

Environmental Risks/Crimes of Nuclear Power Plant and Complexity Green Criminology: Anatomy of Problematique around Nuclear Power Plant, Earthquake and Environment

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1 Introduction

The report from Intergovernmental Panel on Climate Change highlights the following three points:

- The world would need to freeze emissions by 2015, and cut them by more than half by 2050, to cap the increase in global temperatures to 2 degrees Celsius (3.6 Fahrenheit).
- Emission of green house gases have increased 70 percent since 1970, and in the absence of changes, could rise 90 percent more by 2030.
- To prevent further increases in greenhouse gases, countries would need to expand policies, like taxes on fuel, that reduce emissions. The report also advocates increased research on advances in solar and nuclear power ¹⁾.

In this paper, the incident of Kashiwazaki-Kariwa Nuclear Power Plant struck by a strong earthquake in 16th July 2007 will be examined. In particular, using the perspective of “complexity green criminology,” as a kind of environmental crimes, diverse problems concerning this incident will be deliberated ²⁾.

2 Nuclear Power Plants and Earthquake

2.1 Danger of Nuclear Power Plant exposed by Earthquake

The earthquake off the Sea of Japan on 16th July 2007 demonstrated anew the vulnerability of nuclear power plants when nature unleashes its fury. The temblor had an intensity of upper 6 on the Japanese seismic scale of 7 and struck the Chuetsu area of Niigata

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Prefecture as well as Nagano Prefecture. Some reactors at the Kashiwazaki-Kariwa Nuclear Power Plant operated by Tokyo Electric Power Co. (TEPCO) automatically shut down. The temblor surpassed the anticipated maximum intensity for which the safety of the nuclear reactors had been designed. Radioactive water spilled and a fire broke out.

A total of seven reactors were built in Kashiwazaki and Kariwa, area that suffered the brunt of damage in this quake. The spill occurred in the building housing the No.6 reactor during a routine inspection. The quake apparently caused water to spill out of a pool where spent fuel is stored. The tainted water then flowed into the Sea of Japan. Although TEPCO assured the nation that the radiation in the spilled water was too negligible to have any effect on the environment, it was nevertheless deeply disturbing that radiation leaked in such an unforeseen manner. Black smoke also billowed from a fire at the TEPCO plant. This was an unnerving sight, even though the source of blaze was not in any of the facilities housing the reactors. In a mammoth complexity system such as a nuclear power plant, one problem can quickly trigger another, resulting in catastrophe³⁾.

2.2 Nuclear Reactors on Fault Line

The site of Kashiwazaki-Kariwa Plant has been the source of controversy because it may sit on a potentially dangerous active fault. Now, as matter of some urgency, this situation must be addressed. Not only this but also other nuclear power plants need to be checked for structural safety against temblors. Some support nuclear power, saying that unlike thermal power generation plants that emit massive amount of carbon dioxide, nuclear power plants, which generate clean energy, are useful in preventing the expansion of global warming. We must never lose sight of the fact that Japan is prone to earthquakes. What occurred on 16th July at Kashiwazaki-Kariwa should be taken as a warning over hasty moves toward dependency on nuclear power generation.

As with the Niigata Chuetsu Earthquake in 2004 and the Noto Earthquake in March 2007, whose intensities are similar to the Kashiwazaki-Kariwa, the temblor at KK was also of a type caused by an active fault. Such temblors can strike anytime. While this means that nowhere in Japan is completely safe, there are nevertheless certain areas that are particularly at risk. For instance, the area stretching from northern Niigata Prefecture to the Hokuriku and Kansai regions has accumulated massive underground stress along active faults. The fact has been confirmed by recent satellite surveys. The area is known among seismological experts as the "Niigata-Kobe Tectonic Zone." The Great Hanshin Earthquake in 1995 occurred in this zone, as did the Niigata Chuetsu Earthquake in 2004. The focus of the temblor at KK was also there⁴⁾.

2.3 Earthquake-proof Guidelines

The shaking from the earthquake at KK was the strongest ever recorded at a nuclear power plant in Japan. Although the epicenter was only about 9 kilometers away, there is no excuse for the fire and the spillage of radioactive water after the incident. As a basic premise, each nuclear power plant should be built with every safety measure against contingency.

As many as 55 nuclear reactors dot this earthquake-prone archipelago. The

Earthquake in 2005 off the coast of Miyagi Prefecture and the Noto Peninsula Earthquake in March 2007 were both stronger than anticipated at the Onagawa Nuclear Power Plant of Tohoku Electric Power Co. and the Shika Nuclear Power Plant of Hokuriku Electric Power Co., respectively. The earthquake at KK is believed to have been caused by an active fault in the seabed that had not been considered dangerous. It is possible that Japan is sitting on any number of yet-to-be-known active faults. A much more thorough survey of active faults is called for.

Earthquake-proof guidelines were reinforced last year for the first time in about 30 years. Experiences from the Great Hanshin Earthquake in 1995 and other temblors made it clear that the old guidelines were inadequate because they were calculated only on the basis of a near-field earthquake with a magnitude of around 6.5. While the new guidelines do not give any specific number for the intensity of the anticipated earthquake, they are said to imply a jolt with a magnitude of around 6.8. But the earthquake at KK was of magnitude 6.8, and it caused the radioactive water to spill and a fire. We need to re-examine the adequacy of the new guidelines ⁵⁾.

2.4 Lack of Firefighting Measures

The strong earthquake that damaged Niigata and Nagano prefectures on 16th July has exposed disturbingly poor firefighting capabilities of many nuclear facilities in Japan.

The deadly earthquake caused a fire at the KK Nuclear Power Plant operated by Tokyo Electric Power Co. (TEPCO). The plant's response to the fire was delayed by various factors. Although the transformer that caught fire was far from any of the nuclear reactors on the premises, it was a dangerous incident all the same. It is suspected that the operators lacked precautions for a possible overload in an earthquake. It is believed that the transformer's insulator oil caught fire, but we wonder why this occurred so easily. A bigger question is why it took nearly two hours to extinguish the fire. Local firefighters were late in arriving, but it makes us uneasy to think that the plant workers were unable to douse the fire swiftly by themselves.

Alarmed by the ineptitude, the Ministry of Economy, Trade and Industry, which regulate the power industry, ordered electric power companies and related firms to report on their preparedness for fires at nuclear facilities. The picture that has emerged from the reports submitted to the ministry is quite troubling. Of the 10 companies that operate nuclear power plants, only about half have chemical fire engines and hotlines linked to local fire departments. None of the operators has firefighting squads on duty around the clock at their nuclear power plants. Given the fact revealed by the power companies' reports, there could well be replays of the frightful spectacle at other nuclear power plants.

A fire within a nuclear power plant must be subdued quickly. Otherwise, it could destroy wirings and pipes, triggering a chain reaction of trouble that could eventually lead to a nuclear disaster with a huge leak of radioactivity. It is crucial for all nuclear power plants to have their own systems to douse fires. They also need to have the ability to fight fires without depending on the fire department ⁶⁾.

3 Reactions and Measures taken by Government, TEPCO and IAEA

3.1 Optimistic Stance of White Paper

A mid a fresh wave of public anxiety over nuclear safety triggered by revelations of cover-ups and data falsification, the Japanese government published the white paper on atomic power for 2006 in March 2007. The annual report is quite upbeat about the role nuclear energy can play in efforts to stem global warming. But the state of the nation's nuclear power industry leaves little room for such optimism.

The white paper was compiled by the Japan Atomic Energy Commission, a governmental body responsible for formulating the basic principles of the nuclear energy policy. The document addresses the issue of global warming and argues that nuclear power generation can be "one of the major means" to solve the problem because nuclear power plants emit little carbon dioxide. Drawing on the forecasts about the warming of the global climate contained in the assessment report released in February 2007 by the Intergovernmental Panel on Climate Change, the white paper stresses the advantages of atomic energy. But no argument for expanded use of atomic energy to protect the environment can be convincing unless the safety of nuclear power plants is assured through effective measures to prevent potentially disastrous accidents.

The white paper was released following the disclosure of cover-up of criticality accident at Hokuriku Electric Power Co.'s Shika Nuclear Power Plant in Ishikawa Prefecture. Since there was not enough time to add a reference to the accident to the report, the commission only issued an emergency statement calling for the central government to confirm the safety of nuclear power plants. But in 2006 saw scattered signs of suspected data falsification at nuclear power plants. Fabricated water intake data at hydroelectric dams across the nation also came to light, seriously undermining public confidence in electric power companies. In November 2007, the Nuclear and Industrial Safety Agency ordered the power industry to review all past data about nuclear power plants and disclose any problem. The recent rash of disclosures of cover-ups and data falsification is a result of the review.

Is nuclear energy really a plausible means for curbing global warming? The answer depends on whether a trustworthy safety system will be established at nuclear power plants ⁷⁾.

3.2 Cover-ups of TEPCO

The supposed safety of nuclear power plants may be based on nothing more than fictitious data. Such suspicions arise from a report released in February 2007 by Tokyo Electric Power Co. (TEPCO), in which the company acknowledged that it has falsified 24 cases in regular inspections and four in non-regular inspections since 1977 until now.

TEPCO has been reviewing data since 2002 when cover-ups at its nuclear facilities were brought to light, and the recent report indicates that a lot of misconduct went unnoticed. What should not be overlooked when it comes to playing down measurement data

is the fabrication of radiation levels at the Kashiwazaki-Kariwa Plant in Niigata Prefecture in the mid-1990s. The release of radioactive iodine from ventilators was detected, but staff recorded results after redoing the test improperly, not at the value they initially encountered. What is puzzling is the initial data from the test that was done properly was not sufficiently alarming to require reporting to the national and prefectural governments. So why did TEPCO falsify the data? The concentration level was almost undetectably low, so simply recording even a tiny amount would have been noticeable. Did the technicians try to ignore the anomaly and write the same data as usual because it was bothersome to explain it each time it happened? If falsifying results was the norm that would be a serious matter, so the motive should be identified as quickly as possible.

Pipes of different sizes run throughout nuclear power plants just like blood vessels do in the human body. Measuring data is similar to doing regular health checkups. Small abnormalities can only be detected when accurate data is continuously recorded. Any deviation could be a sign of a major illness, so even small alterations should not be allowed. Heinrich's Law posits that about 300 minor errors can be found in relation to a major accident in a large system. At nuclear facilities, the slightest abnormalities that do not even rank as minor errors must be accurately recorded.

If a major accident strikes a nuclear power plant, there is no turning back time. It is of paramount importance to properly gather and analyze data about mistakes as a safety measure to prevent accidents⁸⁾.

3.3 Nuclear Power Plants out of New Assessment Plan

The recent scandals at electric power companies (cover-ups of accidents at nuclear power plants, data falsification, etc.) have cast grave doubt on the reliability of the nuclear power industry.

It is suspicious that they truly repent their actions. While the companies involved have made their apologies, they oppose to new environmental assessment rules that would require early disclosure of relevant information affecting future projects. This became clear at the 27th March 2007 meeting of the Environment Ministry's research commission, whose task is to introduce crucial early environmental assessments in Japan. The panel removed power plants from the 13 project categories set to be targeted by its new shared guidelines.

In Japan, the standard approach has been to conduct such assessment just prior to launching a project. This inevitably limits the sphere of environmental protection measures because there is seldom time to thoroughly work out ways to protect the environment sufficiently. Assessment should be made long before work actually begins. They should be done in fact while a project blueprint is under study. Internationally, such assessments at the decision-making stage are called Strategic Environmental Assessments (SEAs). The move toward SEAs in Japan was part of a new plan proposed by the panel that was geared to examining location, scale and other project parameters at the initial feasibility study stage. Assessments should occur at the feasibility stage, and multiple proposals should be examined, requiring full disclosure of the facts revealed such studies.

Why were power plants excluded? The commission included a member sympathetic to

the domestic electric power industry and affiliated fields. The member insists that he doesn't see why new environmental assessment rules are needed for their sector. The industry also claims that early information disclosure at the project planning stage is detrimental to corporate interests because it makes it more difficult to build new facilities.

When it comes to disputes over facility locations, early information disclosure can lead to faster resolution of issues. Although an earlier panel meeting had reached agreement on a proposed guideline that included power plants, the final draft removed power plants from the list, probably because of strong oppositions from the Ministry of Economy, Trade and Industry. It is neither logical nor fair to exclude electric power stations from strategic environmental assessments⁹⁾.

3.4 UN Nuclear Site Inspections

The damage the latest quake caused to the KK Plant drew the attention of the International Atomic Energy Agency, the UN nuclear watchdog. A thorough investigation of the impact of the earthquake on the plant and full transparency in such investigation is required. To this end, the IAEA expressed its readiness to assist Japan and offered to send an international expert team to join Japan in assessing the event and its consequences. But the Japanese government rejected this offer, saying it could handle the safety check in its own.

The operator of the plant, Tokyo Electric Power Co., and nuclear regulators have stressed that the amount of radioactivity leaked were extremely low and posed no threat to the environment or local residents. But the damage still raised concerns about the safety at the plant, prompting the government to order it shut until its safety can be confirmed. The earthquake triggered a wave of malfunctions and caused damage at the plant, including a fire that charred an electrical transformer and planks that toppled into a pool of spent nuclear fuel. Four hundred barrels containing low-level nuclear waste tipped over. Radioactive water had sloshed out of a tank and was flushed out to sea, and radioactive material was vented into the air in two separate instances. Officials at the plant have acknowledged that they had not foreseen such a powerful quake hitting the facility. They also repeatedly underreported its impact.

Facing this serious situation, at last, the Japanese government decided to accept the IAEA offer in the interest of international cooperation and information sharing. IAEA Director General, Monamed ElBaradei, welcomes an invitation by the Japanese government to send specialists to jointly examine the current condition of the KK Nuclear Power Plant. He said that this invitation is important for identifying lessons learned that might have implications for the international nuclear safety regime.

4 Grave Environmental Risk of Quake Damage

In the 40 years that Japan had been building nuclear plants, seismic activity was relatively quiet, although not a single nuclear facility was struck by a big quake. The government, along with the power industry and the academic community, all developed the

habit of underestimating the potential risks posed by major quakes.

In the past two years, major quakes took place in close proximity of three nuclear power plants. In each case, the maximum ground motion caused by the quake was stronger than the seismic design criteria for the nuclear power plants. This is the kind of hazardous situation that a very quake-prone nation must expect to occasionally face when it operates so many 55 nuclear reactors. What happened to the KK Nuclear Plant should not be described as “unexpected.” What happened there could have been much worse. If the focus of the quake had been a little farther south-west, toward the plant site, and the magnitude had been 7.5, and if all seven reactors at the plant had been operating, a great disaster, a combination of an earthquake and a nuclear meltdown could have occurred. That would have been a catastrophic event where the damaging effects of the quake itself and radiation leaked from the plant reinforced each other.

TEPCO has been criticized for failing to sufficiently consider the submarine active faults near the plant. The most serious fact is that not only are the new design guidelines defective, but the system to enforce them is in shambles. Much of the blame for the underestimation of the active fault line near the KK Plant rests with the shoddy examination of TEPCO’s design for the plant that overlooked the problem. But no action has been taken against similar serious oversights in the safety inspection, demonstrating the irresponsibility of the nuclear safety authorities¹⁰⁾.

5 Conclusions

Unless radical steps are taken now to reduce the vulnerability of nuclear power plants to earthquake, Japan could experience a true nuclear catastrophe in the near future. We should take a good look into the government’s and companies’ flawed nuclear safety policy along with problems caused by the recent earthquake for a radical reform of the government and companies approach to ensuring the safety of nuclear power plants. Otherwise, there can be no viable future for Japan’s nuclear safety¹¹⁾

Notes

- 1) International Herald Tribune/Asahi, 5-6th May 2007, p.1.
- 2) This article a part of research results subsidized by Grant-in-Aid for Scientific Research 2008, and is based on the paper titled “Environmental Crimes and Green Complexity Criminology” and presented at the 7th Annual Conference of European Society of Criminology, Bologna, Italy, 26-29 September 2007.
- 3) International Herald Tribune/Asahi, 18th July 2007, p.21.
- 4) Ibid.
- 5) International Herald Tribune/Asahi, 19th July 2007, p.23.
- 6) International Herald Tribune/Asahi, 24th July 2007, p.24; International Herald Tribune/Asahi, 19th July 2007, p.23.
- 7) International Herald Tribune/Asahi, 22th March 2007, p.31.
- 8) International Herald Tribune/Asahi, 11-12th February 2007, p.25.
- 9) Opinion of Harashima, S., International Herald Tribune/Asahi, 27th April 2007, p.26.
- 10) Opinion of Ishibashi, K., International Herald Tribune/Asahi, 11-12th August 2007, p.21.
- 11) Ibid.

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