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Workshop on Radiation Exposure Control at the TEPCO Holdings' Fukushima Daiichi Nuclear Power Plant

Measures to prevent the spread of contamination in hot laboratory expansion and removal work at 1F Units 5 and 6

14 November 2016

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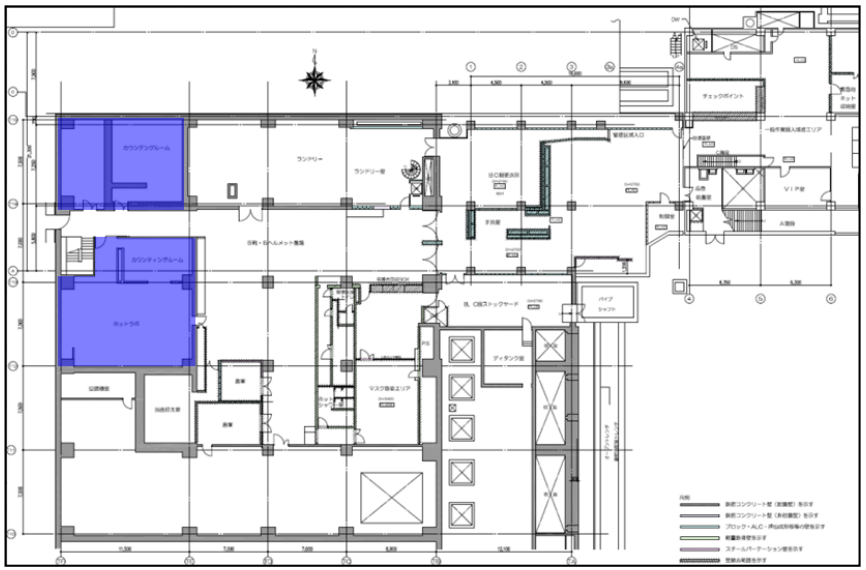
AHGFF-2016-000018R3
PSNN-2016-0825

1. Objective and overview of work

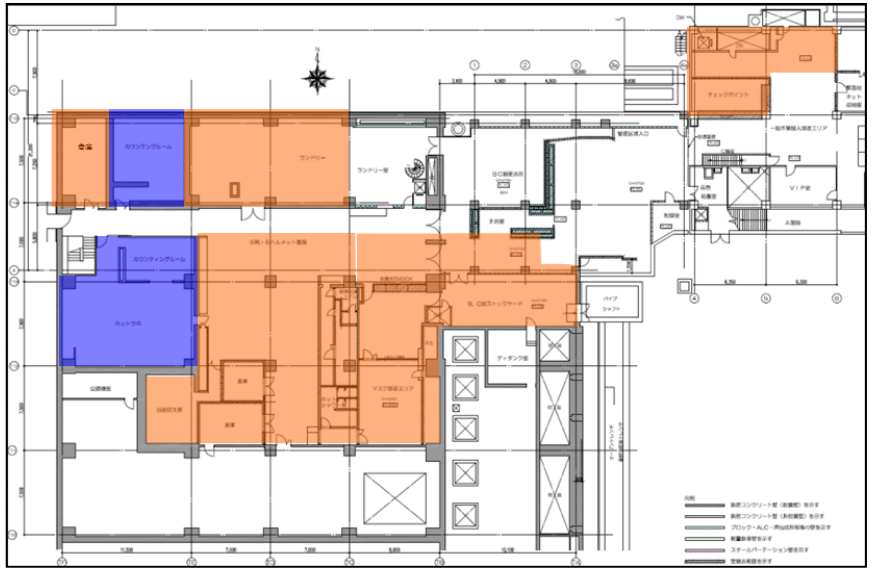
Objective and overview

The hot laboratory at Units 5 and 6 was expanded to cope with the increasing number of analysis samples due to operation of the Multi-Radionuclides Removal System and sub-drain water purification equipment, etc.

Before expansion



After expansion



Hot laboratory floor area	About 180 m^2	➡	About 850 m^2
Sample processing rate (design value)	About 80/day		About 180/day

2. Radiation control policy

Contamination level has been kept low at Units 5 and 6 by exchanging shoes since the initial stage of the disaster

	Average contamination level	**Ambient dose rate**	
Area immediately before shoe exchange	5,000 cpm	Up to 2.5 μSv/h	Contamination brought in from outside building
Area after shoe exchange	160 cpm	Up to 0.1 μSv/h	Suppression of contamination brought in

By diligently preventing contamination brought in from outside the building...

Reduction of physical burden on body

Prevention of bodily contamination

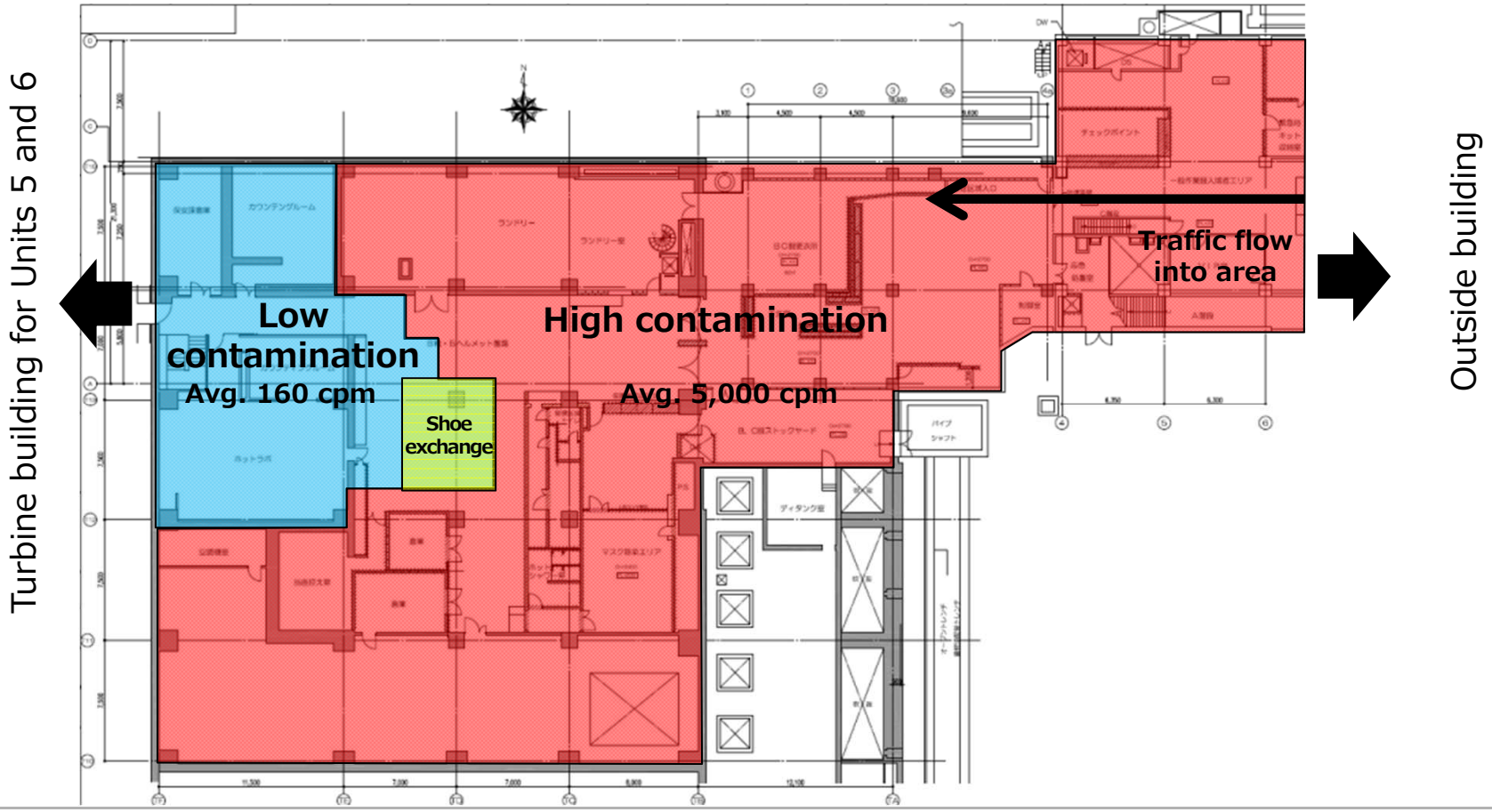
Prevention of spread of area contamination

Improved work efficiency → Achieved reduced exposure

3. Preventing contamination being brought in from outside the building

Before expansion work

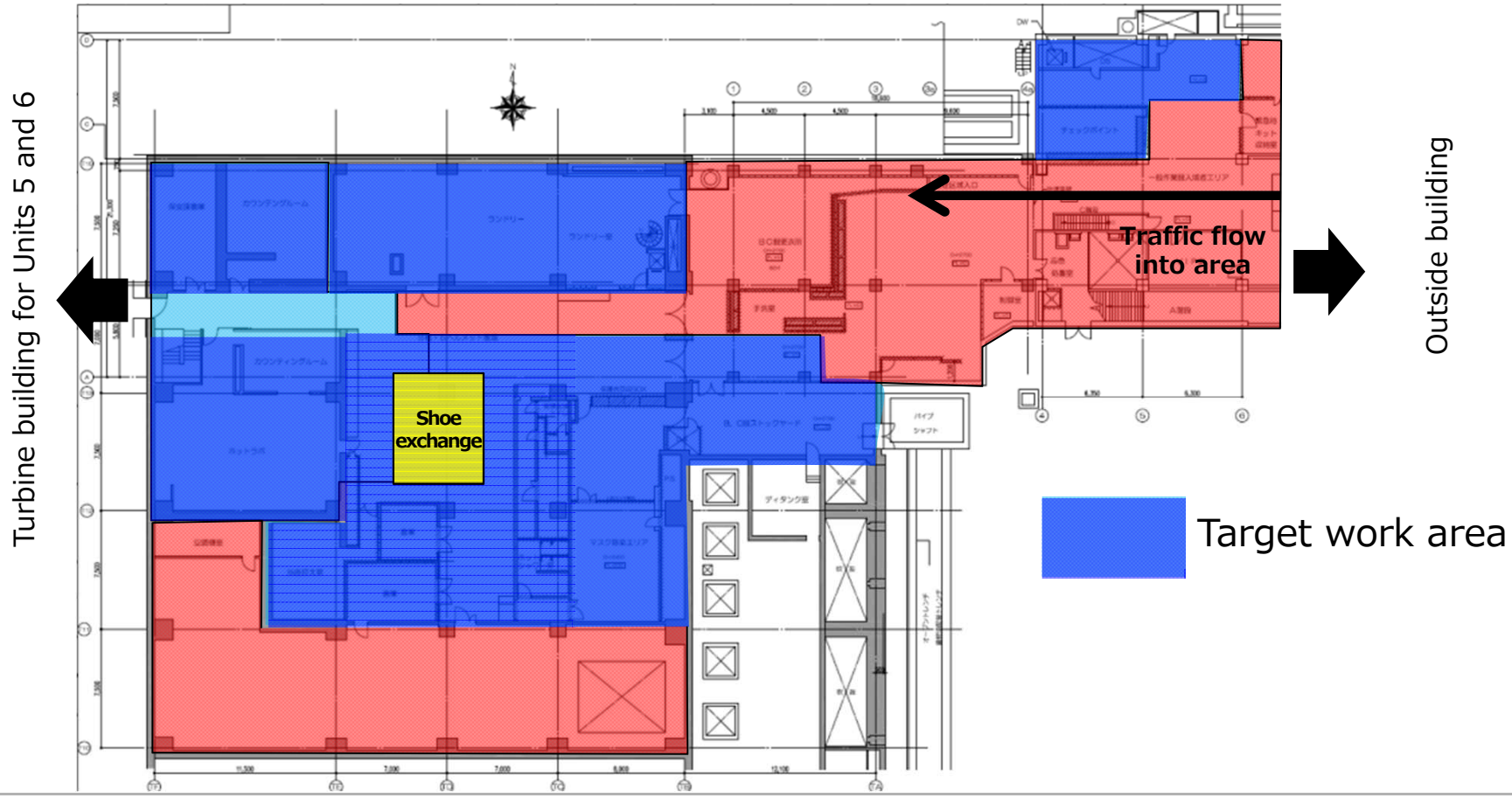
Average contamination in red area is 5,000 cpm, due to contamination brought in from outside the building.
Average contamination in light blue area is maintained at 160 cpm, through isolation via shoe exchange.



3. Preventing contamination being brought in from outside the building

Before expansion work

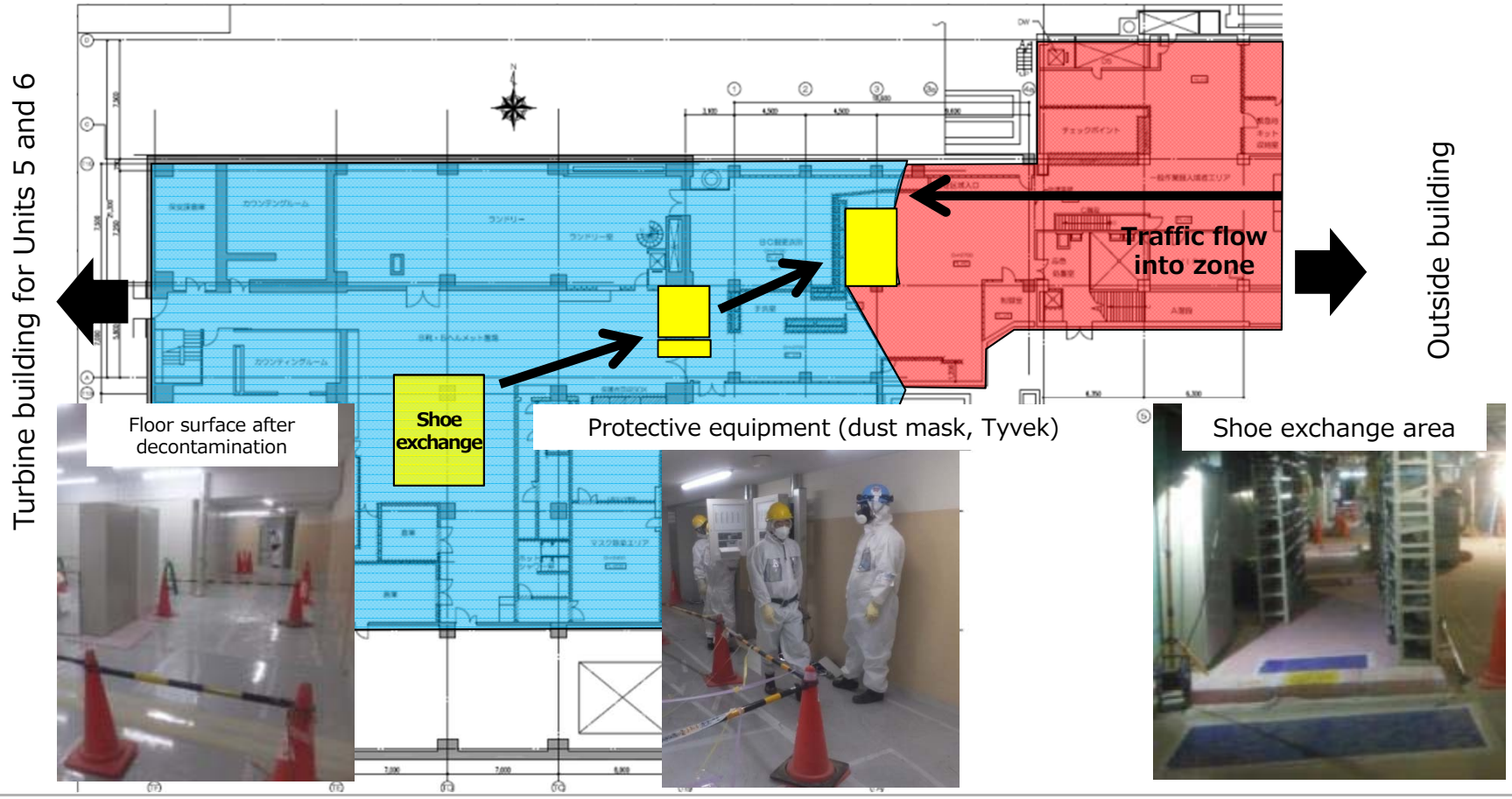
Part of the target work area is located in high contamination area.
Also, preventing contamination being brought in was difficult with the existing shoe exchange area.



3. Preventing contamination being brought in from outside the building

Modification of contamination zones

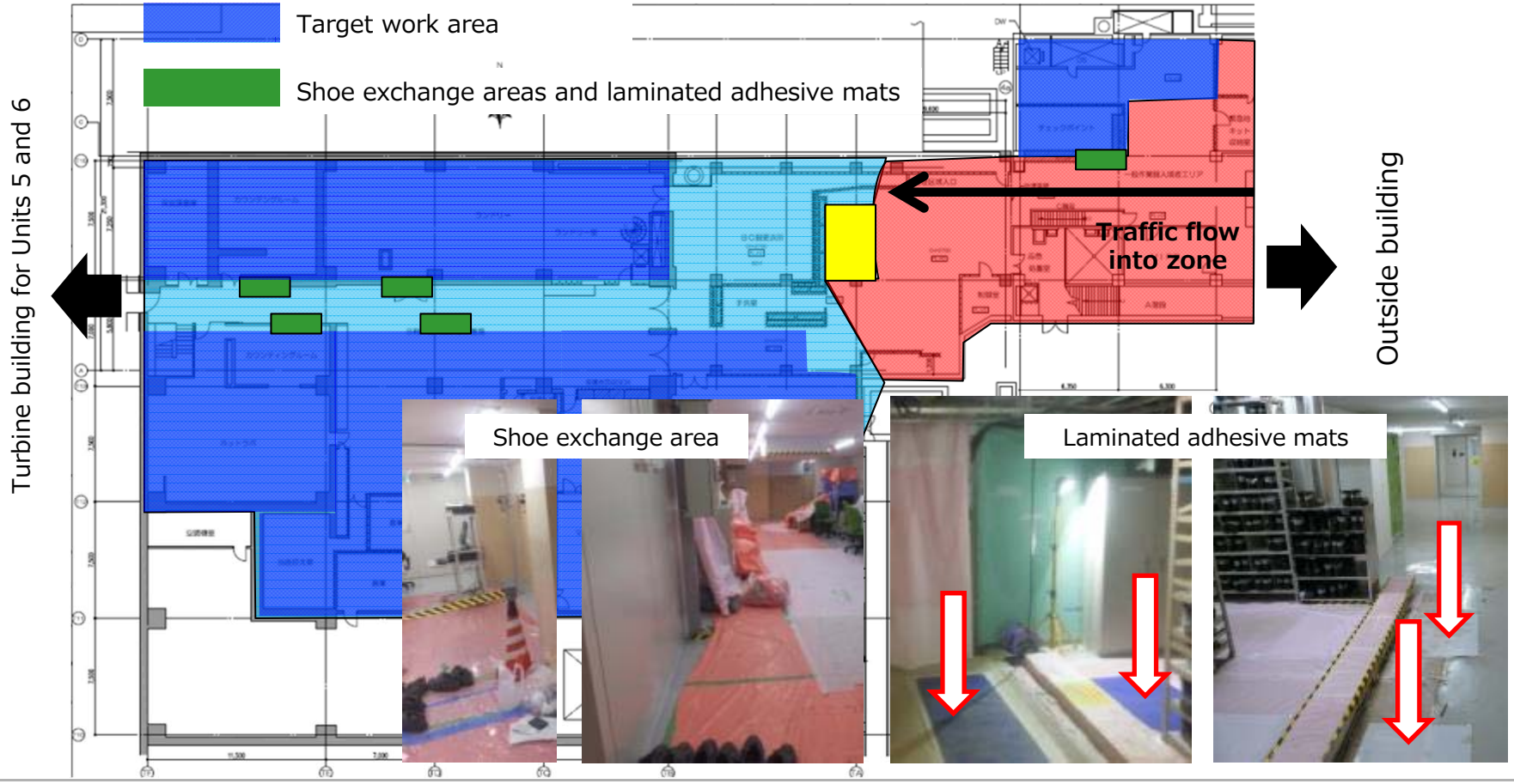
The red area was decontaminated to an average of 100 cpm, allowing reduction of protective equipment and reducing physical burden on the body.
(For tasks such as removal of highly-contaminated equipment, workers wore protective equipment suited to the contamination level.)
Moved shoe exchange area to the front of the expansion area to suppress contamination brought into expansion area.



3. Preventing contamination being brought in from outside the building

Modification of contamination zones

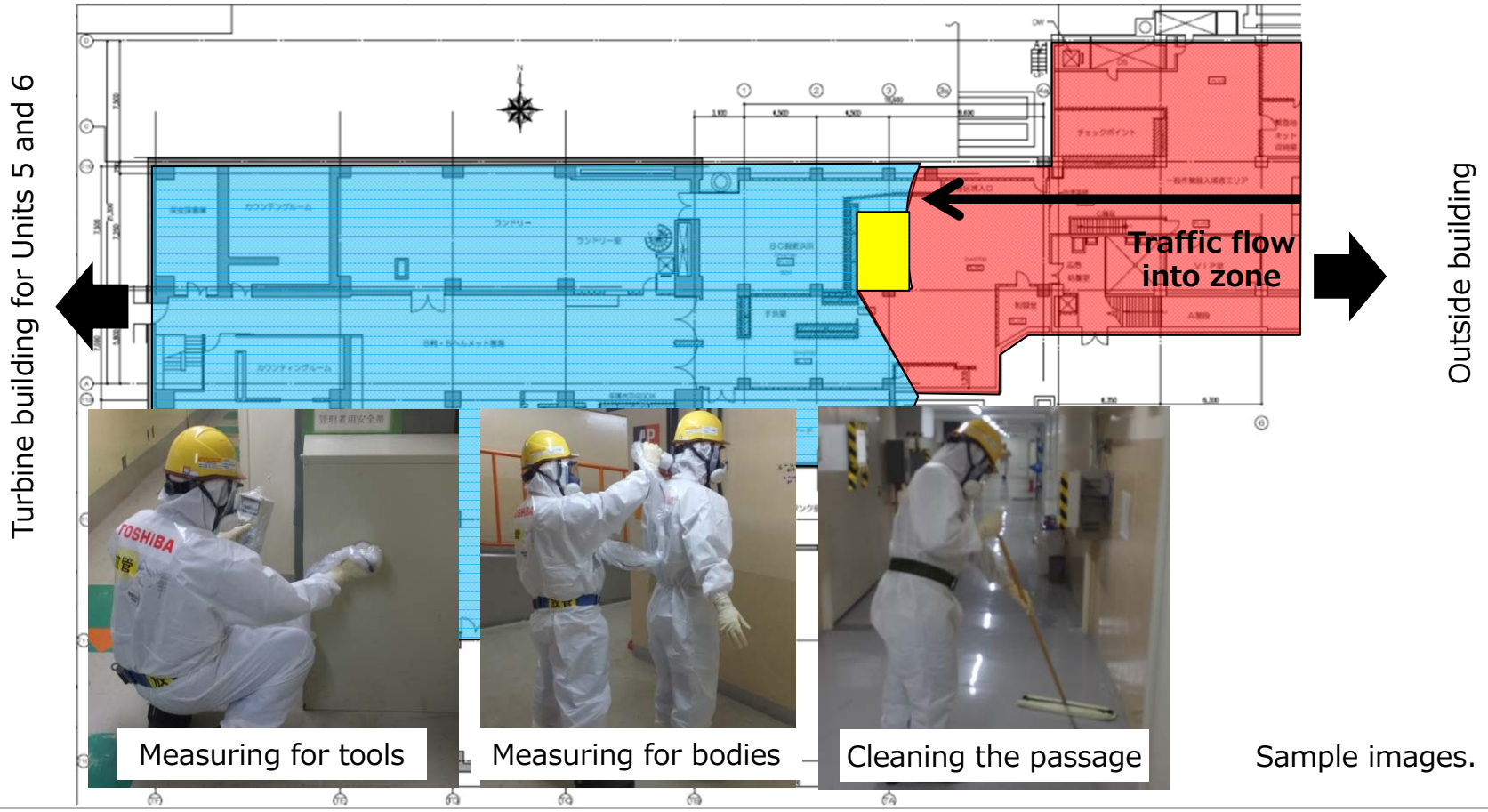
Contamination in the target work area was maintained at 100 cpm through periodic cleaning/decontamination, and use of laminated adhesive mats.
Shoe exchange areas and laminated adhesive mats were also installed at hot laboratory work area entrances.



3. Preventing contamination being brought in from outside the building

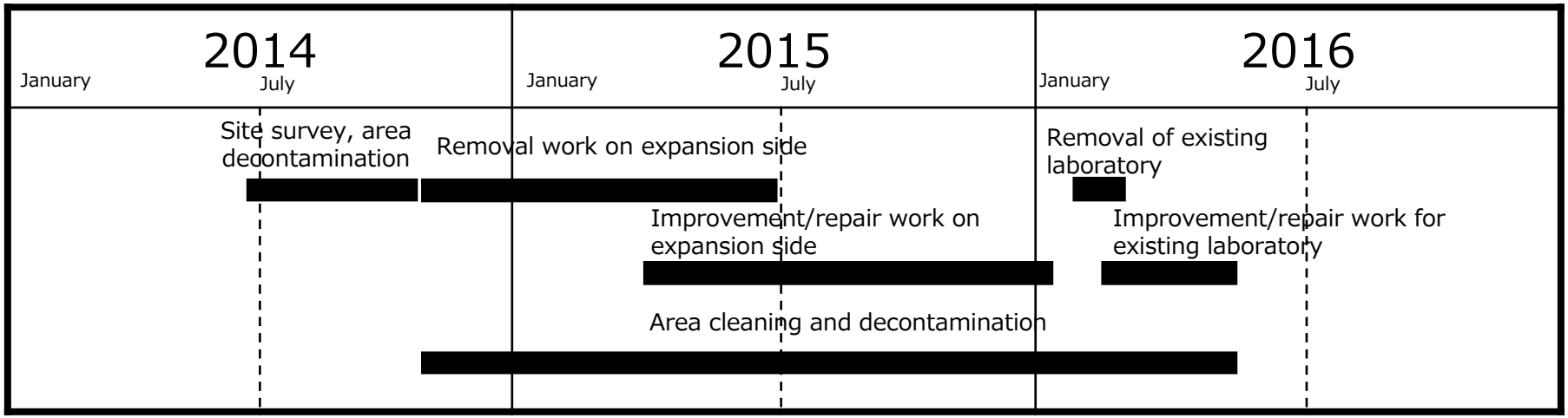
Controlling contamination from workers and materials/tools brought in

Contamination is measured for construction materials and tools brought into the light blue area.
Shoe exchanging areas and passage are regularly cleaned.

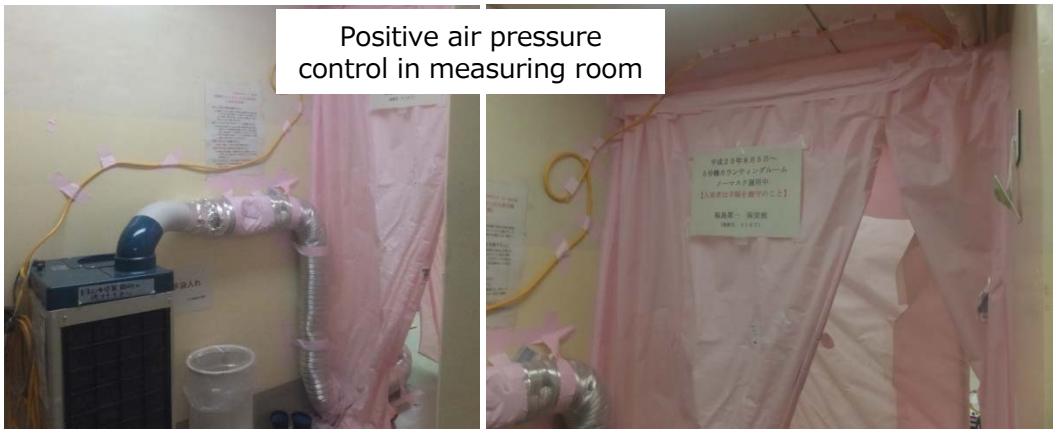


Sample images.

4. Contamination control during expansion work



To prevent influx of contamination into measurement rooms, positive air pressure is maintained.
Prior to removal, contamination surveys were conducted on ceiling panels, and local exhaust fans were used during removal.
Spread of contamination was prevented by putting a protective covering over ducts after cutting, etc.



Positive air pressure control in measuring room

Protective covers over cut duct ends

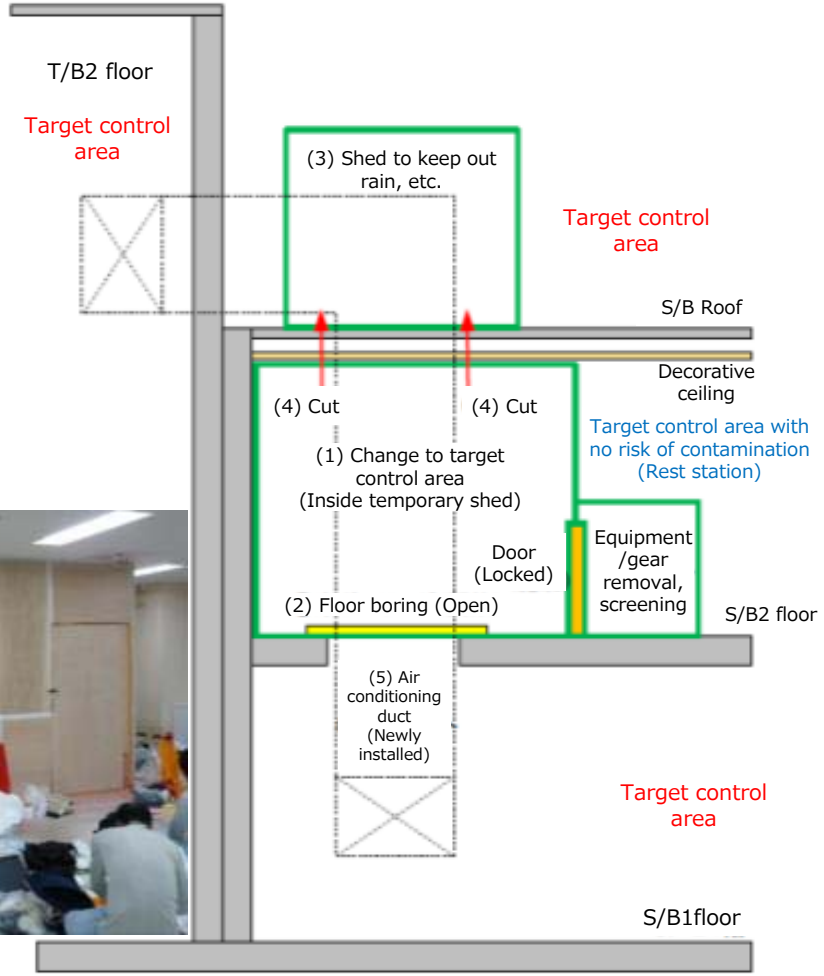
4. Contamination control during expansion work

Along with expansion of the hot laboratory, new ducts were passed through to the upper floor. Measures to prevent contamination from spreading were implemented on the upper floor because this is a zone with no risk of contamination (rest station, etc.)

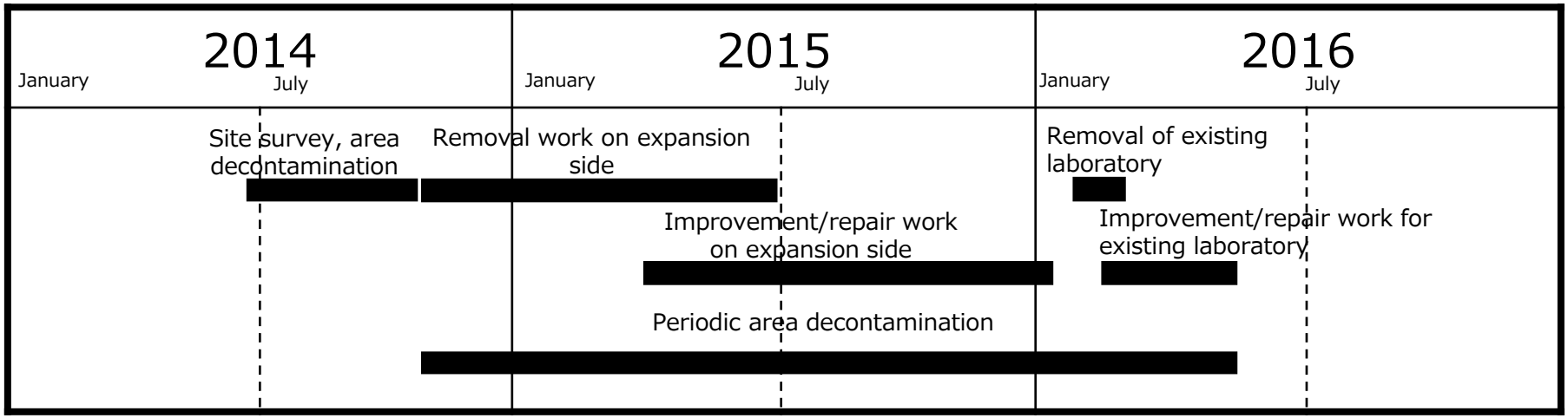
Risk of contamination at
rest station, etc. (no risk of contamination)
↓
Built temporary shed
↓
Established target control zones with risk of temporary contamination

Computer room


Rest station



5. Contamination control after hot laboratory expansion



When laboratory improvement/repair work was complete, TEPCO began to use the shoe exchanges.
Contamination levels were maintained at below detection limits (levels that cannot be detected with measuring equipment).

6. Results and reflections on the future

Reduction of physical burden on body	Most work was done in the summer, but there were no instances of heat stroke. - Used N95 dust masks for low contamination work such as installing new equipment - Set up rest areas within working area (installed spot coolers)
Prevention of bodily contamination	No serious bodily contamination occurred throughout the work period. - Measures to prevent bringing contamination in + periodic cleaning and decontamination
Prevention of spread of area contamination	No spread of work area contamination, and no contamination setbacks. - Measures to prevent bringing in contamination + periodic cleaning and decontamination - Clean-shed and local exhaust fans prevented spread of contamination

- **Reduction of physical burden on the body by using dust masks and coolers made it possible to work long hours with a low dose rate.**
- **Kept to the work schedule without work interruptions or setbacks due to bodily contamination or area contamination, etc.**
- **A reduced physical burden on the body improved work efficiency and contributed to finishing the work without any accident or disaster.**

These improvements in work efficiency helped achieve reduced exposure.

Decontamination reduced the ambient dose rate from 2.5 μSv/h to 0.1 μSv/h.
Worker exposure dose: daily average 0.0037 mSv, individual average 0.12 mSv/work period

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