

Power Supply Facilities Failure (Units 3-4 Temporary M/C (A), etc.)

March 22, 2013

Tokyo Electric Power Company



東京電力

Occurrence of Events in a Chronological Order

At around 6:57 PM on March 18, 2013, there was an incident where the power supply facilities in the Main Anti-earthquake Building at Fukushima Daiichi Nuclear Power Station momentarily stopped. Upon investigation, the regular M/C (Metal-clad switch gear) in the Process Building, common M/C4A and Units 3-4 temporary M/C (A) were found to be stopped due to the incident.

[Events in a chronological order]

March 18

6:57 PM: The power supply facilities in the Main Anti-earthquake Building momentarily stopped.

7:18 PM: BUS power supply of the common M/C4A, regular M/C in the Process Building and Units 3-4 temporary M/C (A) was confirmed to be suspended.

10:01 PM to 10:15 PM: Insulation resistance test performed on the regular M/C in the Process Building and Units 3-4 M/C (A). No abnormality found.

March 19

From 2:10 AM: Soundness investigation performed on the regular M/C in the Process Building.

3:00 AM: Nitrogen separator (B) recovered.

9:04 AM: The regular M/C in the Process Building received power. No abnormality found with the parameters (Vo and others).

10:01 AM: The common M/C 4A received power from the regular M/C in the Process Building. The common PC 4A and 4C also received power.

2:20 PM: Unit 1 SFP alternative cooling system recovered.

4:13 PM: Unit 4 SFP alternative cooling system temporarily recovered by a temporary diesel generator.

10:26 PM: Unit 4 SFP alternative cooling system recovered by the regular M/C in the Process Building.

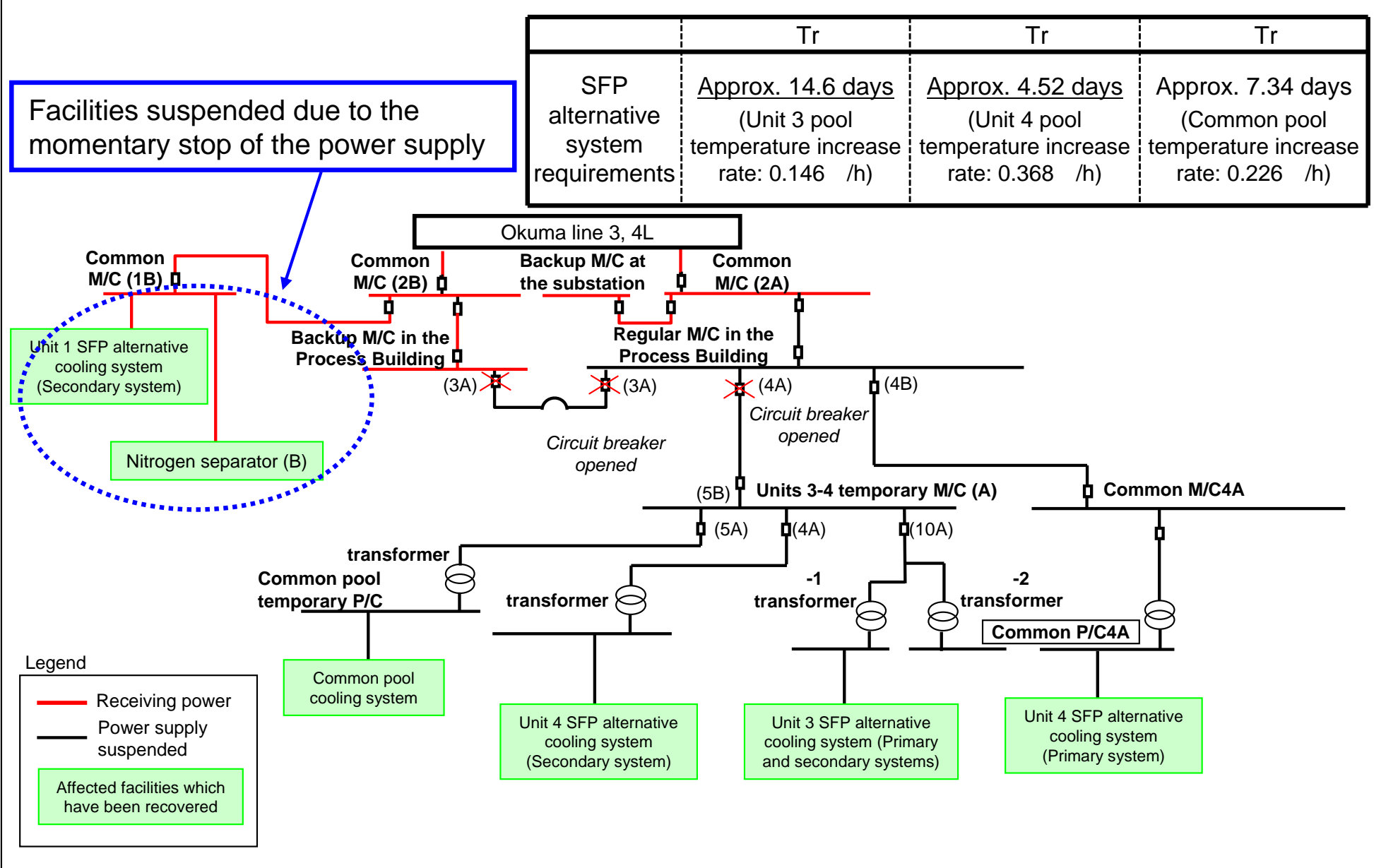
10:43 PM: Unit 3 SFP alternative cooling system recovered.

March 20

12:12 AM: The common pool cooling system recovered.

*Reason why recovery required a substantial amount of time: In a normal process of recovery after a failure, the location of failure is identified first. Then the location of failure is detached and the sound power line is recovered. In this case, investigation was initially performed assuming that the location of failure is a part of Units 3-4 temporary M/C (A), however, the location of failure could not be identified. Thus, the entire Units 3-4 temporary M/C (A) was identified as the location of failure and was detached. It took a substantial amount of time switching to an alternative power line.

Power Supply Structure of the Affected Facilities



Overview of Investigation of Units 3-4 Temporary M/C (A) (Performed on March 20)

[Investigation of Units 3-4 temporary M/C (A)]

(1) Appearance inspection of Units 3-4 temporary M/C (A)

Results: Trace of short circuit found on 5A unit of Units 3-4 temporary M/C (A): See photos and

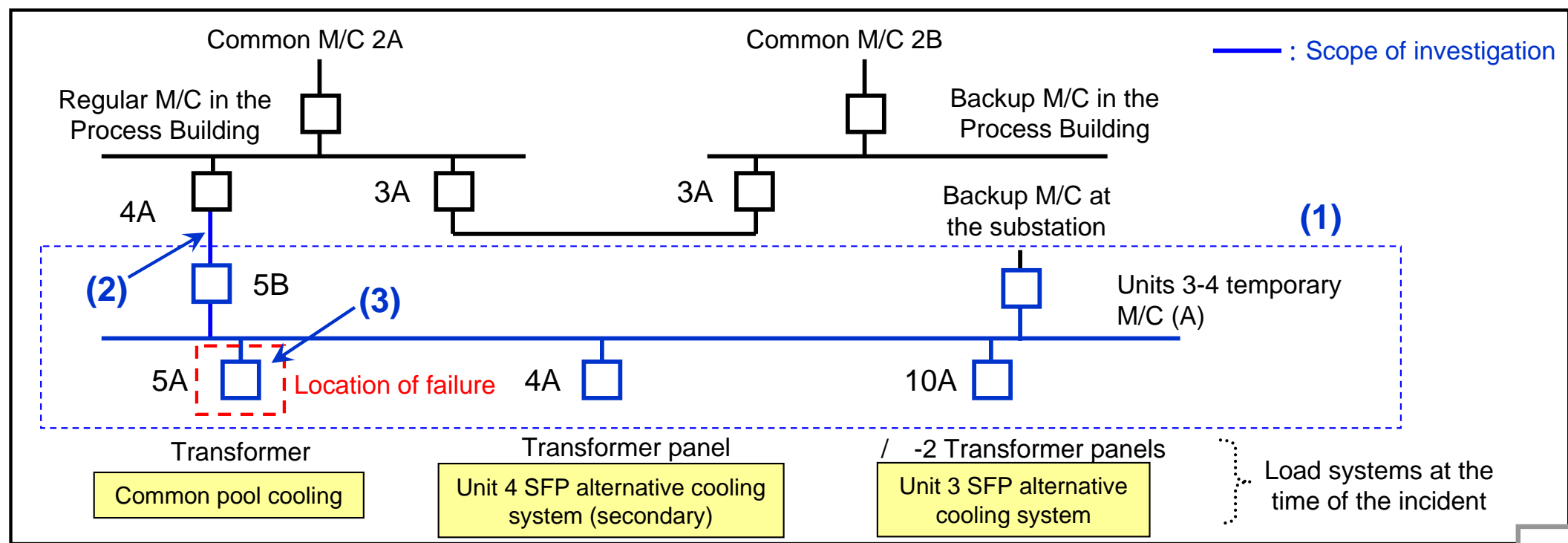
A dead small animal was found on the floor of the same unit: See photo

(2) Appearance inspection of the power receiving cable, insulation resistance test, conduction resistance test

Results: No abnormality found

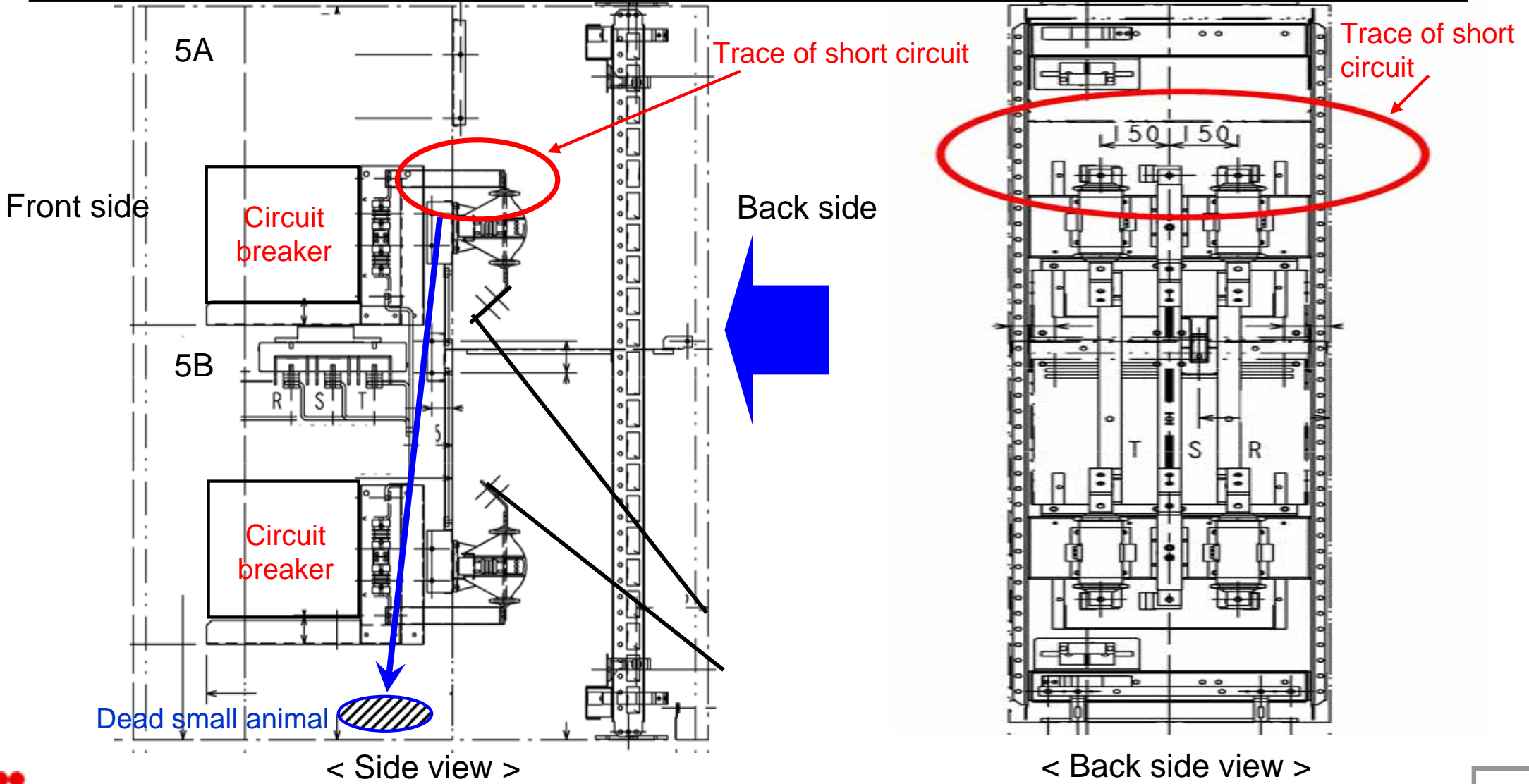
(3) Appearance inspection of the circuit breaker, insulation resistance test

Results: Discoloration found: See photo

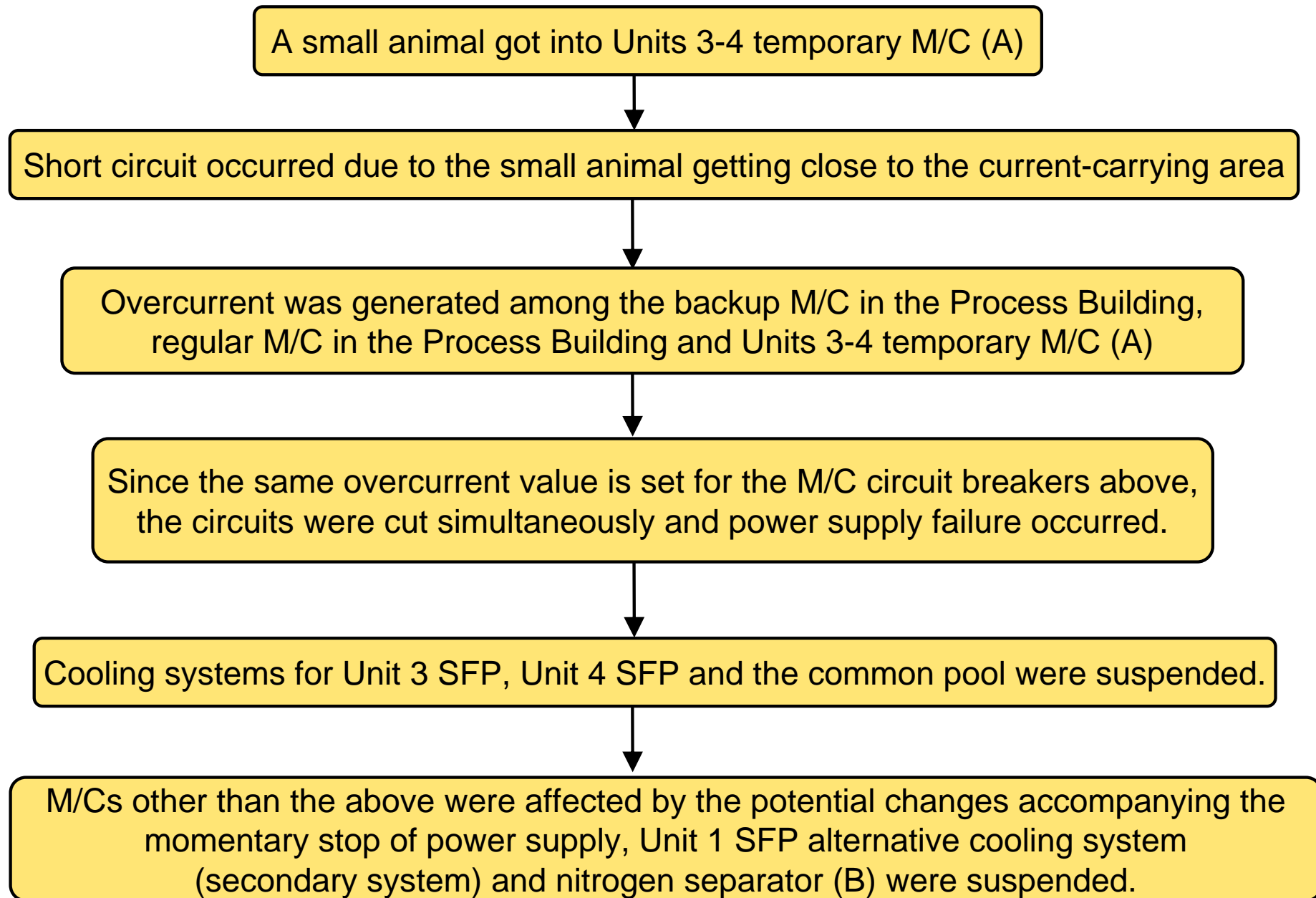


Investigation of Units 3-4 Temporary M/C (A) Unit (5A)

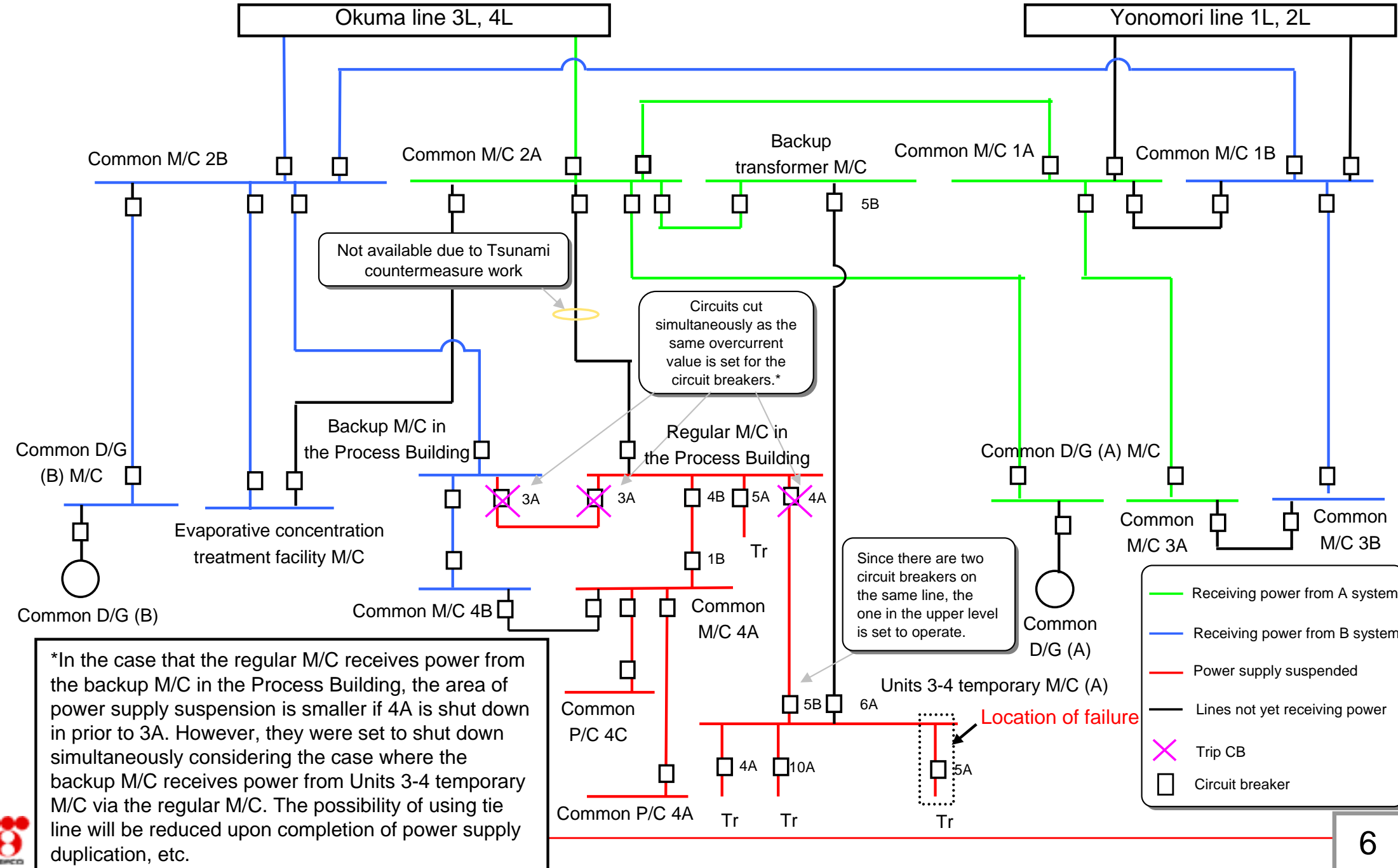
A trace of short circuit was found on the primary conductor (R, S, T phases) of the current transformer in the back of 5A unit of Units 3-4 temporary M/C (A). Also, a small animal was found dead on the floor of the same unit.



Assumed Cause of Power Supply Failure of Units 3-4 Temporary M/C (A)



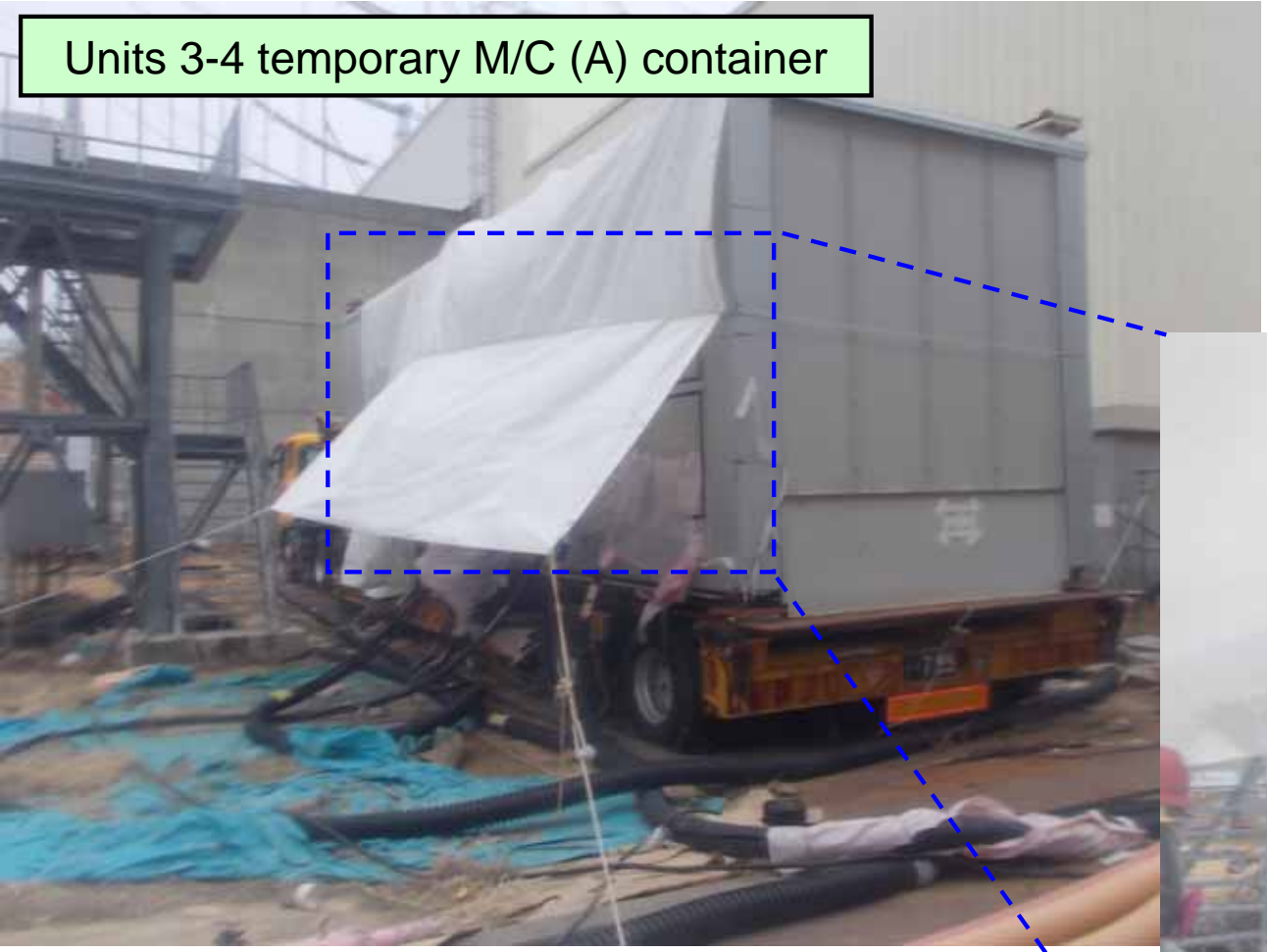
Power Supply System at the Time of the Incident



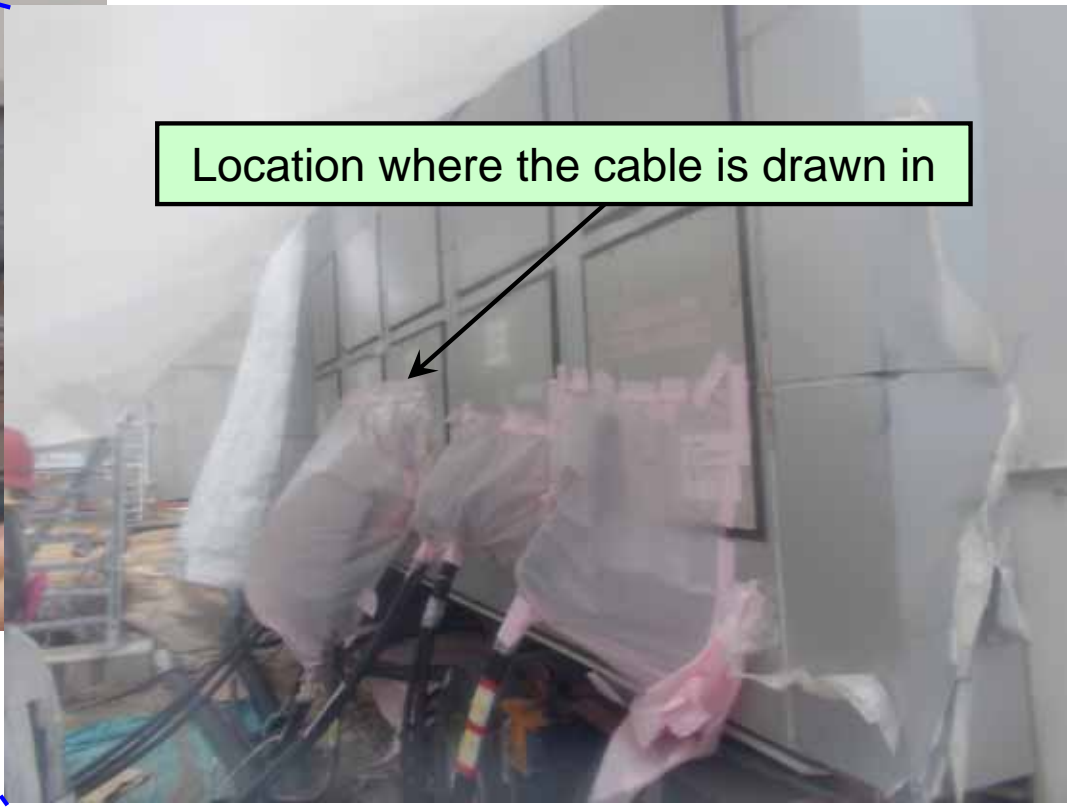
*In the case that the regular M/C receives power from the backup M/C in the Process Building, the area of power supply suspension is smaller if 4A is shut down in prior to 3A. However, they were set to shut down simultaneously considering the case where the backup M/C receives power from Units 3-4 temporary M/C via the regular M/C. The possibility of using tie line will be reduced upon completion of power supply duplication, etc.

Photo Condition of Units 3-4 Temporary M/C (A)

Units 3-4 temporary M/C (A) container



Location where the cable is drawn in



A small animal is assumed to have entered from the opening of Units 3-4 temporary M/C (A)

Photo Investigation of Units 3-4 Temporary M/C (A) Unit (5A)

An arc was generated when a small animal got close to the conductor and short circuit occurred.

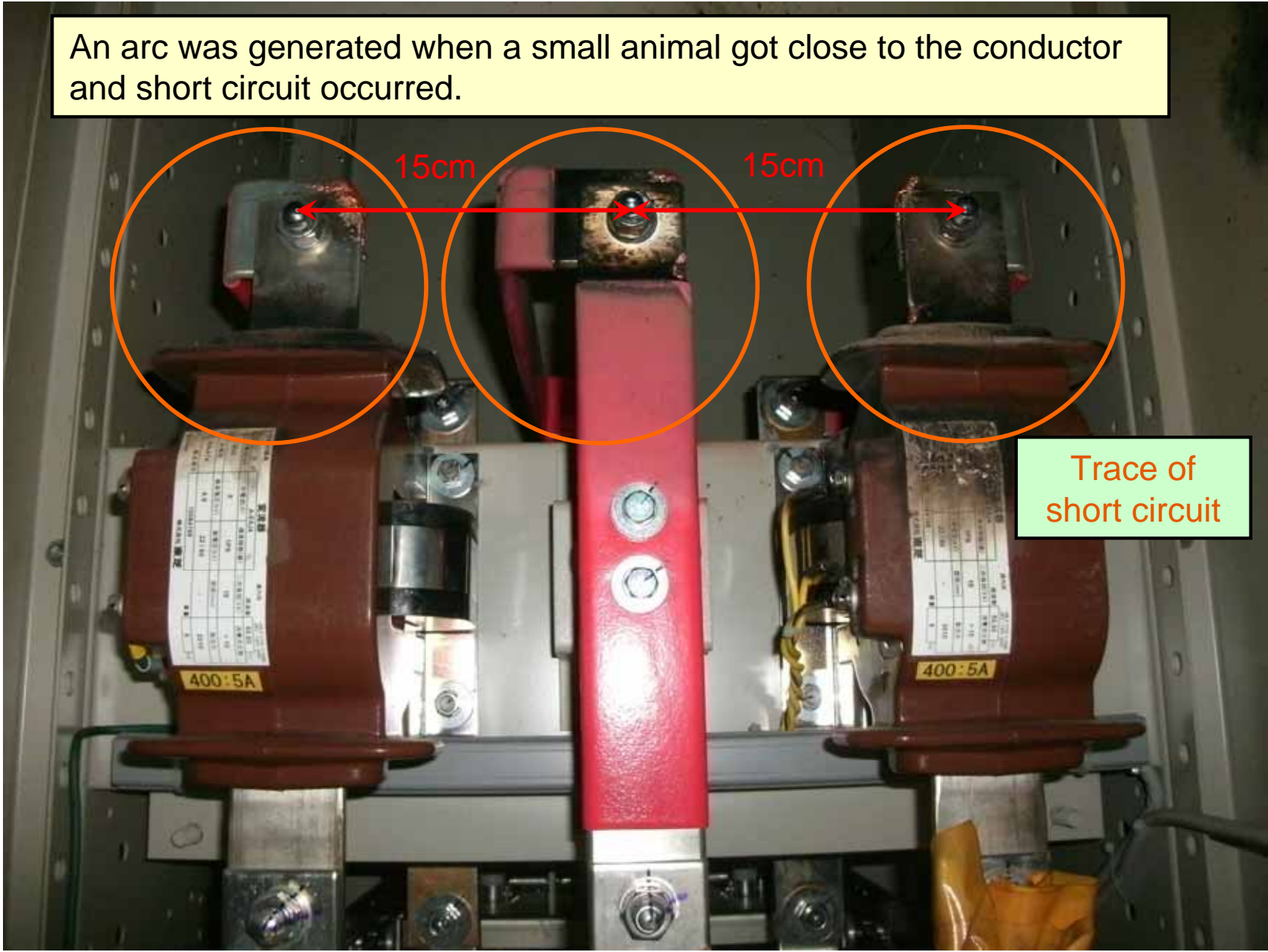
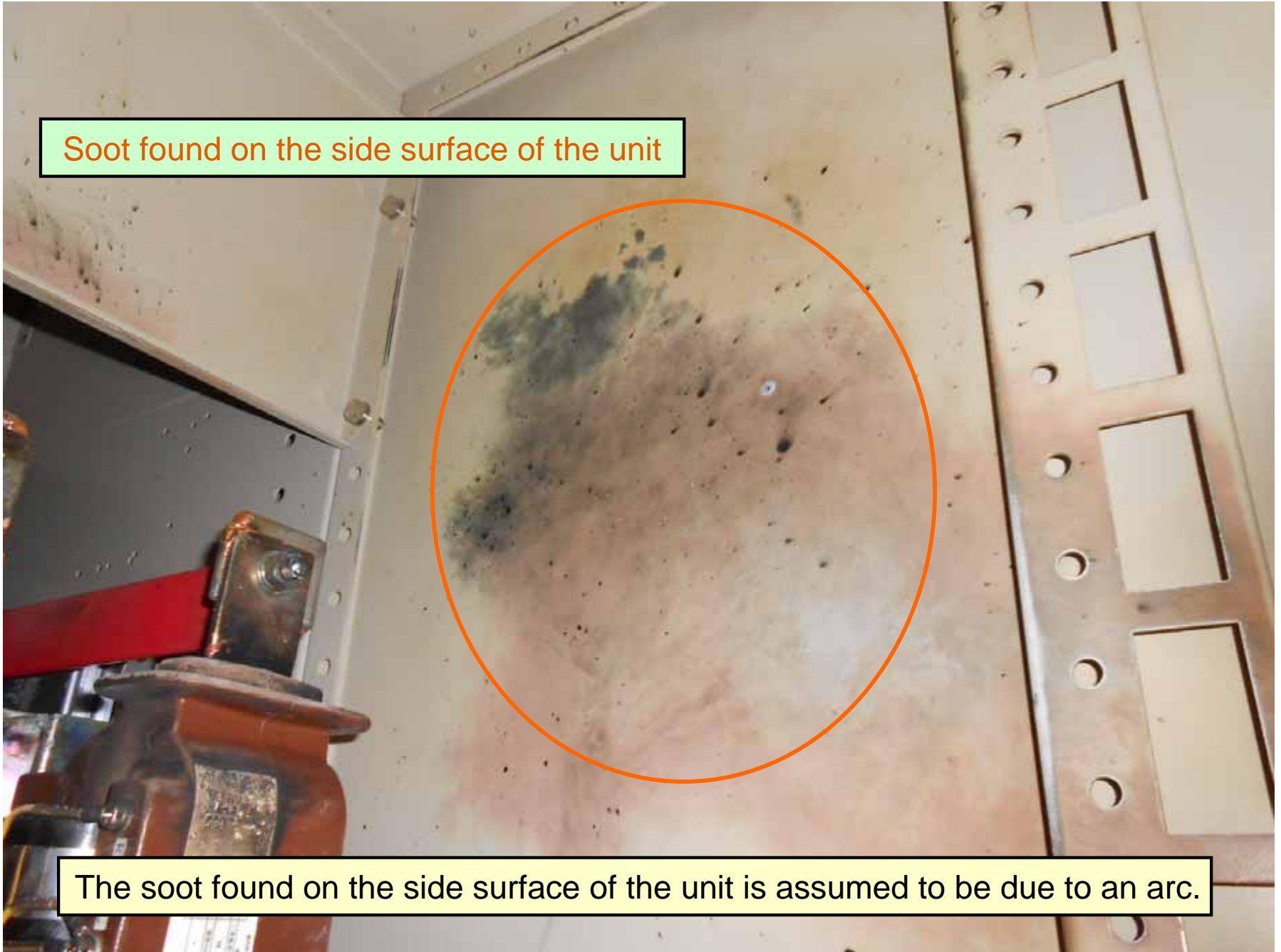


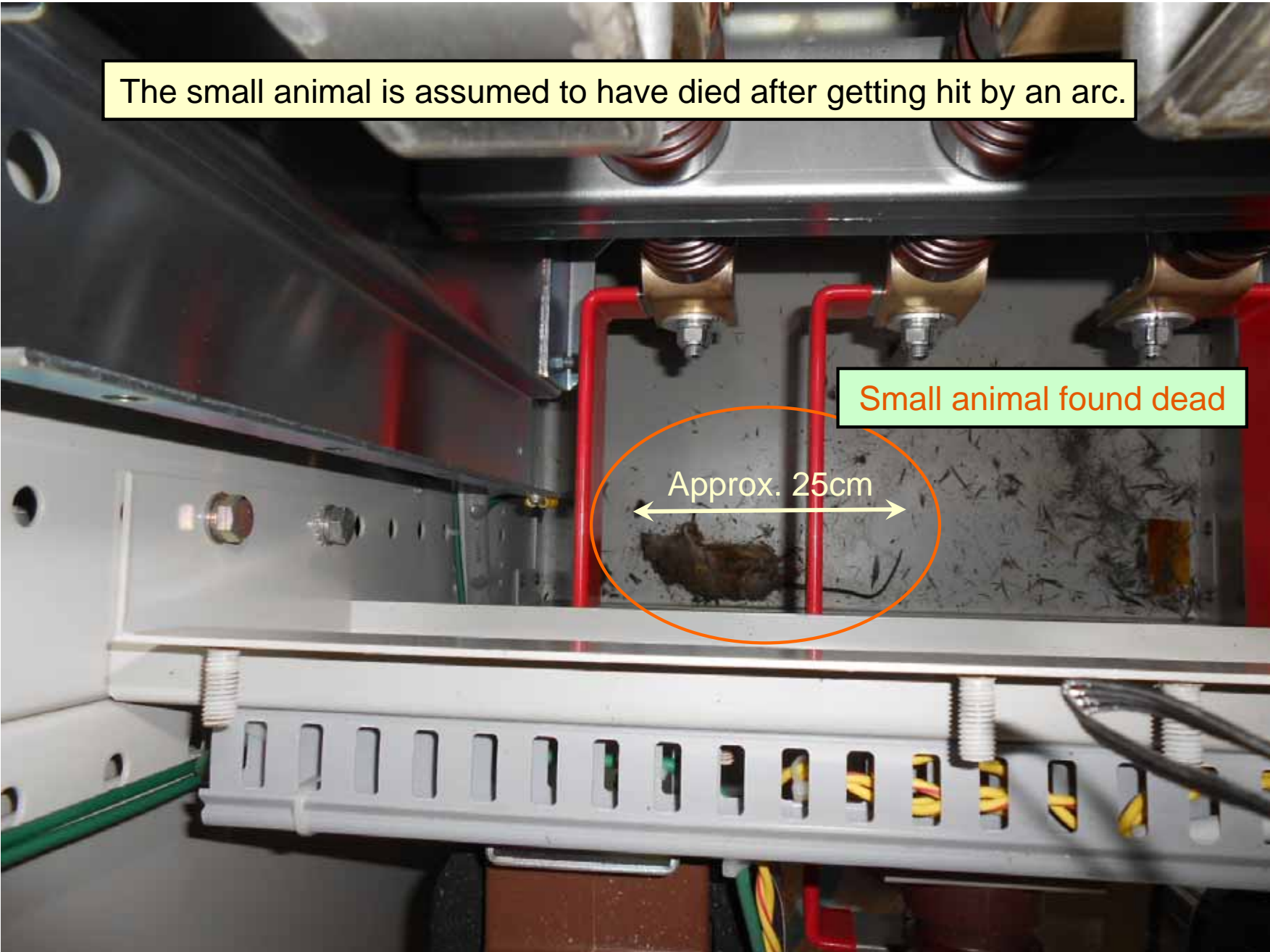
Photo Investigation of Units 3-4 Temporary M/C (A) Unit (5A)



Soot found on the side surface of the unit

The soot found on the side surface of the unit is assumed to be due to an arc.

Photo Investigation of Units 3-4 Temporary M/C (A) Unit (5A)



The small animal is assumed to have died after getting hit by an arc.

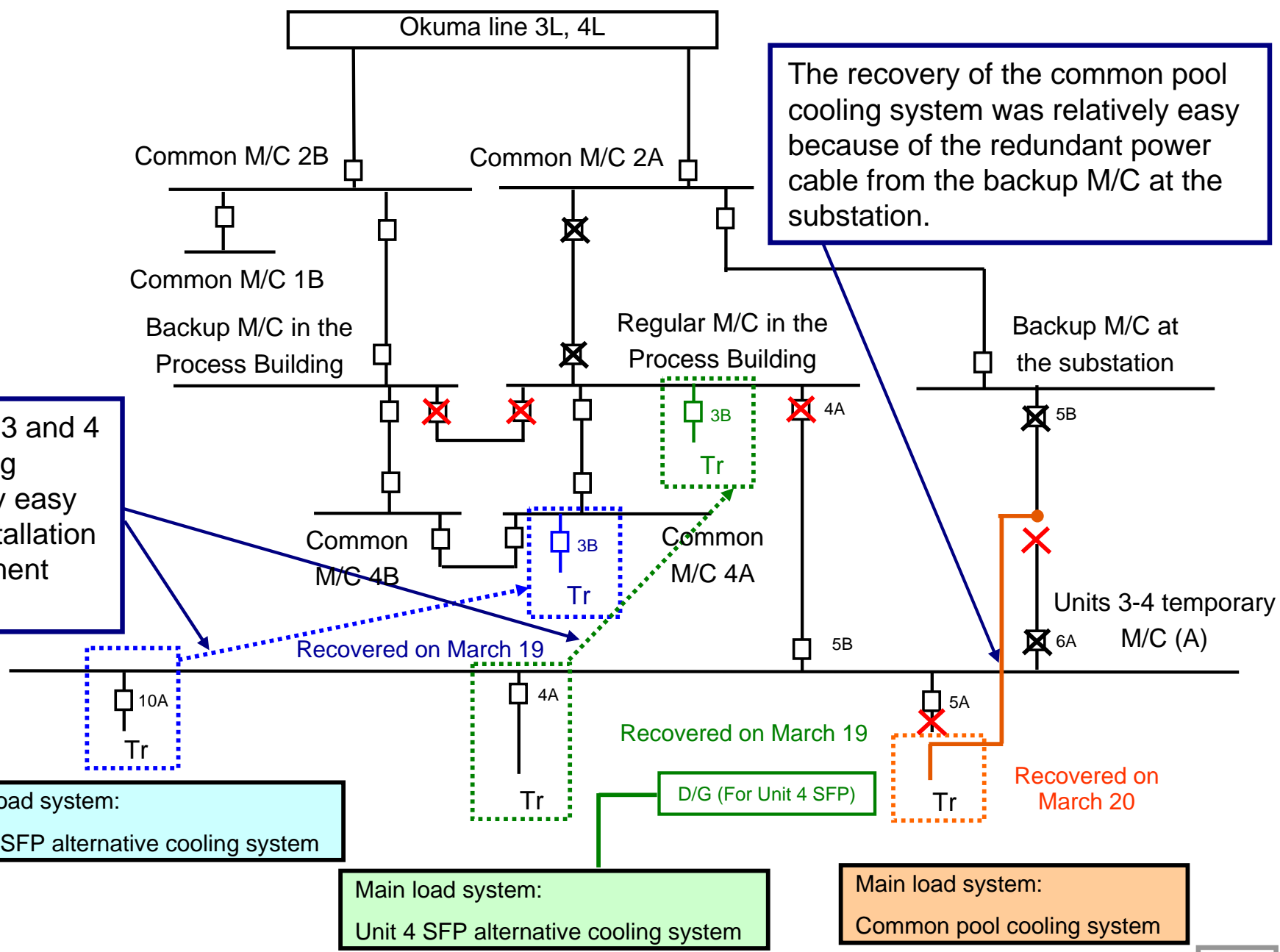
Small animal found dead



Photo Investigation of Units 3-4 Temporary M/C (A) Unit (5A)



One-line Diagram of / Transformer Panels and Transformer after Recovery



Power Supply Duplication and Reliability Improvement

Power supply reliability improvement work is being implemented for the following systems which were suspended due to the power supply failure.

➤ Units 1-4 SFP alternative cooling systems

- The power supply for Units 1-2 SFP alternative cooling systems will be multiplied.
- The load systems previously receiving power from Units 3-4 temporary M/C (A) will be connected to the permanent common M/C4A and the regular M/C in the Process Building. Furthermore, the cable of Units 3-4 SFP alternative cooling systems will be made redundant to allow for connection with common M/C4B and the backup M/C in the Process Building in the case of M/C failure.

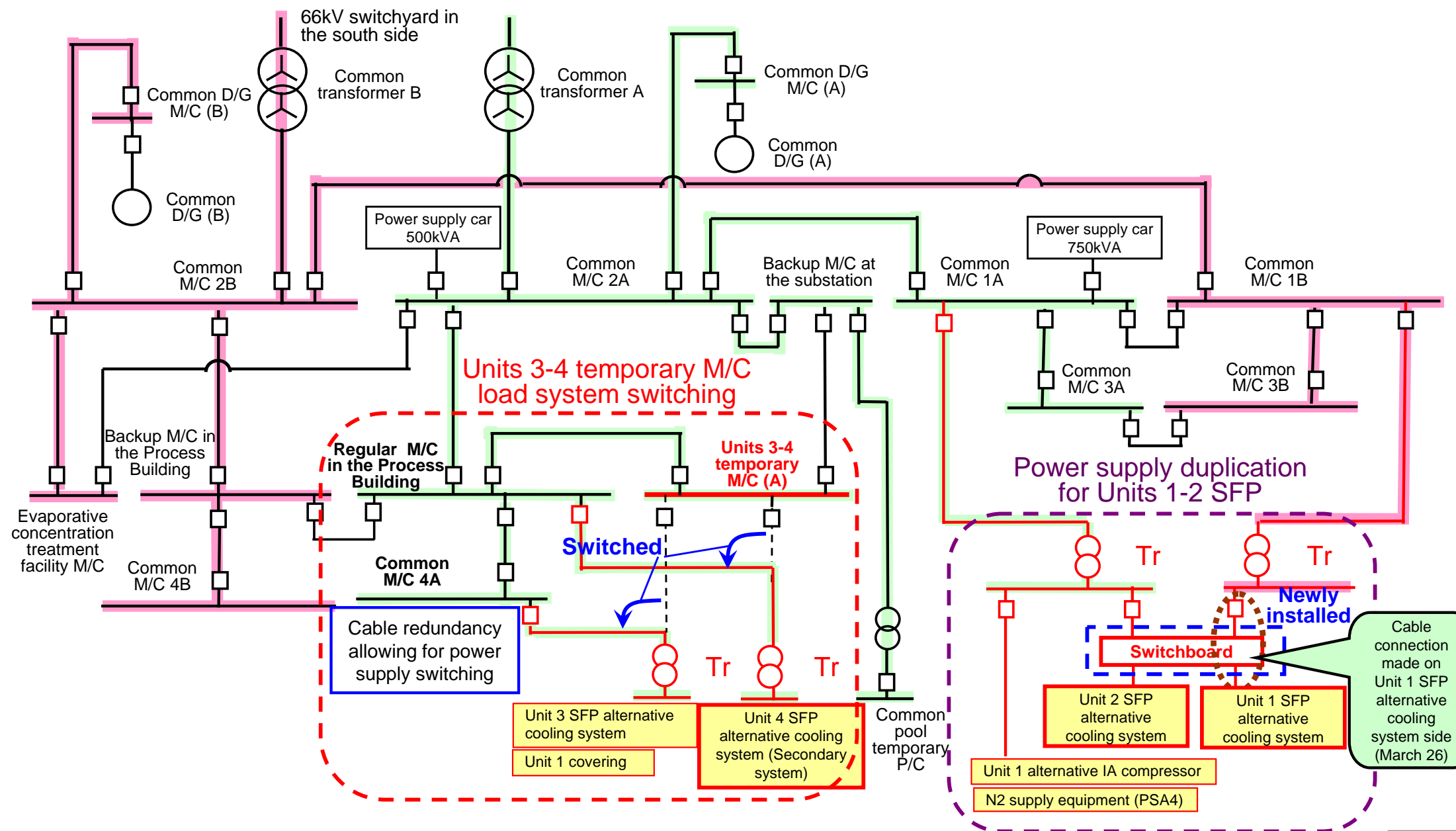
➔ **Work to be completed at the end of March 2013**

➤ Common pool cooling system

The common pool cooling system will be duplicated through recovering the power supply for the common pool M/C and P/C.

➔ **Work to be completed at the end of September 2013, however, work implementation ahead of schedule is being considered.**

Reliability Improvement Work (Units 1-4 SFP Alternative Cooling Systems)



Cable connection made on Unit 1 SFP alternative cooling system side (March 26)

Reliability Improvement Work (Common Pool Cooling System)

