

RPSC-Winter Course L-9 (2)

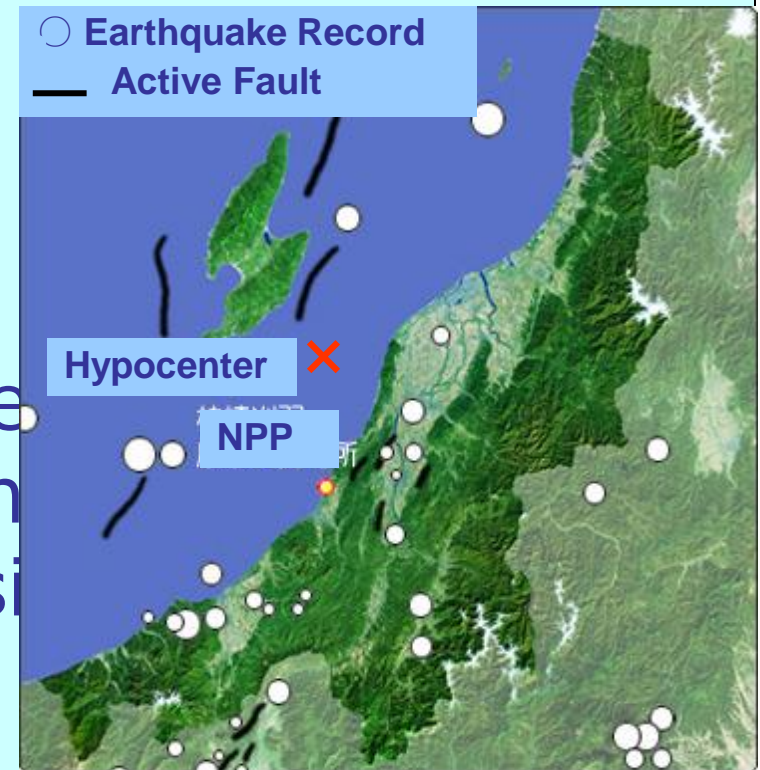
Earthquake at Kashiwazaki-Kariha
NPP

Earthquake at Kashiwazaki-Kariha NPP

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1. Outline of the Earthquake

- Name: Chuetsu Earthquake
- Date: July 16, 2007
- Seismic Center: near Kashiwazaki City
(in the Sea)
- Depth: 17 km
- Magnitude: $M = 6.8$
- Distance to NPP:
16 km (Epicentral Distance)
23 km (Hypocentral Distance)
- Maximum Seismic Intensity
at the Area: 6+



2. Kashiwazaki-Kariha NPP

Unit	Reactor Type	Power (MW)
No.1	BWR	1100
No.2	BWR	1100
No.3	BWR	1100
No.4	BWR	1100
No.5	BWR	1100
No.6	ABWR	1356
No.7	ABWR	1356
Total		8212



3. Maximum Earthquake Acceleration

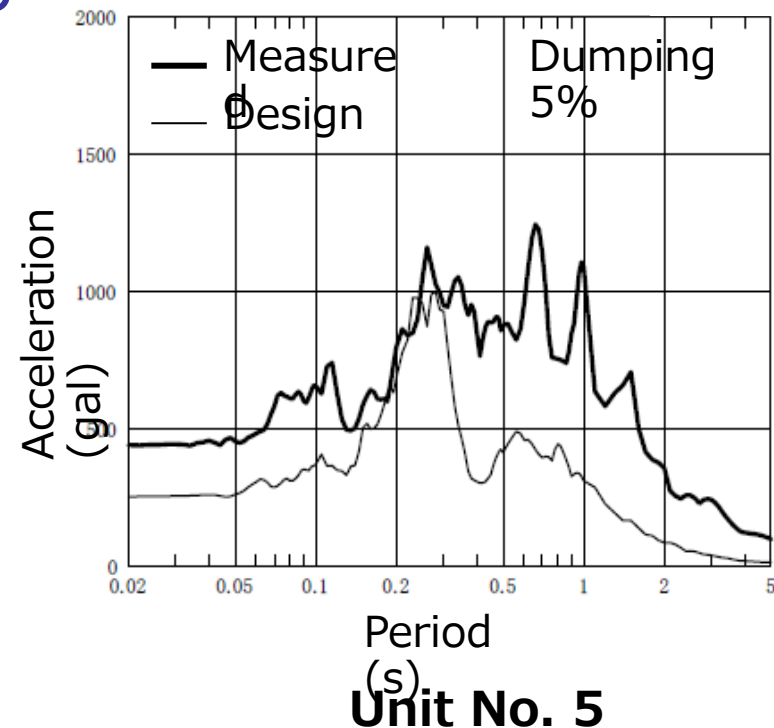
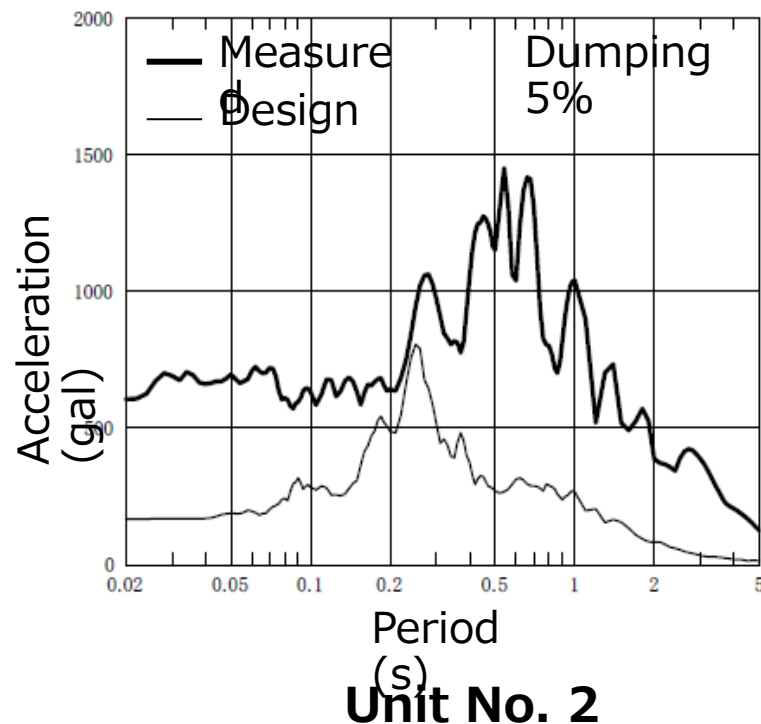
Unit : Gal
(cm/s²)

Unit	Horizontal (N-S)			Horizontal (E-W)			Vertical		
	Meas'd	Design	Ratio	Meas'd	Design	Ratio	Meas'd	Design	Ratio
No.1	311	274	1.14	680	273	2.49	408	235	1.74
No.2	304	167	1.82	606	167	3.63	282	235	1.20
No.3	308	192	1.60	384	193	1.99	311	235	1.32
No.4	310	193	1.61	492	194	2.54	337	235	1.43
No.5	277	249	1.11	442	254	1.74	205	235	0.87
No.6	271	263	1.03	322	263	1.22	488	235	2.08
No.7 (Ss)	267	263	1.02	356	263	1.35	355	235	1.51

「日本機械学会 M&M 2007 特別フォーラム：東京電力
中越沖地震による柏崎刈羽原子力発電所への影響」を基に作成

4. Response Curve of the Earthquake

- Response Curve on Reactor Building Base Mat (Horizontal)
- Exceeding the Design Curve in All Period



5. Plant Status at the Earthquake

- All Plants are Automatically Shutdown or in Periodic Inspection

Unit	No.1	No.2	No.3	No.4	No.5	No.6	No.7
Reactor Type	BWR	BWR	BWR	BWR	BWR	ABWR	ABWR
Operation Status	Periodic Inspection	Operation	Operation	Operation	Periodic Inspection	Periodic Inspection	Operation
Automatic Shutdown		Yes	Yes	Yes			Yes

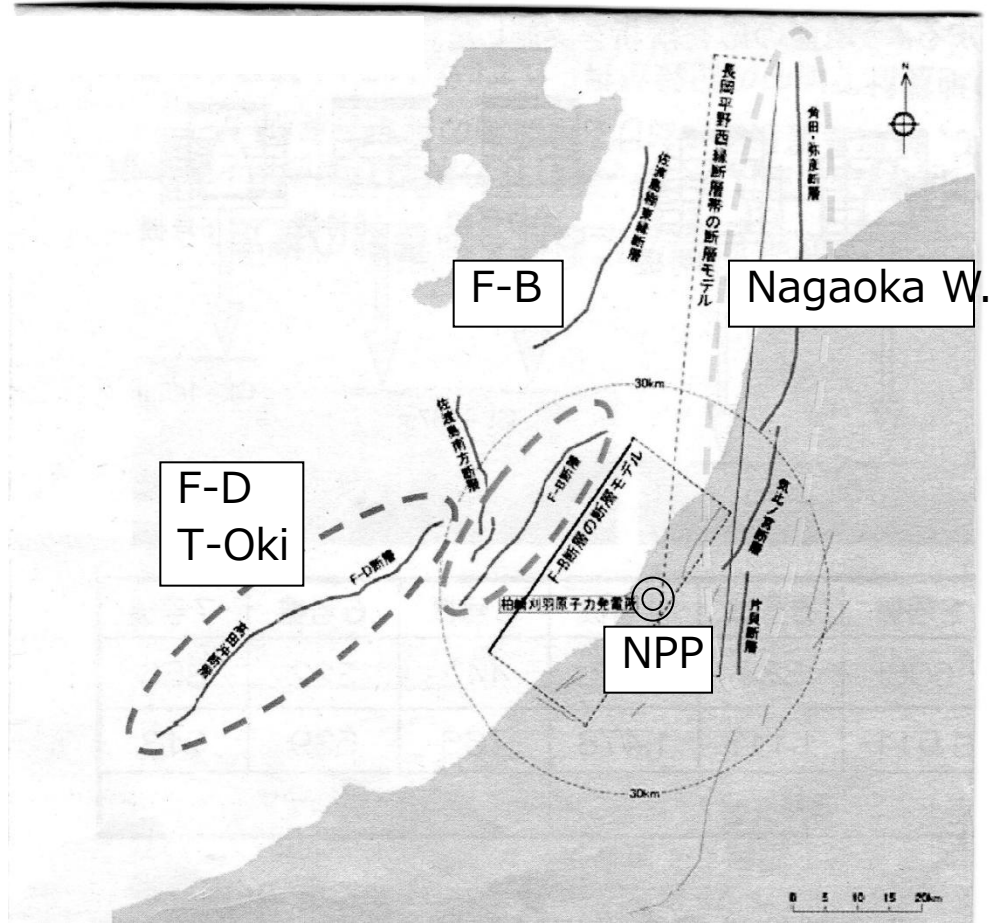
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6. Impacts of the Earthquake

- No Damage in Safety Related Component through Visual Inspection.
- Extremely Small Activity Release to Environment
- Many Damages in Non Safety Facilities
- Eminent Troubles Caused by the Earthquake

Item	Unit
Fuel pool water sloshing and splashing to floor	①～⑦
Small quantity of fuel pool water leak out through cable penetration to sea (9×10^4 Bq).	⑥
Small quantity of activity release from condenser through ventilation stuck (Iodine 4×10^8 Bq, Particle 2×10^6 Bq)	⑦
In-station transformer fire	③
Fire water flow-in into reactor building surroundings	①
Sea water leak into turbine building	④
Reactor building crane drive shaft break	⑥

7. Detailed Evaluation Result for Faults

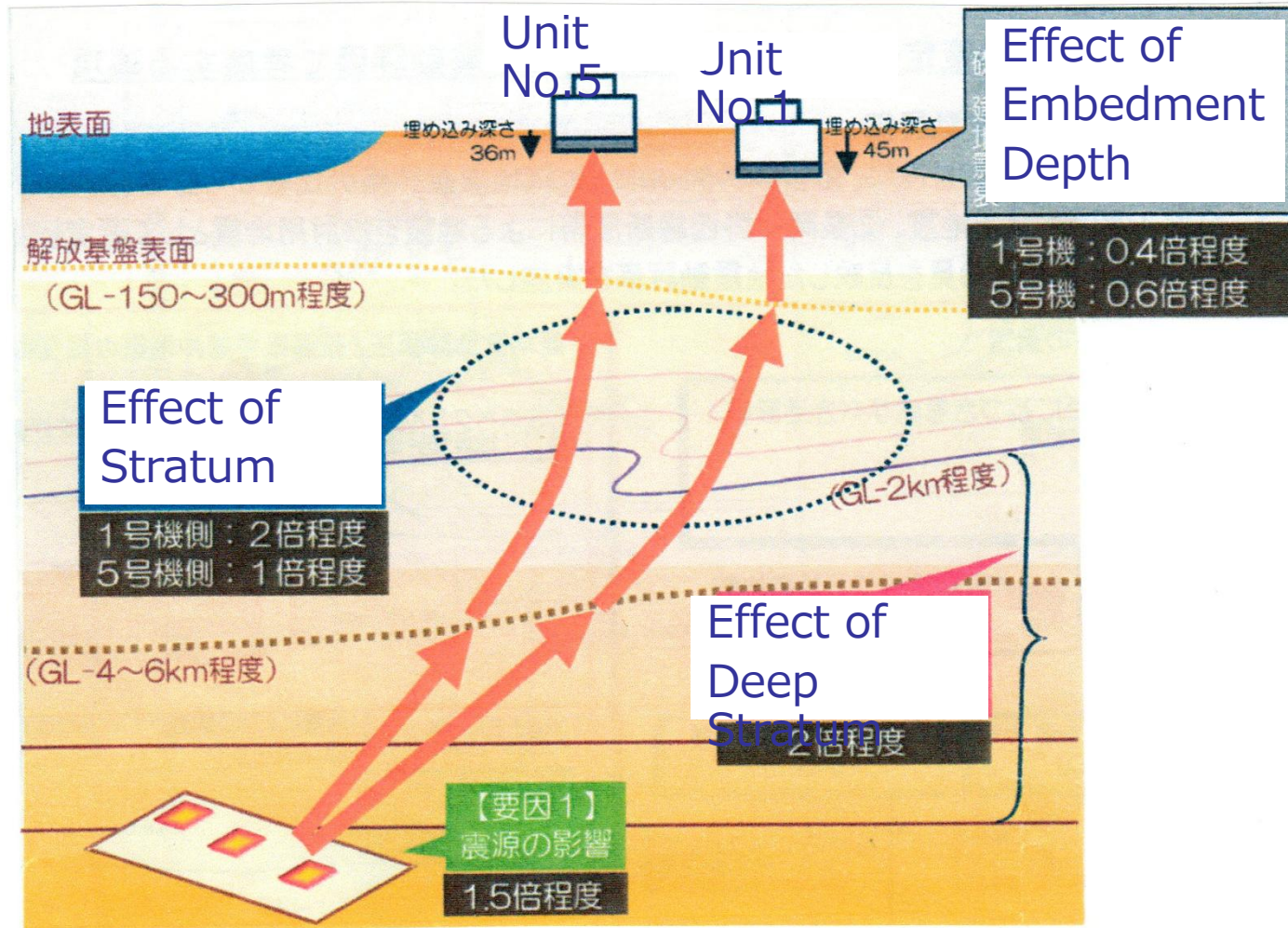


Important Faults

Name	Length	Mag.
F-B	34 km	M7.0
Nagaoka West	91 km	M8.1
F-D Takada-Oki	55 km	M7.7

「柏崎刈羽原子力発電所のこれまでの取組みと基準地震動の策定について 平成20年5月 東京電力株式会社」を基に作成

8. Evaluation for Seismic Wave Propagation



「柏崎刈羽原子力発電所のこれまでの取組みと基準地震動の策定について
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9. Re-Evaluation Result & Current Plant Status

Unit	No.1	No.2	No.3	No.4	No.5	No.6	No.7
Observed Acceleration(Gal)	680	606	384	492	442	322	356
Re-Evaluation Result(Gal)	829	739	663	699	543	656	642
Value for Design Evaluation(Gal)	1000	1000	1000	1000	1000	1000	1000
Current Plant Status (Jan.2011)	Operation	Repair Work	Repair Work	Repair Work	Operation	Operation	Operation

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10. Experience through Chuetsu Earthquake

1. Seismic design of the plants was proved to be adequate and to have sufficient margin as for plant safety.
2. Estimation of the design earthquake was not conservative. More precise investigation of faults should have been required.
3. Most of troubles occurred in the Class C (Non safety class) facilities built on the weak ground.
4. Though not relating to the reactor safety, the plant troubles, even in the Class C facilities cause immense impacts to electricity supply, economy and public acceptance.