<Reference>
May 25, 2012
Tokyo Electric Power Company

# “Development of Remote Decontamination Technology in the Reactor Building”
# Robot Investigation Results of Unit 1 Reactor Building

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# 1. Investigated Items and the schedule

## Objectives

To investigate the contamination in the reactor and acquire data that will contribute to the development of the devices, as a part of the "Development of Remote Decontamination Technology in the Reactor Building"

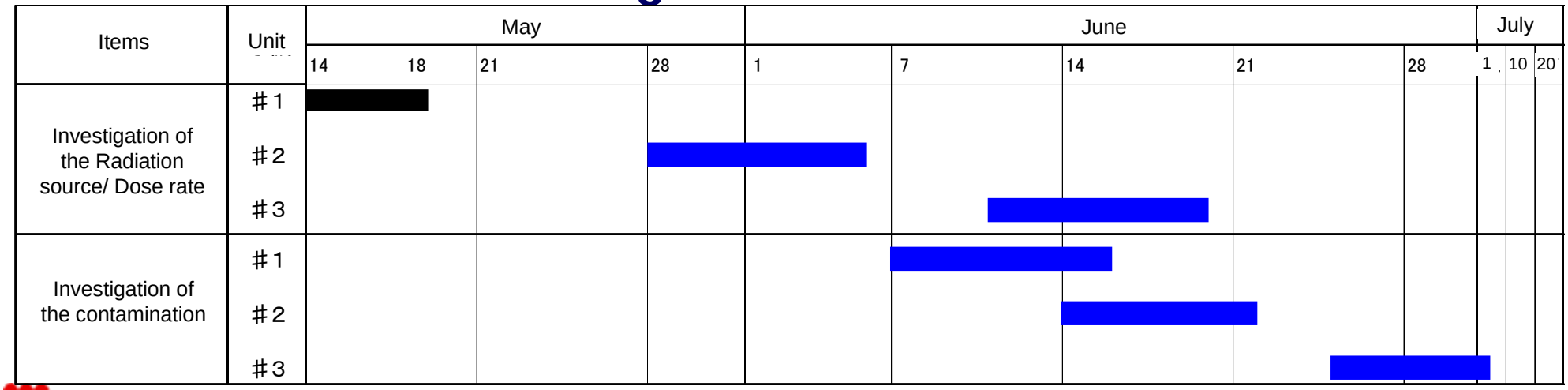
## Items investigated

The following investigation was / will be conducted in the reactor buildings of Unit 1- 3.

- Robot investigation of the radiation source/dose rate
  →Using gamma cameras, dosimeters

  **The result of the Unit 1 is reported for this time**
- Employee investigation of the contamination
  →Samplings of dust, release coating, and the boring core

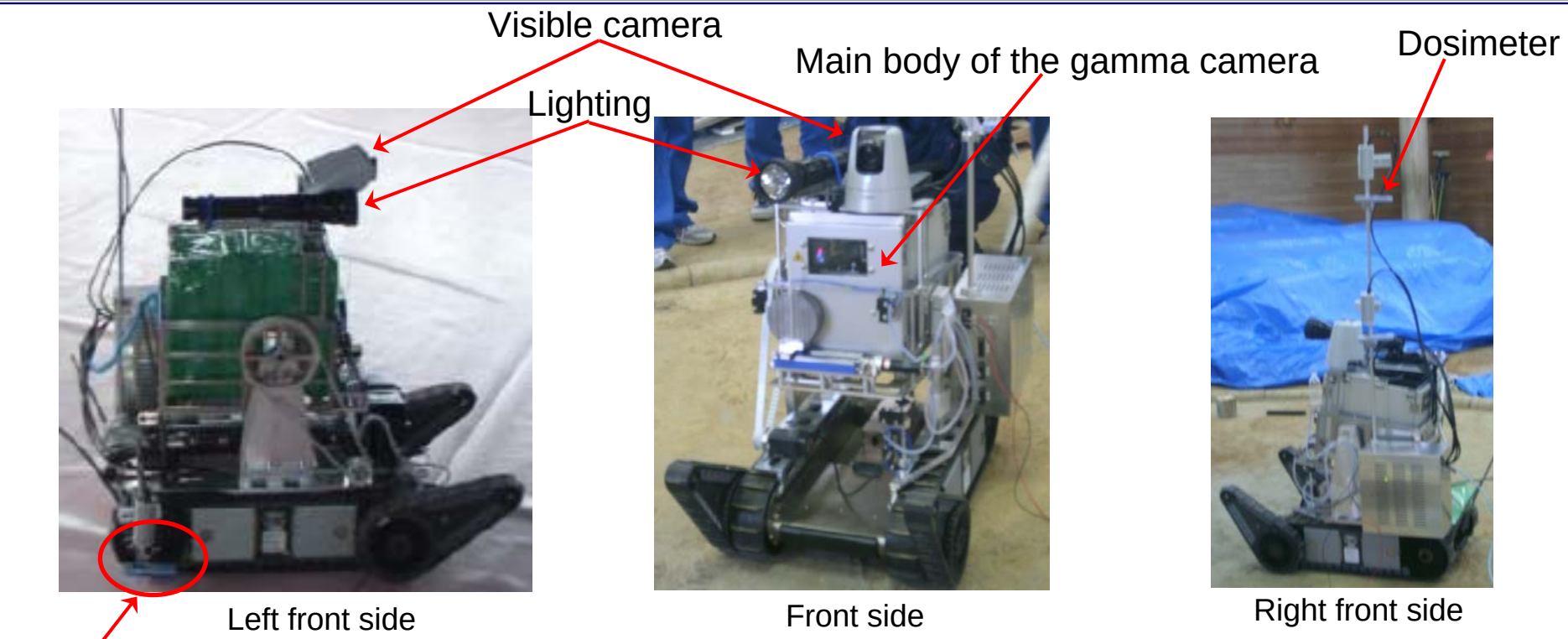
## Schedule of the investigation



# 2. Packbot Investigation of the Radiation Source/Dose rate



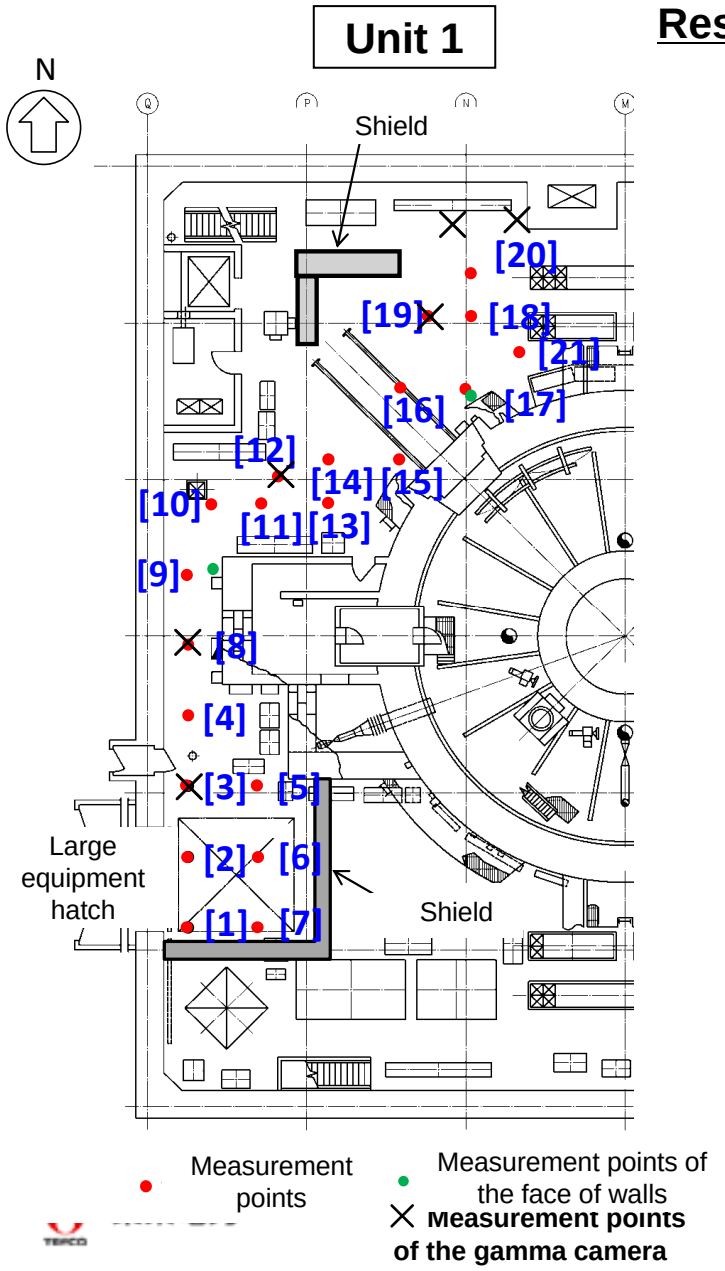
- Radiation source: Photographed changing the angle of elevation and rotation of gamma camera
- Dose rate: measured by dosimeters set at the height of approx. 0.05 m and approx.1.5m , with a 3m pitch horizontally and vertically




Packbot with a gamma camera

# 3-1. Results of the Dose Rate Investigation on the First Floor of the Unit 1 Reactor






## Result of the measurement of the dose rate of the gamma rays

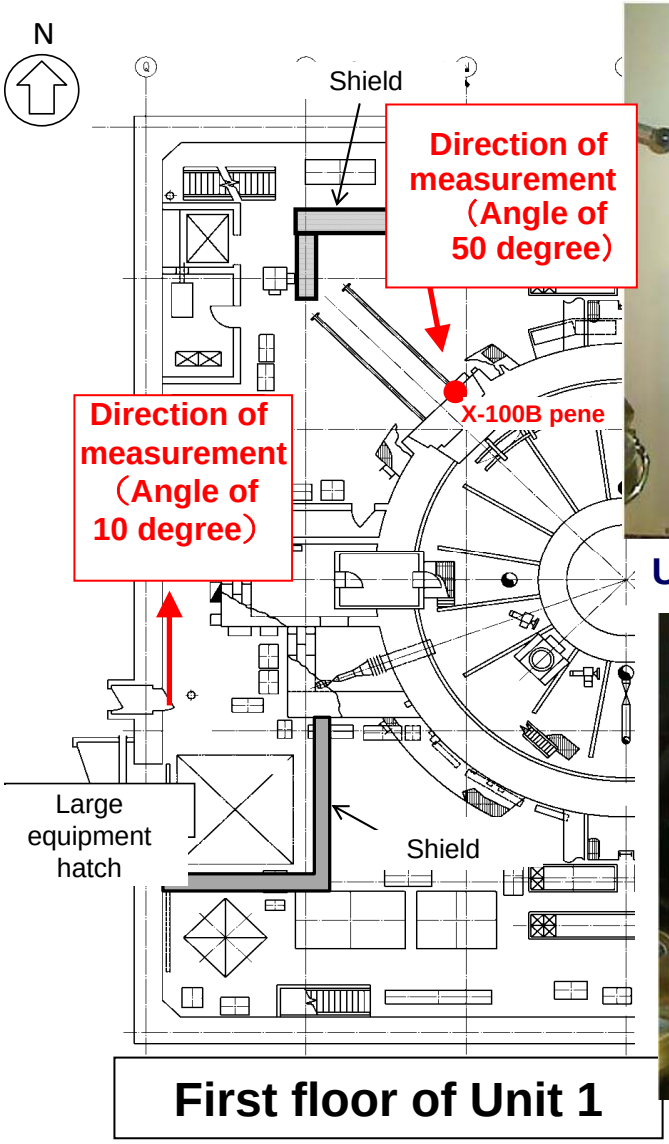
(Unit:mSv/h)

| Measurement points | Dose rate (50mm from floors) | Dose rate (1500mm from floors) | Measurement points | Dose rate (50mm from floors) | Dose rate (1500mm from floors) |
|---|---|---|---|---|---|
| [1] | 5.9 | 7.9 | [12] | 4.5 | 5.1 |
| [2] | 6.0 | 8.1 | [13] | 4.4 | 4.6 |
| [3] | 5.2 | 8.1 | [14] | 4.3 | 4.4 |
| [4] | 4.5 | 6.2 | [15] | 4.4 | 4.4 |
| [5] | 13.1 | 8.4 | [16] | 4.5 | 4.5 |
| [6] | 6.5 | 8.9 | [17] | 5.2 | 4.1 |
| [7] | 5.9 | 6.2 | [17]the face of walls | 5.1 | 4.0 |
| [8] | 4.3 | 5.1 | [18] | 5.1 | 4.9 |
| [9] | 2.5 | 3.8 | [19] | 3.3 | 4.0 |
| [9]the face of walls | 2.6 | 3.2 | [20] | 7.1 | 4.8 |
| [10] | 3.2 | 4.4 | [21] | 4.0 | 4.4 |
| [11] | 3.7 | 4.0 | | | |

**The numbers read by meter of 1500mm from the floors are higher than that of 50 mm from the floors**

# 3-2. Gamma Camera Photo Results on the First Floor of the Unit 1 Reactor Building (Example)

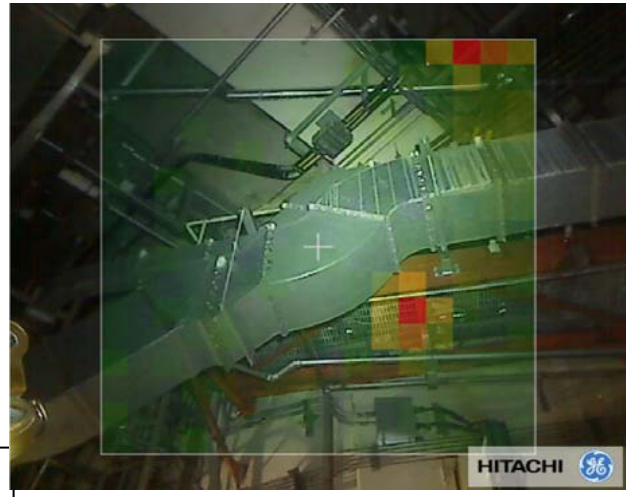




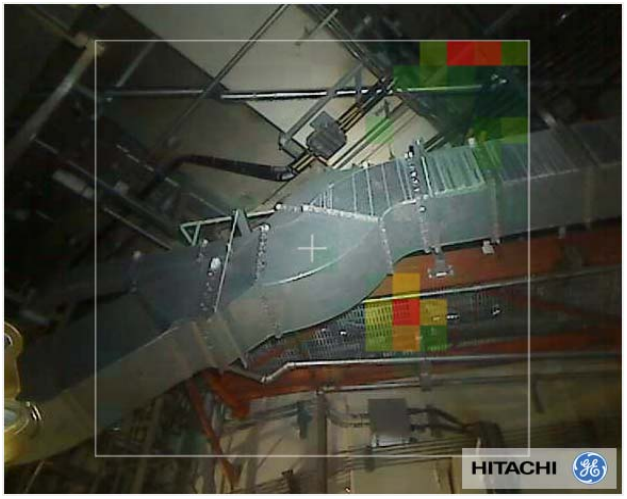

First floor of Unit 1


Unprocessed data on the west aisle


Processed data on the west aisle



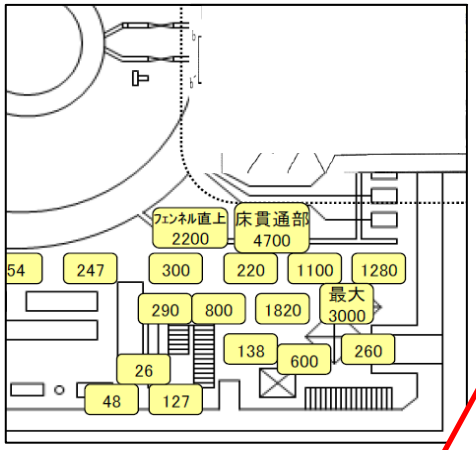

Data unprocessed by X-100B penetration



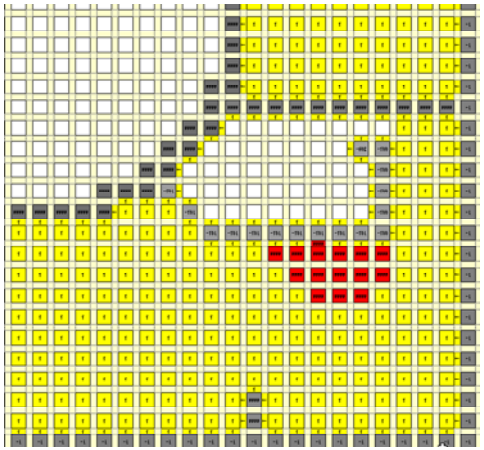

Data processed by X-100B penetration

# 3-3. Mapping Image of the Dose Rate

**The air dose distribution map will be created by inputting the measured dose rate on surface (50 mm from the floors ) and the dose rate on the surface captured by the gamma camera with the 3D model, and an execution of the analysis codes. The map will help with the drawing up the future decontamination / shield plans.**




Measured data (sample)



Input of dose rate on the surface (sample of fair surface)

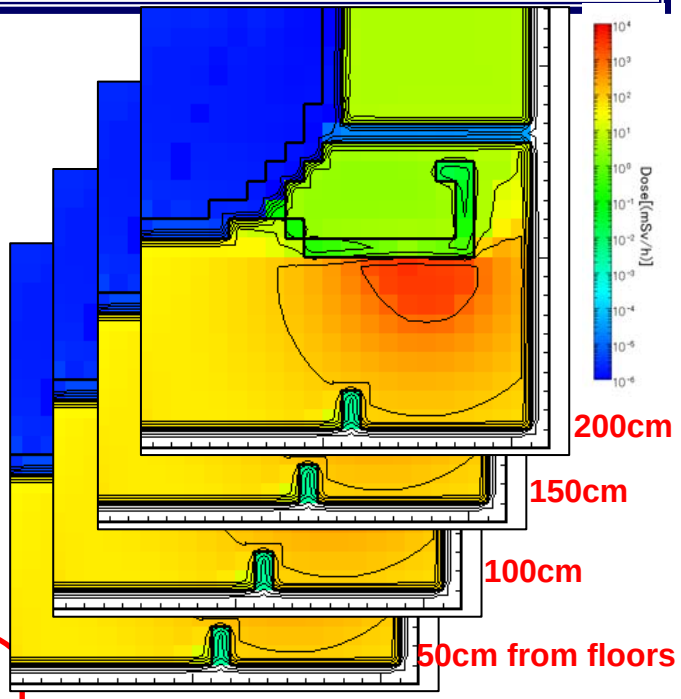



Image of the output of air dose distribution map

Input of radiation dosage on the surface of the walls and floors obtained from the investigation and data captured by the gamma camera (currently being evaluated )to the cells of 1m × 1m in the 3D format and modelization

Execution of analysis codes to the modelized system. Air dose distribution map will be outputted as 2D data with parameters of the direction to the height

**Image of the creation of the air dose distribution map**

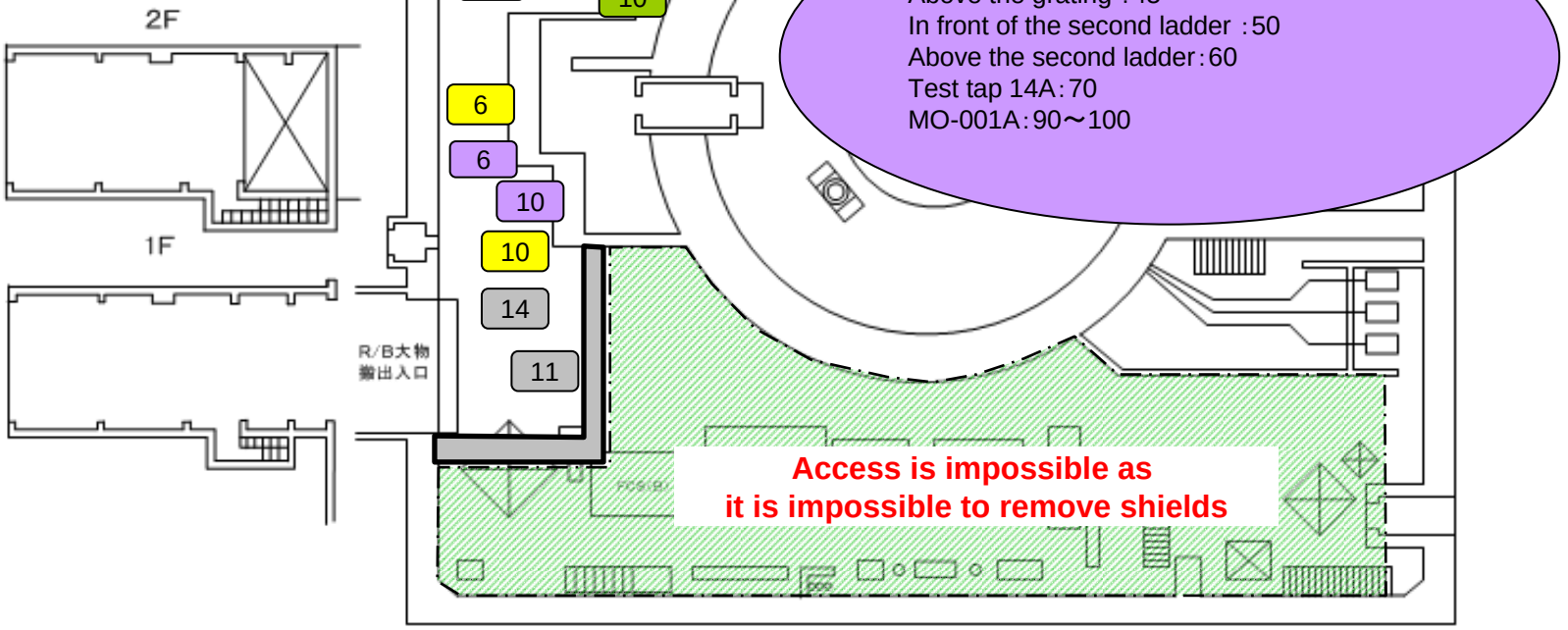
# 【Reference】Existing Data of the First Floor of the Unit 1 Reactor Building



First floor of the Unit 1 of R/B

Measured in

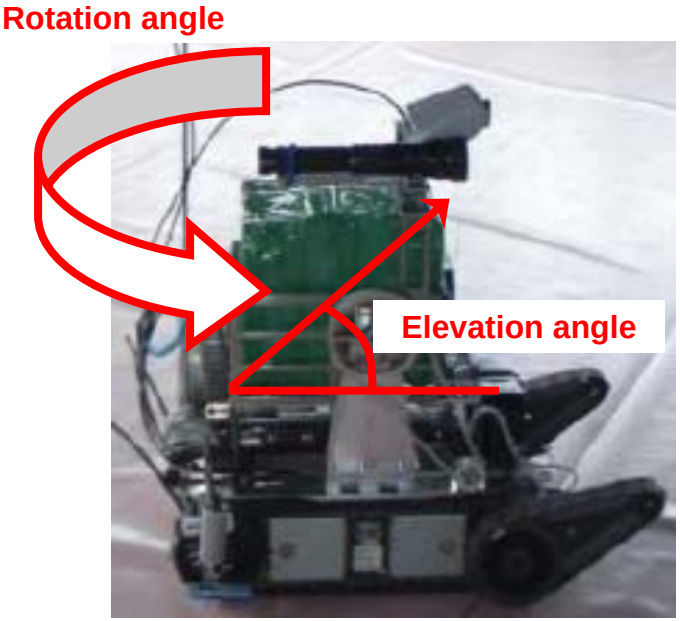
- 2011.7
- 2011.9
- 2011.10
- 2011.11



# 【Reference】Gamma Camera Photo Operations

Getting the robot to stop every 3m horizontally and vertically and conduct radiation measurements on the first floor of the reactor building
The gamma camera photographed at designated points
The angle of elevation and rotation of the gamma camera are as follows

- 10 degrees : each 30 degrees ×12 times
- 50 degrees : each 45 degrees ×8 times
- 90 degrees : No rotation ×1 time




Definitions of the rotation angle and elevation angle

Operating procedures
①10 degrees fixed, rotation pitch of 30 degrees each for 12 times
②50 degrees fixed, rotation pitch of 45 degrees each for 8 times
③90 degrees fixed, with no rotation for 8 times