by mass media companies showed that besides

strong support for the Zero-Scenario, a lot of people also voted for the 15-Scenario.

As a result of the national debate, the Democratic Party of Japan (DPJ), which was the ruling party at this time, established the Energy and Environment Investigating Committee. On September 6, the DPJ officially announced its proposal, "Heading for a Nuclear Power Free Society", which became the formal policy of the DPJ. Based on this announcement, on September 14 the EEC released the Innovative Strategy for Energy and the Environment (New Strategy) in which it stated: "We will mobilise all policy resources, particularly for the "realisation of a green energy revolution," such a level as to even enable zero operation of nuclear power plants in the 2030's."

At a joint press conference on September 18, the three representative Japanese economic organisations – the Federation of Economic Organisations (Keidanren), the Japan Chamber of Commerce and Industry (JCCI) and the Japan Committee for Economic Development – strongly opposed the decision to phase out nuclear power. However, there are different corporate voices and views, such as the 400 entrepreneurs who established the Network of Business Leaders and Entrepreneurs for a Sustainable Business and Energy Future in April 2012.

The confused nuclear fuel cycle

In the three Scenarios, only the Zero-Scenario called for an end to the reprocessing of nuclear fuel. In the other two Scenarios, both reprocessing and direct disposal of spent nuclear fuel are possible. However, discussion on the nuclear fuel cycle was lost in the debate on nuclear energy.

In the New Strategy concluded by the EEC, it says: "The Government will continue its present nuclear fuel cycle policy to engage in reprocessing projects, and will have discussions responsibly in communicating with related local governments including Aomori Prefecture and with the international community." In the New Strategy, decisions on the future of the Monju Fast Breeder and the start of research on direct disposal of nuclear waste were included.

Before the Fukushima accident, Japan's policy on spent nuclear fuel only focused on reprocessing and no research was conducted into direct disposal of

spent fuel. However, this might have changed as a result of the discussions on nuclear fuel cycle alternatives. For example, in METI's budgetary request for 2013 the cost for research on direct disposal is included. Furthermore, it is unlikely that the Rokkasho reprocessing plant, in Aomori Prefecture, which is still not operating because of ongoing troubles, will be able to process the official capacity of 800 ton/year. The construction of a MOX fuel fabrication plant to consume the surplus plutonium produced by reprocessing has just started. Consequently, even with the Liberal Democratic Party (LDP) in power, the trend from reprocessing to direct disposal of nuclear fuel will probably not change.

Japan Atomic Energy Commission

On October 31, 2012 the government established the Council for Revising the Atomic Energy Commission and the Council, in which the author of this article took part as a nominated member, started its investigation. At the sixth meeting on December 12, the work was summed up in a document called "Basic Point of View".

The debate showed that the AEC did not have authority. Practically, several ministries and government offices have jurisdiction over nuclear policy in Japan and the AEC just collects all the information. In the early days of nuclear power development the AEC had a leading role, but with the reorganisation of the central bureaucracy in 2001 this role fundamentally changed.

In the report it says that the function of the AEC is to guarantee the peaceful use of nuclear material. In a 2012 amendment to the Atomic Energy Basic Law, the purpose of nuclear energy was augmented to include the phrase "to contribute to national security". The DPJ government explained that this refers only to the physical protection of nuclear material, but due to the military implications of this wording the amendment was strongly criticised. There were concerns that the explanation given by the DPJ could change according to the political circumstances.

The report comments on the need for a revision of the Atomic Energy Basic Law. If we are heading for a nuclear phase out by the 2030s, it is necessary to eliminate the words "encouraging the research, development and utilisation of nuclear energy" from Article 1, which states the purpose of the law.

Change of Government

In the Lower House General Election in 2012, the DPJ suffered a crushing defeat and the LDP along with the New Komeito Party came into power. In the lead up to the election, many candidates and parties called for a nuclear phase out and nuclear power was one of the main issues. Anti-nuclear citizens' movements also set up a proposal for a basic law for a nuclear phase out. To some extent it was successful, but on the other hand, as the number of parties supporting a nuclear phase out grew, the votes were scattered between these parties.

After the election, the LDP announced that it will not follow the nuclear phase out policy. But given that the majority of the population still wants a nuclear-free society, the LDP-led government will not be able to ignore this completely.

The 10 reactors in Fukushima will be decommissioned, regardless of what TEPCO thinks. In Hamaoka and/or Tokai the opposition of surrounding local governments cannot be ignored. It will not be possible to forcibly restart the reactors just because there was a change of government. Further, there is the possibility that the outcome of the debate about active faults will lead to the decommissioning of more nuclear plants. Decommissioned plants cannot easily be replaced by new construction, as it is difficult to gain the acceptance of local governments for new plants after the Fukushima accident.

As a member of several committees, I felt that even after the Fukushima accident the influence of the so-called 'nuclear village' still exists. Therefore we who desire a nuclear phase out have to join together with different groups and people and continue to demand that those responsible for the accident be held accountable, and to make sure that the memories of the Fukushima accident do not fade away.

Contact: *Citizens' Nuclear Information Center (CNIC), Tokyo. Web: www.cnic.jp/english. Email cnic@nifty.com*

Whistleblowers show need for nuclear industry accountability

Greg McNevin from Greenpeace International summarises the issues raised in a new report, 'Fukushima Fallout'.

The triple meltdown at the Fukushima Daiichi nuclear power plant – the worst nuclear accident since Chernobyl – not only all but ruined the Tokyo Electric Power Company (TEPCO), one of the largest energy utilities in the world, it also highlighted the total lack of responsibility suppliers of nuclear reactors have in the event of a nuclear accident.

The plant made up less than 5% of TEPCO's business, but the losses it sustained when three of its six reactors exploded in 2011 soon far exceeded

the value of the entire company. Putting aside the immense threats to the health of the people and environment surrounding the plant, having such potential for financial ruin lurking in such a small part of a company's business makes it startling that anyone would be prepared to take such a risk.

Yet in the nuclear business, this risk is not treated like the huge gamble it is in reality. In most cases, nuclear safety laws protect nuclear operators from paying all but a small fraction of the

costs of a disaster, and these laws also protect the suppliers of reactors and other equipment from paying any of the costs of a disaster. This increases risk for operators, for people, for the environment, and for national economies.

Take former Babcock-Hitachi engineer Mitsuhiro Tanaka's story for example. Tanaka exposed a critical flaw in the reactor pressure vessel of the now-exploded number 4 reactor at Fukushima Daiichi. This flaw did not contribute to the explosion itself, but it is a shocking

example of the cost of failure, and the great lengths the nuclear industry goes to keep the myth of nuclear safety alive.

When a manufacturing flaw can bankrupt a company, but it is covered up only to create a potential Fukushima-scale meltdown, then there is a serious problem with the technology, the company behind it, and with laws that don't hold this company responsible.

The Fukushima Daiichi plant was made up almost entirely of reactors with flaws. Dale Bridenbaugh, a General Electric (GE) engineer who quit the company and became a whistleblower in the US. He encountered the dangerous potential of nuclear power in the mid-1970s. When he alerted his employer to the serious issues with the containment vessels it designed and manufactured, GE was more interested in protecting its bottom line.

The substantial risk of failure caused Bridenbaugh to push for the reactors to be shut down for repair, which could have scuttled GE's nuclear business completely. GE chose to keep them online, eventually deploying one at Fukushima Daiichi.

As Tanaka says: "when the stakes are raised to such a height, a company will not choose what is safe and legal. Even if it is dangerous they will choose to save the company from destruction."

You might think "if the fault makes the chance of a major accident so high, why would companies like Hitachi and GE still take such a huge risk?"

You could say possible bankruptcy in the future is better than certain bankruptcy now, however, the shocking reality is these companies, even when they supplied flawed equipment, are not liable for any damage caused by their faulty nuclear technology.

The huge risks the nuclear industry poses were always clear, so in order to create conditions for the technology to flourish, regulations were written to ensure no supplier would be liable for damages in the case of a nuclear accident, and the utilities running the plants would have a cap for how much they would pay.

Nuclear companies around the world are given a free ride to profit, while

taxpayers are put on the hook for the hugely expensive damages when an accident inevitably happens. Worse still, this happens when they are also suffering the tremendous damage a meltdown does to their health, their environment, and their communities.

Given the scope of disaster can far outweigh the worth of any one company, this needs to change. The polluter pays principle needs to be applied in the nuclear industry as it is elsewhere. All nuclear companies need to be made accountable and liable for the disasters they cause. If they are not, then we will have learned no real lessons from Fukushima.

The February 2013 Greenpeace report, 'Fukushima Fallout: Nuclear business makes people pay and suffer', was written by Antony Froggatt, Dr David McNeill, Prof Stephen Thomas and Dr Rianne Teule. It is posted at www.greenpeace.org/international/fukushima-fallout

Contact: Greg McNevin, Greenpeace International communications, greg.mcnevin@greenpeace.org

Fukushima cancer death toll

An article in *Nuclear Monitor* #757 pointed to some preliminary estimates of the long-term cancer death toll from the Fukushima disaster, based on information about radiation releases and exposures (Green, 2013). Specifically, the article pointed to:

- a "very preliminary order-of-magnitude guesstimate" of "around 1000" fatal cancers (von Hippel, 2011); and
- a Stanford University study that estimates "an additional 130 (15–1100) cancer-related mortalities and 180 (24–1800) cancer-related morbidities" (Ten Hoeve and Jacobson, 2012).

Responding to the Ten Hoeve and Jacobson (TH&J) study, Beyea et al. (2013) arrive at a higher estimate. They state: "On balance, the net result of adjusting the TH&J numbers to account for long-term dose from radiocesium is uncertain, but the mid-range estimate for the number of future mortalities is probably closer to 1000 than to 125."

In a web-post, radiation biologist and independent consultant Dr Ian Fairlie (2013) estimates around 3,000 cancer

deaths – about an order of magnitude lower than those from Chernobyl. Of course the Fukushima figures would be much higher if not for the fact that wind blew around 80% of the radioactivity from the Fukushima disaster over the Pacific Ocean.

A media release accompanying a World Health Organization (2013) report released in late February states:

In terms of specific cancers, for people in the most contaminated location, the estimated increased risks over what would normally be expected are:

- all solid cancers – around 4% in females exposed as infants;
- breast cancer – around 6% in females exposed as infants;
- leukaemia – around 7% in males exposed as infants;
- thyroid cancer – up to 70% in females exposed as infants (the normally expected risk of thyroid cancer in females over lifetime is 0.75% and the additional lifetime risk assessed for females exposed as infants in the most affected location is 0.50%).

For people in the second most contaminated location of Fukushima Prefecture, the estimated risks are approximately one-half of those in the location with the highest doses.

However the WHO report provides no information on the number of people in each of the exposed categories. It provides no information on total human radiation doses (a.k.a. collective doses) nor does it provide sufficient information for readers to be able to do those calculations. Thus there is no way of estimating the total number of cancer deaths.

The WHO report excludes radiation doses received by workers at the Fukushima nuclear plant. It also does not consider radiation doses within 20 kms of the Fukushima site, ostensibly because most people in the area were rapidly evacuated and because "such assessment would have required more precise data than were available to the panel." A report by Oda Becker (2012) on behalf of Greenpeace Germany found that people within the 20 km zone are likely to have received high radiation doses before evacuation – but Bec-

ker does not attempt to estimate the number of people who may have been affected.

Commenting on the WHO report, Ian Fairlie (2013b) states: "Despite the report containing some useful information (and some good members on its expert team) it fails in what should have been its most important task – i.e. to calculate collective doses to the people of Fukushima, to the people of Japan and to the people of the Northern hemisphere from the Fukushima accident. Indeed the phrase 'collective dose' does not appear in the report. ... Not only does the report not contain population doses, it appears to have been designed to prevent independent readers and scientists from doing their own calculations. For example, it tries to blind people with science by giving lots of estimates on organ doses (tables 4 and 5) but none on whole body doses, and lots of worker data (tables 6,7,8,9) but relatively little on public doses."

Contact: *Jim Green is editor of the Nuclear Monitor and national nuclear campaigner with Friends of the Earth,*

Australia. monitor@wiseinternational.org

A longer version of this article is posted at foe.org.au/fukushima-cancer

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Fukushima anniversary protests and vigils

Actions and vigils were held in an estimated **270 locations throughout Japan** to mark the second anniversary of the Fukushima disaster. On March 10, an estimated 40,000 protesters demonstrated around **Tokyo**, including in front of the Prime Minister's official residence, ministry offices and Hibiya Park. Weekly anti-nuclear power rallies are still being held in Tokyo, as evidenced by a gathering of some 3,000 people outside the Prime Minister's office one recent cold February evening. The demonstrations are organised by the Metropolitan Coalition Against Nukes, a body made up of 13 groups as well as individual members.

In Fukushima Prefecture, thousands came out to demonstrate against nuclear power. On March 8, a citizens group called Fukushima Smile Project held its 31st anti-nuclear demonstration; the first was held last August.

Perhaps the largest protests were held in **Taiwan**. A March 9 protest in Taipei was attended by around 100,000 people, and tens of thousands participated in protests in other major cities. Taiwan is located on the Pacific Ring of Fire, the same tectonically active region as

Japan. Taiwan's three existing nuclear power plants are situated near to the coast on active fault lines. A partly-constructed fourth reactor is the subject of intense opposition. A referendum on the fourth reactor is expected to be held later this year, and opinion polls currently indicate majority opposition.

In Germany, around 28,000 protesters rallied at four locations on March 9, expressing solidarity with victims of the Fukushima disaster and demanding a halt to the reactors that are still operational in Germany. In Lower Saxony, many thousands took part in a training exercise based on the scenario that an accident had occurred at Grohnde Nuclear Power Plant. People wearing protective gear washed down the vehicles of evacuees from areas in the vicinity of the plant and students took their pets with them as they evacuated in the training exercise. Protests and solidarity events were held in at least 20 locations in Germany.

In Paris, about 20,000 anti-nuclear demonstrators formed a human chain. The event was jointly organised by 26 anti-nuclear groups. Participants gathered at 18 locations in the city and began to

march hand in hand at the same time.

Gatherings in **South Korea** reflected concerns over nuclear energy and nuclear weapons. In Seoul on March 9, several thousand people remembered the victims of the 2011 Great East Japan Earthquake, and also called for denuclearisation of Asia and the world due to concerns about the growing tensions on the Korean Peninsula with a nuclear-capable North Korea. Among the participants were hibakusha who survived the atomic bombings of Hiroshima and Nagasaki in 1945, as well as their descendants.

In London, crowds took to the streets on March 9. The protest was organised by the Sunflower Revolution, CND and Kick Nuclear. Demonstrators, including Japanese expats, wore sunflower garlands and carried an array of sunflower-covered flags and banners as they marched on London's streets.

The **fukushima2013.com website** links to actions that were held in **many other countries** including the Netherlands, Italy, Belgium, Switzerland, New Zealand, Australia, India, Canada, the USA, Taiwan, and Mongolia.

Fukushima survivors launch class action. Hundreds of survivors of the Fukushima nuclear crisis in Japan have filed a class action lawsuit seeking restitution of the region contaminated by radioactive materials. Lawyers for about 800 plaintiffs say the case has been filed with the Fukushima District Court. The plaintiffs are demanding around US\$540 a month from the government and TEPCO until the area is restored. "Through this case, we seek restitution of the region to the condition before radioactive materials contaminated the area, and demand compensation for psychological pains until the restitution is finished," the plaintiff lawyers' statement said. (*Australian Broadcasting Corporation, 'Hundreds of Fukushima survivors launch class action', 11 March 2013.*)

How to clean a reactor site subject to multiple explosions, fires and meltdowns? "It's like going to war with bamboo sticks," said Takuya Hattori, president of the Japan Atomic Industrial Forum and a 36-year TEPCO veteran. "It's a pipe dream," Michio Ishikawa, chief adviser at the Japan Nuclear Technology Institute, said of the 40-year target for cleaning up the site. "It's like the fog of war," said John Raymont, president of U.S.-based Kurion Inc, which supplied a water treatment system briefly used to filter contaminated water at the plant. Keiro Kitagami, a former lawmaker who headed a government task force overseeing R&D for the project, said: "This kind of job has never been done ... The technology, the wherewithal, has never been developed. Basically, we are groping in the dark." (*Reuters, 8 March 2013, 'Insight: Japan's "Long War" to shut down Fukushima'.*)

Nuclear fuel rods at Fukushima. TEPCO is planning to move undamaged fuel rods from reactor #4 to a common fuel pool in an operation that is expected to start in November and take a year to complete. The rods will remain in the common pool for 4–5 years before being placed in safer dry casks being built further away from the sea-front. (*Asia Times Online, 8 March 2013, 'Reality of Fukushima cleanup hits Japan'.*)

Radioactive water. TEPCO is again considering releasing radioactive water into the ocean. The water has been used to cool the Fukushima Daiichi reactors, and is being stored in 930 tanks, each capable of storing 1,000 tons of water. Each tank fills within two and a half days. TEPCO plans to test new purification equipment to remove radioactive substances from the contaminated water. But with the local fisheries industry firmly against any move to release the water into the ocean, the situation remains unresolved. (*The Mainichi, 6 March 2013.*)

Highly radioactive fish. A record concentration of radioactive cesium – 5,100 times the government's food safety standard – was detected in a fish caught near the Fukushima plant, TEPCO said on February 28. (*Asahi Shimbun, 'Record cesium level found in Fukushima fish', 1 March 2013.*)

Food and drink testing. According to the Ministry of Health, Labor and Welfare, central and local governments carried out about 230,000 tests of food and drink between April 2012 and January 2013. About 2,000, or 0.9 percent, had cesium levels exceeding government standards. Marine products, wild meat and mushrooms accounted for 80% of the contaminated items. Fifty-five percent of the samples with higher cesium levels were detected in Fukushima Prefecture, while Iwate, Tochigi, Miyagi, Ibaraki and Gunma prefectures each had more than 100 samples that exceeded the limit. (*Asahi Shimbun, 6 March 2013.*)

80% of evacuees may never return home. Eighty percent of those who have evacuated from Iwate, Miyagi and Fukushima prefectures are unlikely to return to their home-towns, a survey has found. Of the 118 evacuees surveyed by the Mainichi Shimbun recently, 58% said they are considering settling down elsewhere and 22% have already done so. The 80% figure is up from 54% in September 2011. Nearly 60% of the evacuees surveyed said they are in financial distress. (*The Mainichi, 5 March 2013.*)

Half of disaster-hit communities need 6–10 more years to rebuild. Of the 42 local governments devastated by the triple-disaster, just over half say they will need 6–10 more years to completely rebuild their communities, an Asahi Shimbun survey found. Most of the other local governments cited a period of 3–5 years. (*Asahi Shimbun, 1 March 2013.*)

Environmental radiation near Fukushima falling. A radiation survey conducted by the Japanese government found that radiation levels near the Fukushima Daiichi plant fell by 40% in the year to November 2012. Government officials attributed the decline in roughly equal measure to radioactive decay, and to wind and rain moving radioactive material elsewhere. The study used helicopters to measure radiation levels one metre from the ground at approximately 140,000 locations within an 80 km radius of the plant. (*Asahi Shimbun, 2 March 2013, 'Declining radiation measured near Fukushima plant, some blown elsewhere'.*)

Radioactive forests. The Japanese government has not yet decided what to do about contaminated mixed deciduous forests and evergreen timber plantations that cover the majority of the Fukushima prefecture near the ruined nuclear plant. Last year, a committee established by the Ministry of Environment concluded that extensive decontamination efforts could lead to erosion and

undermine tree health, while tree thinning would likely reduce air dose rates only slightly. Numerous local and prefectural officials and forestry industry representatives registered opposition for a variety of reasons – wanting greater human access to forested areas and greater availability of forest foods; concern about contamination spreading from forests to inhabited areas; and commercial interests in plantation forestry and the potential for biomass power plants. There are no good solutions. Extensive decontamination would generate many millions of tonnes of radioactive waste. (*Environmental Health Perspectives*, 1 March 2013, 'A Tale of Two Forests', ehp.niehs.nih.gov/121-a78)

Media freedom plummets in Japan. Japan fell from 22nd to 53rd place in the Reporters Without Borders' most recent ranking of media freedom. This was attributed to a single factor – the lack of access to information related to the Fukushima nuclear disaster. Many reporters have met with restricted access, lack of transparency and even lawsuits. TEPCO has consistently barred access to documents and to people. When freelance and independent reporters were finally allowed into the plant, TEPCO demanded final say over their video and images. An investigative reporter was sued by one of TEPCO's subsidiaries. Freelance journalists and magazines were sued after publishing articles on the collusion between politicians, nuclear construction companies and TEPCO. (*Japan Times*, 10 Feb 2013, 'Nuclear power and press freedom' / *RWB 2013 World Press Freedom Index*, en.rsf.org/press-freedom-index-2013,1054.html)

Workers sent in to reactor building without proper protection. A worker told the Australian Broadcasting Corporation that he was ordered in to tackle the meltdowns wearing insufficient protection gear. Two of his ill-equipped colleagues suffered beta-ray burns after they had to wade through radioactive water. The team leader told workers to ignore warnings from their radiation monitors, saying they must be broken. Three of the team were exposed to 180 mSv of radiation. (*Australian Broadcasting Corporation*, 7 March 2013, 'Fukushima worker sent in despite the radiation, without proper protection'.)

Last July, a subcontracting company admitted that an executive told 14 workers to cover their radiation dosimeters in an effort to give false readings. Workers were told that if they did not comply, they would rapidly exceed the one-year legal limit of 50 mSv and they would have to stop working. (*Australian Broadcasting Corporation*, 22 July 2012, 'Fukushima workers told to lie about radiation exposure'.)

Life as a clean-up worker. Around 3,000 people work at the Fukushima Daiichi plant every day. Clean-up workers employed by the many subcontractors complain of the discomfort of long days spent in stifling protective masks, the stress of the job, and the relatively low pay. The health ministry has revealed that at least 63 Fukushima Daiichi workers were exposed to radiation levels higher than those registered in their personal records between November 2011 and October 2012. The number will grow as the ministry continues to investigate records of workers exposed to radiation between March and October 2011, when radiation levels were higher. By the end of 2012, 146 TEPCO workers and 21 contract workers had exceeded the limit of 100 mSv over five years, TEPCO said. (*The Guardian*, 6 March 2013, 'Life as a Fukushima clean-up worker' / *Asahi Shimbun*, 2 March 2013, '63 workers exposed to higher radiation than logged in their records'.)

Radioactive waste disposal and decontamination. Three workers have come forward to confirm illegal dumping practices of radioactive materials by subcontractors. Earlier this year, a series of articles in *Asahi Shimbun* highlighted numerous similar incidents, but this is the first time that workers themselves have reported being ordered to improperly dispose of waste. The workers said that they were told to dump radioactive branches and leaves into a river in a forest in Tamura, Fukushima Prefecture. (*Asahi Shimbun*, 1 March 2013, 'Workers break silence to allege boss ordered corner-cutting'.)

Pacific coast clean-up controversies. Two years after the triple-disaster, Japan's Pacific coast is littered with debris containing asbestos, lead, PCBs and radioactive waste. Researchers are only beginning to analyse environmental samples for potential health implications, said Shoji Nakayama of the government-affiliated National Institute for Environmental Studies. A probe by the Health, Labor and Welfare Ministry found violations – such as inadequate education and protection from radiation exposure, a lack of medical checks and unpaid salaries and hazard pay – at nearly half of the clean-up operations in Fukushima. About half of the 242 contractors have been reprimanded for violations. (*Associated Press*, 11 March 2013, 'Japan's Clean-Up from 2011 Tsunami, Nuclear Accident Lagging'.)

Mafia accused of cashing in. A member of the Sumiyoshi-kai yakuza group has been arrested after sending three workers to perform decontamination work in Fukushima and taking one-third of their wages. He reportedly told police it was a good way of cashing in on the disaster. Police have launched a series of investigations into the yakuza's attempts to earn money from the Fukushima clean-up, fearing it has become a major income source for organised crime. (*Australian Broadcasting Corporation*, 31 Jan 2013, 'Gangster accused of cashing in on Fukushima disaster'.)

Fukushima plant 'set to collapse' from another quake or tsunami. The Fukushima plant remains critically vulnerable to a new earthquake or tsunami two years after the tragedy, according to senior workers at the plant including members of the so-called Fukushima 50. These nuclear workers, who battled to resolve the initial crisis at the plant and have remained largely silent until now, said they had received massive undocumented exposures to radiation, and the danger money supposed to flow to workers

was being creamed off by unscrupulous companies. (*The Australian*, 9 March 2013, 'Fukushima plant 'set to collapse' from another quake or tsunami'.)

Rally in solidarity with Fukushima workers. Around 480 people, including members of National Union of General Workers, participated in a February 15 rally in Tokyo to protest against poor conditions and poor pay for Fukushima clean-up workers. One of the companies profiting from the clean-up is OZE Corporation – a fully-owned subsidiary of TEPCO. (*LaborNet Japan*, 23 Feb 2013.)

"Nuclear power, for a rich life on correct understanding." Pro-nuclear signboards erected in Futaba, Fukushima Prefecture, in the 1980s have taken on deeply ironical meaning since the nuclear disaster. "Nuclear power, energy for a bright future," one reads, and on the reverse side: "Nuclear power, for a rich life on correct understanding." Former resident Hiroyuki Endo said: "This signboard has become famous since the accident." Futaba is now a ghost-town, with 7,000 former residents scattered across Japan. Endo says he has little hope of returning permanently to his home. (*Asahi Shimbun*, 13 March 2013, 'Empty streets, menacing crows and little hope in towns co-hosting Fukushima plant'.)

Decades of corruption and collusion. A report produced by Friends of the Earth, Australia last year details the decades of corruption and collusion in Japan's nuclear industry in the lead-up to the Fukushima disaster. It covers the following topics: safety breaches and cover-ups; corruption and collusion; nuclear accidents in Japan: earthquake and tsunami risks; and responsibility for the Fukushima disaster. (foe.org.au/anti-nuclear/issues/nfc/power/japan)

WISE/NIRS NUCLEAR MONITOR

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WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

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Paper version	100 Euro	250 Euro
Email version	50 euro	125 Euro

Contact us via:

WISE International

Po Box 59636, 1040 LC Amsterdam, The Netherlands

Web: www.wiseinternational.org

Email: info@wiseinternational.org

Phone: +31 20 6126368

ISSN: 1570-4629

WISE/NIRS offices and relays

WISE Amsterdam

P.O. Box 59636
1040 LC Amsterdam
The Netherlands
Tel: +31 20 612 63 68
Fax: +31 20 689 2179
Email: info@wiseinternational.org
Web: www.wiseinternational.org

NIRS

6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
Tel: +1 301-270-NIRS
(+1 301-270-6477)
Fax: +1 301-270-4291
Email: nirsnet@nirs.org
Web: www.nirs.org

NIRS Southeast

P.O. Box 7586
Asheville, NC 28802
USA
Tel: +1 828 675 1792
Email: nirs@main.nc.us

WISE Argentina

c/o Taller Ecologista
CC 441
2000 Rosario
Argentina
Email: wiseros@ciudad.com.ar
Web: www.taller.org.ar

WISE Austria

WISE Austria
c/o atomstopp
Roland Egger
Promenade 37
4020 Linz
Tel: +43 732 774275
Fax: +43 732 785602

WISE Czech Republic

c/o Jan Beranek
Chyťalky 24
594 55 Dolní Loučky
Czech Republic
Tel: +420 604 207305
Email: wisebrno@ecn.cz
Web: www.wisebrno.cz

WISE India

42/27 Esankai Mani Veethy
Prakkai Road Jn.
Nagercoil 629 002, Tamil Nadu
India
Email: drspudayakumar@yahoo.com;

WISE Japan

P.O. Box 1, Konan Post Office
Hiroshima City 739-1491
Japan

WISE Russia

Moskovsky prospekt 120-34
236006 Kaliningrad
Russia
Tel/fax: +7 903 299 75 84
Email: ecodefense@rambler.ru
Web: www.anti-atom.ru

WISE Slovakia

c/o SZOPK Sirius
Katarina Bartovicova
Godrova 3/b
811 06 Bratislava
Slovak Republic
Tel: +421 905 935353
Email: wise@wise.sk
Web: www.wise.sk

WISE South Africa

c/o Earthlife Africa Cape Town
Maya Aberman
po Box 176
Observatory 7935
Cape Town
South Africa
Tel: + 27 21 447 4912
Fax: + 27 21 447 4912
Email: coordinator@earthlife-ct.org.za
Web: www.earthlife-ct.org.za

WISE Sweden

c/o FMKK
Tegelviksgatan 40
116 41 Stockholm
Sweden
Tel: +46 8 84 1490
Fax: +46 8 84 5181
Email: info@folkkampanjen.se
Web: www.folkkampanjen.se

WISE Ukraine

P.O. Box 73
Rivne-33023
Ukraine
Tel/fax: +380 362 237024
Email: ecoclub@ukrwest.net
Web: www.atominfo.org.ua

WISE Uranium

Peter Diehl
Am Schwedenteich 4
01477 Arnsdorf
Germany
Tel: +49 35200 20737
Email: uranium@t-online.de
Web: www.wise-uranium.org

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