

## About this CR-ROM

This CD-ROM compiles acceleration time history data recorded at the SHIKA Nuclear Power Plant during the 2024 Noto Peninsula Earthquake.

We hope that making this data public will greatly contribute to the advancement of academic research in seismology, earthquake engineering, and structural engineering among other scientific fields.

Please be advised that change in data may occur in future years as a result of advancement in data processing and analysis methods.

The directory structure of the CD-ROM is illustrated as follows.

```
/
|
| 00_readme.txt : This file
| 01_Data_File_Name.pdf
| 02_Data_Format.pdf
| 03_Maximum_Acceleration.pdf
| 04_Location_of_Seismometers.pdf
| 05_Ground_conditions_of_ground_observation_point.pdf
| 06_Characteristics_of_Seismometers.pdf
+-DATA : Data flie
|
| +- The 2024 Noto Peninsula Earthquake
|   |
|   +- Ground
|     |
|     +- Building
|       |
|       +- Reactor building of Unit 1
|       +- Turbine building of Unit 1
|       +- Seawater heat exchanger building of Unit 1
|       +- Rad-waste building of Unit 1
|       +- Stack of Unit 1
|       +- Reactor building of Unit 2
|       +- Turbine building of Unit 2
|       +- Seawater heat exchanger building of Unit 2
|       +- Rad-waste building of Unit 2
|       +- Stack of Unit 2
|       +- Emergency response center
|       +- Warehouse dedicated to materials & equipment for disaster prevention
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### Note

- The North direction of the seismometers coincides with the NS-axis of the plant (Plant North, P.N.), along which all buildings are aligned. See file 04 for description of the P.N.

However, the Cardinal direction needs to be corrected for the borehole data. See file 01 for details of the required correction.

- There is no automatic calibration of time and no clock accuracy for the stand-alone (SA) seismometers in Reactor building of Unit 2. See file 01 and 04.
  - Zero line correction of records is not performed.
  - Data from the deepest seismometer (GR-00) at the ground observation point is missing.
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1. This CD-ROM cannot be copied for distribution to a third person or party.
2. Hokuriku Electric Power Company is to be credited as the provider of data for any outcome that result from use of this CD-ROM.

SAMPLE

**【Ground seismometer】**

Installation location : Ground observation point

File name	Observation Point	Component	Altitude	Floor	Remarks
01_GR-01.NS	GR-01	NS	EL-200.00m	—	Correction from PN 【-10°】
02_GR-01.EW		EW	EL-200.00m	—	
03_GR-01.UD		UD	EL-200.00m	—	
04_GR-02.NS	GR-02	NS	EL-100.00m	—	Correction from PN 【-12°】
05_GR-02.EW		EW	EL-100.00m	—	
06_GR-02.UD		UD	EL-100.00m	—	
07_GR-03.NS	GR-03	NS	EL-10.00m	—	Correction from PN 【-4°】
08_GR-03.EW		EW	EL-10.00m	—	
09_GR-03.UD		UD	EL-10.00m	—	
10_GR-04.NS	GR-04	NS	EL+19.50m	—	
11_GR-04.EW		EW	EL+19.50m	—	
12_GR-04.UD		UD	EL+19.50m	—	

The North direction of the seismometers coincides with the NS-axis of the plant (Plant North, P.N.), along which all buildings are aligned.

However, the seismometer cardinal direction of the borehole observation points (GR-01, GR-02, GR-03) deviates from the PN, and the observed waveform needs to be rotated by the angle (positive in clockwise direction from north) described in the Remarks for correction.

## Data format (Ground seismometer, Building seismometer)

The data format is described using example data.

- Line 1: Header information
- Starting Line 2: Data[Unit: Gal = cm/s/s]

■ Header information ... Delimited with a space.

(1) File name (2) Record start time[year, month, day, hour, minute, and second]<sup>※1</sup>

(3) Total number of data

(4) Sampling interval[Unit: second] (5) Maximum acceleration[Unit: Gal = cm/s/s]<sup>※2</sup>

<Example>

01\_GR-01.NS 20240101161002 10000 0.01 1.69859E+02

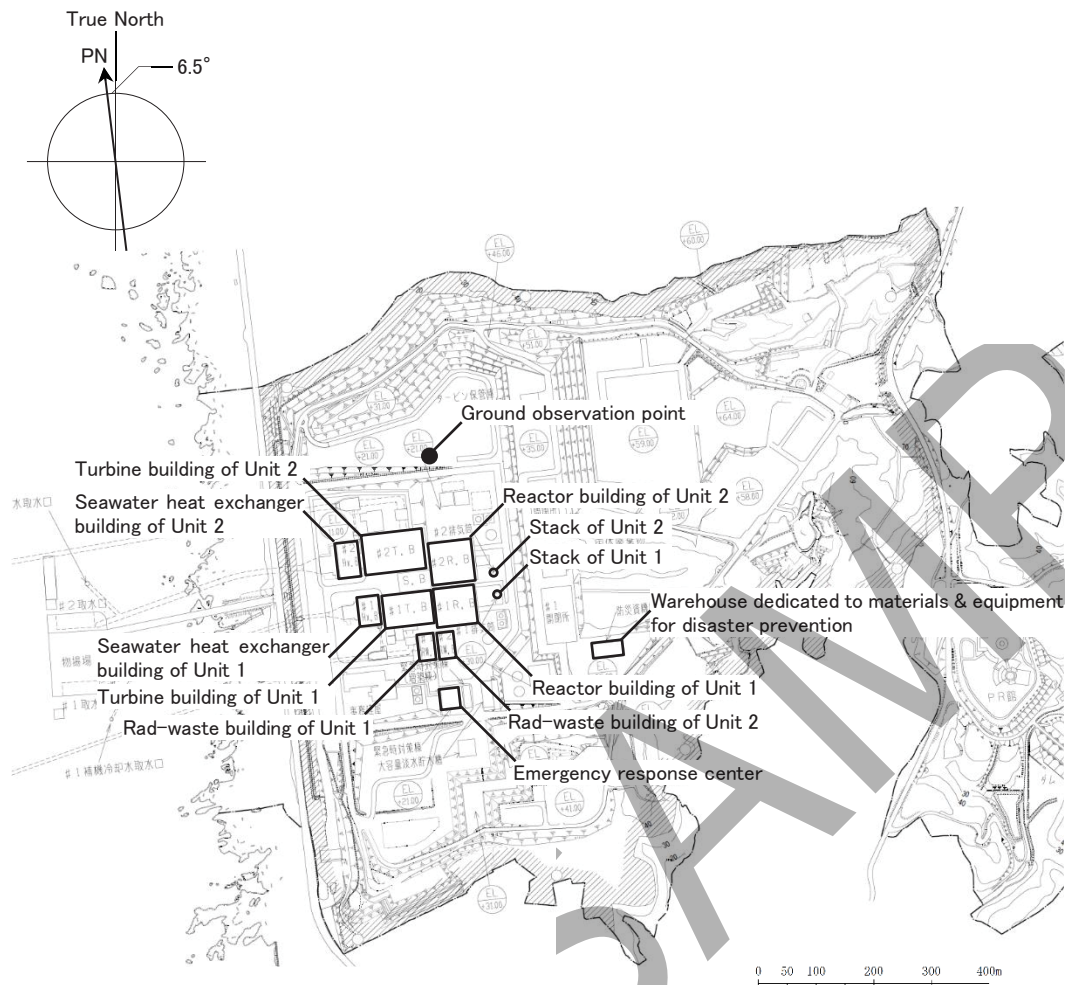
■ Data[Unit: Gal = cm/s/s]<sup>※2</sup> ... 8E12.5

<Example>

1.23978E-02 1.23978E-02 1.35899E-02 1.76430E-02 1.78814E-02 1.23978E-02 1.64509E-02 1.07288E-02  
6.91414E-03 1.35899E-02 1.76430E-02 2.00272E-02 1.64509E-02 1.26362E-02 1.52588E-02 1.74046E-02

※1 Record start time and source of time acquisition are as follows.

	Installation location	Observation Point		Record start time	Time acquisition source
		Component			
Ground seismometer	Ground observation point	( all )		20240101161002	GPS time
Building seismometer	Reactor building of Unit 1	( all )		20240101161002	GPS time
	Turbine building of Unit 1	( all )		20240101161002	GPS time
	Seawater heat exchanger building of Unit 1	( all )		20240101161002	GPS time
	Rad-waste building of Unit 1	( all )		20240101161002	GPS time
	Stack of Unit 1	( all )		20240101161002	GPS time
	Reactor building of Unit 2	2RB-36	NS	20240101160957	PC time (There is no automatic calibration of time and no clock accuracy for these stand-alone (SA) seismometers.)
		2RB-41	EW		
		2RB-45	EW UD		
2RB-50		EW			
	( Other than above )		20240101161002	GPS time	
Turbine building of Unit 2	( all )		20240101161002	GPS time	



Plant Arrangement Plan



Ground observation point  
Section

### Ground conditions of ground observation point

Elevation	Installation level of seismometers	Layer thickness (m)	S-wave velocity (km/s)	P-wave velocity (km/s)	Geological classification
+21.0m		1.5	0.25	0.79	Embankment
+19.5m	▲	2.4	0.25	0.79	
+17.1m		22.0	0.60	1.37	
-4.9m		5.1	1.50	3.19	Andesite, tuff breccia
-10m	▲	90.0	1.50	3.19	
-100m	▲	8.9	1.50	3.19	
-108.9m		91.1	1.96	3.96	
-200m	▲	—	2.14	3.92	

The layer thickness, S-wave velocity and P-wave velocity from EL+21.0m to -200m are based on the velocity structure obtained from many PS logging results at the site. S-wave velocity and P-wave velocity at depths below EL-200m are based on PS logging result at ground observation point.

SAMPLE

### Characteristics of Seismometers

Equipment		Others	1RB-53~55 1TB-04 2RB-52~55 2TB-04	GR-01~04 2RB-01~04
Detector (Accelerometer)	Type name	SD-240	4G detector	SD-112
	Method	Electromagnetic feedback	Servo type	Electromagnetic feedback
	Frequency range	0.1~30Hz	DC~200Hz	0.1~30Hz
	Measurement range	±2000Gal	±4000Gal	±2000Gal
Amplifier	Frequency characteristics	DC~30Hz	DC~30Hz	DC~30Hz
	Low-pass filter	Cutoff frequency 30Hz, 6th order butterworth filter (-36dB/oct)	Cutoff frequency 30Hz, 6th order butterworth filter (-36dB/oct)	Cutoff frequency 30Hz, 6th order butterworth filter (-36dB/oct)
Recording device	Boot processing unit	Boot Method	Booted when a certain acceleration is recorded.	Booted when a certain acceleration is recorded.
		Data processing section	Return measures after a power outage	Automatic return
	Frequency band	DC~30Hz	DC~30Hz	DC~30Hz
	Recording medium	CF card 1GB (1GB × 1)	CF card 1GB (1GB × 1)	CF card 1GB (1GB × 1)
	Maximum recording time	About 43 hours	About 43 hours	About 43 hours
	Calibration	Once a week, Enter the specified current (CAL signal) at the secondary coil, check the rated output voltage (response waveform) of the primary coil.	Once a week, Enter the specified current (CAL signal) at the secondary coil, check the rated output voltage (response waveform) of the primary coil.	Once a week, Enter the specified current (CAL signal) at the secondary coil, check the rated output voltage (response waveform) of the primary coil.
	Pre-trigger	20 seconds	20 seconds	20 seconds
	Post-trigger	60 seconds	60 seconds	60 seconds