Report on Re-examination of Hamaoka Nuclear Power Station Reactors No. 3, 4 and 5 Seismic Safety Evaluation Reports (Overview)

1. Scope of re-examination

Chubu Electric Power has conducted a re-examination of all the evaluation results, etc. contained in previously submitted seismic safety evaluation reports on Hamaoka Nuclear Power Station Reactors No. 3, 4 and 5.

2. Method of re-examination

The following was confirmed regarding whether there were input data errors in the analysis of seismic safety evaluation.

(1) There were clear grounds for the input

(2) Input to the calculator program was done correctly, etc.

3. Results of re-examination

Our re-examination of approximately 500,000 items of data in our seismic safety evaluation report on Hamaoka Nuclear Power Station Reactors No. 3, 4 and 5 revealed that there were analysis input data errors in six analyses in 15 places. Aside from input data errors, we also found report errors in an additional 40 places as a result of transcription errors, etc.

[Number of input data errors in analysis]

Items re-examined	Input data errors*1			
	Number	Places		
		No. 3	No. 4	No. 5
Establishment of standard seismic motion Ss	0	0	0	0
Stability evaluation of ground under reactor building	0	0	0	0
Seismic safety evaluation of buildings and structures important to anti-seismic design	3	0	0	5
Seismic safety evaluation of equipment and piping important to anti-seismic design	2	1	1	1
Seismic safety evaluation of important outdoor civil engineering structures	0	0	0	0
Consideration of earthquake-accompanying events (stability of area slopes)	0	0	0	0
Consideration of earthquake-accompanying events (safety against tsunami)	1	2	2	3
Evaluation of impact on seismic safety by phenomena related to facility aging and deterioration	0	0	0	0
Total	6	3	3	9

*1 The “Number” column shows the number of types of analysis in which error(s) occurred. “Places” shows the number of data items with error(s).

4. Confirmation of impact on seismic safety evaluation

We conducted analyses with correct data for those places having input data errors and found that while the content of some reports required amending, there was no impact on the seismic safety in any of the cases.

5. Cause

The following explains the cause of input data errors at three companies conducting analysis and at Chubu Electric Power.

(1) Company A, designer of reactor buildings, etc. (errors (1)-(4) on Attachment 2)

- At the time of analysis (2007), the company’s internal rules did not stipulate that “materials providing the grounds for input shall be created” or “methods for checking that input were correctly done.”
- Therefore, staff conducting analysis performed input work without creating materials providing the grounds for input, resulting in input errors, and calculation methods were not written in materials, so incorrect calculation methods were used.
- Staff conducting analysis checked data input on the screen while inputting it, so checking was insufficient and no check was performed by someone other than staff conducting analysis.

(2)Company S, which is an affiliate of Company B (designer of reactor vessels, etc.) and that subcontracted to do analysis for Company B (error (5) on Attachment 2)

- The analysis staff at Company S performed the work of selecting maximum values from data used in the piping analysis as the horizontal acceleration, but misread the data, selected values that were not the maximum and wrote them in the materials providing grounds for input.
- The analysis staff and other persons subsequently checked the materials providing grounds for input, but did not notice the errors because there were not enough check items addressing the question, “Was the maximum value chosen?”
- Company B found that the materials providing grounds for input had been checked by Company S’s analysis staff and other persons, but did not check the validity of the data shown in the materials.

(3) Company C, which conducted analysis on water level changes caused by tsunami (error (6) on Attachment 2)

- At the time of the analysis (2006), the company’s internal rules did not clearly require that “materials providing the grounds for input shall be created.”
- The analysis staff created materials that listed the data used for analysis, but did not include their sources, grounds or calculation processes, and therefore there were misread numbers and calculator input errors, leading to errors in the calculation of loss coefficient.
- Additionally, the analysis staff did not perform a sufficient check following the calculation of the loss coefficient, and no check was performed by someone other than the analysis staff.

(4) Chubu Electric Power

Chubu Electric Power asked its contractors to provide general quality assurance, but our internal guidelines at the time did not stipulate specific items related to analysis work, such as “clarify grounds for input” and “clarify input data check methods.” As a result, such requirements were not placed on the contractors, and such items were not checked by Chubu Electric Power staff.

6. Recurrence prevention measures

(1) Company A

- The company now creates materials providing grounds for input, taking steps to make input errors less likely, such as clearly stating data parameters and the calculation process. The company also creates a check sheet that clearly states the items that need to be checked to determine whether the data is valid and was input correctly, and the analysis staff and other parties use this check sheet to perform the check. These measures were reflected in Company A’s internal rules in June 2009, after the analysis was performed.

(2) Company B and its affiliate Company S

- Company B created a check sheet that includes checking input data validity and has reflected this in its internal rules. It has also confirmed that the following measures have been reflected in Company S’s internal rules.
  - The process of selecting the maximum value from a list of acceleration values has been automated with a computer program, and the selection results are confirmed by analysis staff. (Measure reflected in March 2008.)
  - The company added “Was the maximum value selected?” to the items on its piping analysis check sheet.

(3) Company C

- The company creates materials providing grounds for input and its analysis staff and other persons check data validity. (Reflected in July 2008.) Additionally, the company clearly states data sources and calculation processes in its materials providing grounds for input, among other steps making input errors less likely. It has created a check sheet clearly stating the items to be checked and has reflected these measures in its internal rules.

Going forward, when Companies A, B and C submit analysis reports to Chubu Electric Power, a responsible party will check that quality control has specifically been practiced, and the results of that check will be submitted in document form.

Each company has also given training on the importance of clarifying grounds for input and checking input data, using this situation as a case study. Such training, furthermore, will be reflected in the companies’ internal rules to ensure that it is given continuously.

Finally, these companies will have their report-writing staff and other persons check for descriptive errors resulting from transcription errors, etc., and have reflected this in their internal rules.

(4) Chubu Electric Power

- In light of the recent re-examination, Chubu Electric Power revised its internal guidelines on procurement control in October 2011, creating a mechanism to present contractors with our specific quality requirements related to analysis work. We have educated our own concerned staff about this mechanism and will train them on it consistently.
- Going forward, when Chubu Electric Power submits reports to the national government, our staff will check that our contractors’ analysis work satisfies our requirements, and that the methods for checking this have been reflected in our internal guidelines on procurement control.
- We have already clarified our system and procedures for checking for descriptive errors resulting from transcription errors, etc. when reports are written and have reflected these in our internal guidelines, and we will follow these faithfully when writing reports in future.
- Through audits and other means, we will ensure that our contractors faithfully adhere to the recurrence prevention measures described herein in future analysis work and that input data errors do not occur, and we will moreover evaluate the effectiveness of the recurrence prevention measures.

7. Conclusion

Chubu Electric Power has reflected on the fact that insufficient quality assurance initiatives in our analysis work allowed the recently discovered input data errors to occur.

Going forward, we will make certain to implement the recently established recurrence prevention measures and work to prevent errors from occurring, but additionally we will again have our staff responsible for analysis work instruct our contractors’ responsible concerned persons about the importance of this type of work and will work with them to thoroughly raise awareness to prevent errors. In future, we will strive to win society’s trust in nuclear power by ensuring that all parties concerned with nuclear power continue to possess this awareness. End