

Comments on Taiwan Stress Test National Report for Nuclear Power Plants
(Part II)

Submitted

by

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August 5, 2013

Summary

After thorough examinations, Taiwan Environmental Protection Union found that *the Taiwan Stress Test National Report for Nuclear Power Plants*, prepared by the Atomic Energy Council of Taiwan, is a carelessly prepared, incomplete report, if not with the intention to mislead readers. There are little discussions on the Instrumentation and Control (I&C) systems in response to extreme external events, even though IAEA indentified I&C *the nervous system of a nuclear power plant*. Within the limited scope of EU Stress Test, key geological parameters are either missing or outdated ones were knowingly provided in this National Report. Very little discussions on volcanic activities and possible impacts are given. The heavily emphasized Ultimate Response Guideline (URG) did not start regulatory assessment when this National Report is in press.

This hastily prepared Taiwan Stress Test National Report contains many biased information and is not a suitable document to conduct EU Stress Test. It is regrettable that this report rouses more suspicion on AEC's independence and its motivation behind the participating EU Stress Test.

Background Introduction

Two things happened in Taiwan lately that are relevant to the coming nuclear 'stress test'. They are the impending downgrade of Taiwanese nuclear regulatory body, the Atomic Energy Council (AEC), and the prospect of having national referendum on Lungmen NPP (4th NPP) at the end of this year. The former one reflects this administration's view on how much independence the nuclear regulatory system needs. Time schedule of the latter event may fix the dates of EU Stress Test and may be responsible for the twisted Taiwan Stress National Report.

Starting January 2012, Taiwanese government began organization restructuring. The initial design was to downgrade the tier-2 Atomic Energy Council (AEC) to tier 3 and divided

into two parts, the Nuclear Safety Administration (NSA) under the new Ministry of Science and Technology, and the Nuclear Research Institute (NRI) under the Ministry of Economic Affairs. At February 2013, the draft version put forward by the Executive Yuan replaces the Nuclear Safety Administration by the Nuclear Safety Council, still a tier 3 organization. It is not clear whether such a slight change would restore part of independent lost in the overall downgrading of the nuclear regulatory body.

February 25th 2013, Premier Jiang proposed using referendum to decide the fate of the controversial, nearly completed 4th NPP (LMNP) during a ruling Chinese Nationalist Party (KMT) weekly meeting. Based on the current Referendum Act, there are two ways to initiate referendum, either through majority support in the Legislative Yuan (Parliament) which KMT dominates, or by collecting more than 5% signatures from eligible voters. KMT prefers the former method. The Referendum Act also requires a voter turnout of more than 50% for the referendum to be valid. From 2004 to 2008, six national referenda were held. Turnouts were between 26 to 45%, and all were rejected. With high turnout as a prerequisite, how to frame the issue determines the fate of referendum. Although the ruling KMT openly support the operation of 4th NPP (LMNP), their proposal is *“Do you agree that the construction of the Fourth Nuclear Power Plant should be halted and that it not becomes operational?”* Since voter turnouts seldom exceeded 50% in the past, it is highly likely that result of referendum will be rejected. It means that the 4th NPP continues and KMT wins. For many, referendum is not used to settle dispute but to legitimize the 4th NPP.

What about safety? On March 5th 2013, Premier Jiang stated *“only when 4th NPP passes safety inspections by international experts and proves operation safely, we then proceed the referendum”*. However, President Ma changed tone in KMT central committee meeting on April 17th by saying 4th NPP (LMNP) *“referendum and safety are two separate issues”*, and safety issue is an intangible “trap”. KMT leaders vow to press the referendum through the Legislative Yuan early August.

Many signs indicate that this administration would let political gain trump nuclear safety. For the coming ‘Stress Test’, the public have little knowledge about the real scopes of the ‘stress test’, and may be tricked to believe international experts guaranteeing the safety of our nuclear plants. It would be disastrous that the ‘Stress Test’ is to serve propaganda purpose instead of promoting nuclear safety.

In the followings, more comments are provided in addition to those sent earlier, on July 4th, 2013. It includes a few new issues and elaborates more on issues mentioned in previous comments.

Additional Comments of the Taiwan Stress Test Nation Report:

1. Little information about I&C systems.

As mentioned in one IAEA report¹ that “*I&C systems are the nervous system of a nuclear power plant*”, there are little information provided in the Taiwan Stress Test National Report (TSTNR). LMNP has two ABWR reactors installed. They are expected to have fully digitized I&C system as Tepco’s Kashiwazaki-Kariwa 6 and 7 have. It is critically important to know how the I&C systems respond to challenges, such as common cause failures, cyber security and emerging technologies, mentioned in IAEA report. It is crucial to know whether all sensors, detectors, transmitters, and data transmission lines meet the temperature, radiation requirements of nuclear power plants, and their responses in case ‘beyond design basis’ extreme conditions occur.

Not only for LMNP, there are little information provided on the I&C systems of CSNP, KSNP, and MSNP in the TSTNP.

2. No information on I&C backups

There are no discussions on backups of the ‘nervous system’ of nuclear power plant in TSTNR. Although one presumes that there are backups for I&C systems, TSTNR needs to assure their existences, describe in what form, and how much redundancy are provided. Their responses to various extreme situations need to be carefully evaluated.

Take the equally entirely digitalized EPR as an example. It is reported² that Finnish regulator requires a hard-wired backup to the digital system. And in 2010, AREVA agreed to modify its US EPR design to include a hard-wired back-up to meet requests by the U.S. NRC. AEC and TPC need to explore the possibility of having hard-wired backup I&C system installed on LMNP.

3. Knowingly provides outdated geological parameters: Faults are much longer than those indicated in TSTNR

The national report, *Taiwan Stress Test National Report for Nuclear Power Plants* (TSTNR) was published on May 28th 2013. It only mentions that “...*the maximum potential earthquake caused by the Shanchiao fault and Henchun fault are still to be evaluated, as they are so close to the Chinshan/Kuosheng and Maanshan NPPs respectively*” (p.51 sect. 2.3, para 5).

¹ Instrumentation and Control (I&C) Systems in Nuclear Power Plants: A Time of Transition. http://www.iaea.org/About/Policy/GC/GC52/GC52InfDocuments/English/gc52inf-3-att5_en.pdf

² Schneider, M and A. Froggatt (2013), “World Nuclear Status Report 2013”.

Earlier, on April 17th 2013, Chairman Tsai of AEC gave a summary report (AEC report) on overall geological survey of all four NPPs³ to the Economic Committee of Legislative Yuan. The 9-page short report stated that Taipower company's (TPC) most recent in-land and under ocean geological survey was submitted to AEC on November 16th 2012, and currently is under review. It said that survey results indicating "*the length of Shanchiao Fault changed from old 50.6km (as written on p.18 of TSTNR) to 74km and possibly extend further into the ocean*", and "*the length of Hengchun Fault changed from initial 16km (as written on p. 20 of the Taiwan National Report) to 41km.*" To be on the safe side, AEC asked the TPC "*use 114km as the length of Shanchiao Fault in seismic assessment due December 2013.*" In the exact same Legislative session, the Central Geological Survey, Ministry of Economic Affairs presented a similar report (the MOEA report), with slightly more details.

AEC owes everyone thorough explanations on why it deliberately ignores the most updated geological information in TSTNR.

4. DBE intact? even fault lengths increase more than twice

Based on Control Yuan investigation report⁴, CSNP and KSNP were designed in the early 70s, and only the non-active ChinSan Fault was considered. ShanChiao Fault was first reported in a geological survey published in 2000, 11 km in length but far away from both NPPs. A report published July 2007 indicated that northern section of SanChiao Fault extend to the current position, 21 km in length. The latest information, mentioned earlier, indicated that length of SanChiao Fault include 34 km inland and at least 40 km under sea.

With such enormous changes, from no active fault to a very long one, it is quite incredible that no need to change the Design Base Earthquake (DBE) of CSNP and KSNP.

5. Hengchun Fault inside MSNP.

In TSTNR, length of Hengchun Fault is 16km inland (p.20), does not extend to sea, and nothing about distance between MSNP and Hengchun Fault. The MOEA report, as in

³ 蔡春鴻, "原子能委員會營運中核電廠與核四廠之地質總檢查專案報告", 2013年4月17日. 立法院第8屆第3會期, 經濟委員會。 Tsai, T. H (2013) "Atomic Energy Council Special Report on Overall Geological Survey of operating NPPs and the Fourth NPP to the Economic Committee, Legislative Yuan" Report to the Economic Committee, Legislative Yuan, April 17 (in Chinese).

⁴ Control Yuan Investigation Report 102-102000131, http://www.cy.gov.tw/AP_HOME/OP_Upload/eDoc/調查報告/102/102000131山腳斷層調查意見-公布.pdf (in Chinese)

AEC report, stated at least 41km in total length, 16 km inland and 25 km in sea, and MSNP nuclear island is only 1.1 km away from Hengchun Fault.

In fact, fault line was found inside MSNP, several hundreds meters from the main entrance. Evidences are provided in the attached Figures 1 and 2, the satellite image of part MSNP, with various locations marked, and the vertical profile of paleo-earthquake trench, respectively. Figure 2 shows that faults found in layers (1530 -1380 Cal BP), (3360-3210 Cal BP), and (3560-3390 Cal BP). These indicate Hengchun Fault being quite active in recent past.

6. Ultimate Response Guideline (URG) only conceptual when TSTNR in print

TPC proclaims that URG is earthquake/tsunami – proof lifeline of nuclear power plants. Many high ranking governmental officials, including President Ma and Premier Jiang, hailed URG as the ultimate solution and safety guarantee. Therefore URG is used to promote nuclear safety in every occasion.

In TSTNR, URG can be found in 1/4 of the document, as if it has passed rigorous evaluation by AEC. However, questions raised by civil society met deaf ear. For example, what happen to the large quantities of radioactive material releasing to environment once URG tripped and TPC plans an immediate depressurizing. Will the immediate pressure release by TPC being too fast to increase the danger of having hydrogen explosion? In response to mounting questions about the URG, AEC released a statement on June 5th, 2012 indicating that URG **WILL** be evaluated⁵.

⁵ <http://www.aec.gov.tw/newsdetail/news/2932.html> (in Chinese)

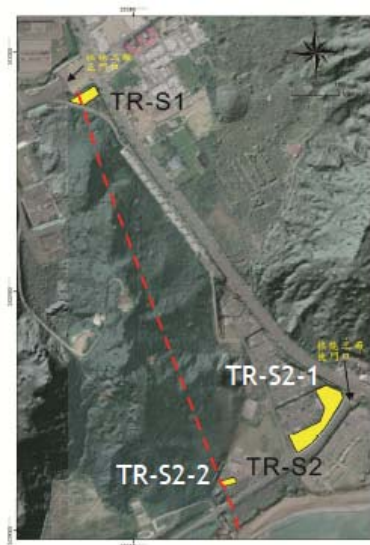


Figure 1. The satellite image of MSNP, lower left half of the map, with main entrance at the upper left corner and one side entrance on lower right corner. TR-S2-2 indicates the excavation site in question.

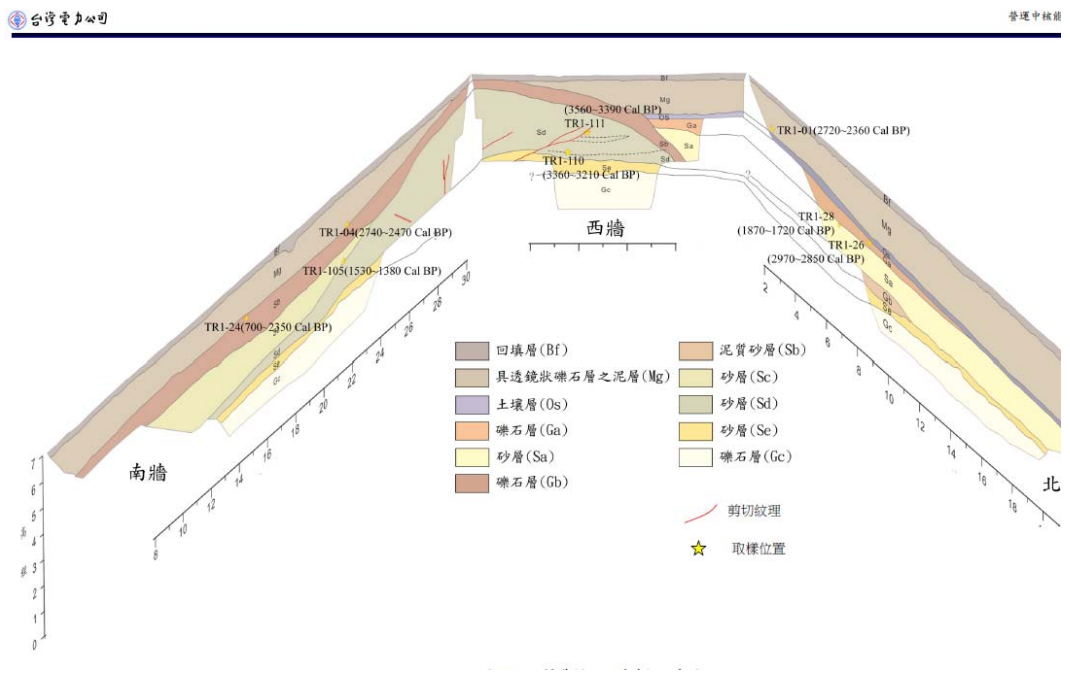


Figure 2. The paleo-earthquake records of TR-S2-2 trench. Colored shades represent different soil layers, and fault indicated as red lines. Faults are found in layers (1530 -1380 Cal BP), (3360-3210 Cal BP), and (3560-3390 Cal BP).