APPEAL
Call for Closure of Kashiwazaki-Kariwa Nuclear Power Plant

On 17 August 2007, the International Atomic Energy Agency (IAEA) fact finding mission released its preliminary report on the impact of the 16 July 2007 Chuetsu-Oki earthquake on Tokyo Electric Power Company's (TEPCO) Kashiwazaki-Kariwa Nuclear Power Plant. The report, compiled on the basis of an investigation that lasted a mere three days, concluded that the plant shut down safely and that the damage was less than expected, even though as yet nothing is known of the condition of key equipment, including the reactor pressure vessel, reactor structural components and internals, and major piping systems. Meanwhile, Haruki Madarame, chairman of the investigation committee established by the Japanese government's Agency for Natural Resources and Energy, by stating that it will take at least 1 to 2 years before the plant can be restarted, lost no time in proclaiming that all 7 units will be restarted eventually. In this way, the belief that the Kashiwazaki-Kariwa Nuclear Power Plant is sure to be restarted is being implanted in the Japanese public consciousness. We find this state of affairs deeply concerning from a straightforward scientific and technical perspective. Our reasons are as stated below.

First, the possibility of occurrence of another huge earthquake near the Kashiwazaki-Kariwa Nuclear Power Plant cannot be ruled out. This region is right in the middle of the Uetsu-Shinetsu fold zone, an area of particularly high crustal activity in the Japan Sea Eastern Margin Mobile Belt and has many active faults. Until the occurrence of the predicted Great Nankai (south sea) earthquake around the middle of this century, there is a high probability that a period of high earthquake activity will continue from the Japan Sea Eastern Margin Mobile Belt to central / southwest Japan (1). It is therefore impossible to say that large earthquakes in this region ended with the 2004 Chuetsu earthquake and the recent Chuetsu-Oki earthquake. Also, we cannot ignore the possibility that, even several to ten years from now, large earthquakes could occur as aftershocks, in the broad sense of the word, of the Chuetsu-Oki earthquake. The IAEA points to the importance of investigation of active faults, but it must not be forgotten that huge earthquakes, which are not related to active faults observed near the surface, could occur.

Second, in the light of the "Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities (Seismic Guide)," which was revised in September last year, it is clearly inconceivable to continue to operate a nuclear power plant at the Kashiwazaki-Kariwa site. The reason for this is that the basic policy stated in the revised Seismic Guide is that all buildings and structures must be installed on ground having enough support performance (2). There can be no doubt now that the ground of the site of the Kashiwazaki-Kariwa Nuclear Power Plant does not fulfill this requirement. This was proved by the damage to many structures at the plant as a result of large-scale, wide-spread ground deformations and failures caused by the Chuetsu-Oki earthquake.

Third, the ground motion due to the earthquake which hit the Kashiwazaki-Kariwa Nuclear Power Plant far exceeded the basic design earthquake ground motion S2 that was assumed when the plant was designed. There is virtually no doubt that the force applied exceeded the elasticity limit of the materials of equipment and facilities categorized as of seismic importance level A (important) or As (most important), including the reactor pressure vessel, the reactor internals, piping, the containment vessel, etc. Hence, even if the minimum functions of "shut down, cooling and containment" were somehow maintained, it should be assumed that plastic deformation (permanent strain) remains in many facilities and items of equipment and that in some cases cracks may have formed. The key problem is that it is impossible to demonstrably determine whether or not dangerous strain remains. All that is possible is to make a guesstimate by inputting the observed earthquake ground motion into numerical simulations, which use assumptions built on top of more assumptions (3). In other words, nobody can objectively claim that the 7 units are sound. As the IAEA has warned, there is a danger that the long-term operation of components could be affected by hidden damage from the earthquake. This does not simply mean that accidents emanating from within the reactor have become more likely. It also means that a major accident could be caused by earthquake ground motion smaller than that of 16 July 2007.

Fourth, we must take the following issues into serious consideration. To begin with, the local residents have kept saying for the last 33 years that the ground condition of the Kashiwazaki-Kariwa Nuclear Power Plant is of very poor quality and that there is a high probability of a major earthquake striking the area because there are several active faults nearby. This was finally proved to be true, at a huge cost, by the recent earthquake disaster. Amidst this misfortune, the one fortunate thing was that on this occasion a major nuclear accident did not occur. However, that was the result of miraculous luck in regard to the way the earthquake occurred. If the source region of the Chuetsu-Oki earthquake had been just a little to the southwest and the magnitude had been in the order of 7.5 like the 1964 Niigata earthquake, the nuclear power plant would have been shaken even more violently. The functions of "shutdown, cooling and containment" might have failed and large quantities of radioactivity might have been released into the environment.

It is unacceptable for the above 4 points to be disregarded, nature to be treated with contempt, and pride in technological ethics to be cast aside just so that the Kashiwazaki-Kariwa Nuclear Power Plant may be reopened. Such a course would expose the local community, Japanese society, and indeed the whole world to serious danger.

It goes without saying that a detailed investigation of the damage to all the facilities, beginning with the inside of the pressure vessel, along with a scientific examination of the ground of the site must now be carried out. However, these should not be carried out on the assumption that the plant will be restarted. They should be carried out as objective scientific and technical investigations to deal with the post-event situation, maintaining the premise that the plant will not necessarily be restarted, keeping in mind the possibility of permanent closure of the plant. Furthermore, the investigation results should not be biased towards the government or the company. We believe that they should be assessed by impartial individuals who also respect the views of the local residents.

This is our fervent appeal.

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Group of Concerned Scientists and Engineers Calling for
the Closure of the Kashiwazaki-Kariwa Nuclear Power Plant

Steering members

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References

1. Such seismically active periods were observed before the 1854 Ansei-Tokai and Ansei-Nankai earthquakes and before the 1944 Tonankai and the 1946 Nankai earthquakes. Meanwhile, there is a view that the following earthquakes are all manifestations of a current active period: 1995 Hyogo-ken Nambu, 2000 Tottori-ken Seibu, 2004 Niigata-ken Chuetsu, 2005 Fukuoka-ken Seiho-Oki, 2007 Noto Peninsula, 2007 Niigata-ken Chuetsu-Oki.
2. The fact that it is "required for all buildings and structures" is clearly explained in Shigeki Nagura, Yosuke Maeda, Hideki Mizuma and Hiroyuki Aoyama's "Revision of Japanese — Examination Guide for Seismic Design of Nuclear Power Reactor Facilities' " (Proceedings of the 12th Japan Earthquake Engineering Symposium, CD-ROM, 43-49, 2006).
3. Damage to facilities and equipment cannot be discerned by visual inspection alone. Even if the existence of cracks can, to some extent, be discerned by non-destructive testing technology used during periodic inspections, it is impossible to check every corner of all the "important" and "most important" equipment of all 7 units. Furthermore, practically usable technology does not exist for non-destructive testing in the cramped confines of a nuclear power plant to ascertain whether or not dangerous deformation has occurred. Consequently, we expect that checks will be restricted to confirming large deformations and damage which can be observed with the naked eye, limited non-destructive tests for cracks in a small number of locations, and estimations of whether dangerous deformation has occurred based on calculations. However, it would be extremely dangerous to restart the plant on the basis of the results of these uncertain calculations.

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