Power Supply for Reprocessing Plants

**Rokkasho reprocessing plant**

**Step 1**
Confirm integrity of power feeding destinations (equipment).

**Step 2**
Transfer power source vehicles.

**Step 3**
Connect cables (for cables that have been laid).

**Step 4**
Start feeding power from power source vehicles.

Feeding power from power source vehicles allows functions of cooling water circulation pumps, cooling towers, and air compressors, to be restored.

**Tokai reprocessing plant**

**Step 1**
Confirm integrity of power feeding destinations (emergency power supply connection panel and power supply switchboard).

**Step 2**
Confirm integrity of mobile power generators and cable routing.

**Step 3**
Lay and connect cables.

**Step 4**
Start feeding power from mobile power generators.

● Route of power fed from mobile power generators
Mobile power generators → Emergency power supply connection panel → Power supply switchboard → Loads

● Power fed from mobile power generators allows functions of cooling water circulation pumps and hydrogen scavenging compressors to be restored.

Power source vehicle

Emergency power supply building

Each building

Load

Load

Load

6.9 kV main bus line for emergencies

6.9 kV metal clad switchgear for emergencies

Connecting scheme using mobile power generators

AC 400 V

AC 400 V and AC 100 V

Mobile power generator

Emergency power supply connection panel

Power supply switchboard

Power fed to loads

Commercial power supply or emergency power generator

Existing power distribution board

Power supply switchboard

Load

Load

Load

Loads being fed power:

- Cooling water circulation pumps
- Cooling towers
- Air compressors, etc.

Loads being fed power:

- Cooling water circulation pumps
- Hydrogen scavenging compressors, etc.
Methods for Injecting Water to Reprocession Plants' Pools

**Rokkasho reprocessing plant**

1. Install portable pumps and hoses (outside the buildings).
2. Install hoses inside buildings.
3. Connect hoses.
4. Activate portable pumps (start injecting water).

**Tokai reprocessing plant**

1. Procedure for supplying water from purified water storage tank
   - Supply water from purified water storage tank to spent fuel storage pool.
2. Procedure for supplying water from the spare pool
   - Connect cables to emergency power supply connection panel.
   - Install submersible pumps and hoses.
   - Connect cables to transformers.
   - Switch over power supply systems on power supply switchboard.
   - Feed power from mobile power generators (activate submersible pumps).
   - Supply water from purified water storage tank to spare pool.

Estimated time to reach boil: approx. 20 days
Anticipated time to restore functionality: 2 days

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**Key**
- : Permanently installed equipment
- : Temporarily installed equipment
  - A: standard equipment; B: equipment to handle extraordinary circumstances

- A refers to standard equipment. B refers to equipment installed to handle extraordinary circumstances.

- Permanently installed equipment: existing processing equipment adapted to implement emergency safety measures
- Temporarily installed equipment: equipment newly installed to implement emergency safety measures

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**Diagram**

- Acceptance and storage
- Cask
- Spent fuel
- Power supply switchboard
- Transformer (400 V/200 V)
- Mobile power generator
- Cable
- Emergency power supply connection panel
- Submersible pump (capacity: 8 kVA)
- Hose
- Pumper truck (existing fire engine)
- Water storage tank (approx. 10,000 m³)
- Water storage tank for firefighting (900 m³)
- Fire engine

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**Legend**

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- : Temporarily installed equipment
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Method for Cooling High-Level Liquid Waste at Rokkasho Reprocessing Plant

1. Starting feeding power from power source vehicles.
2. Each building receives power.
3. Activate safety cooling water circulation pump.
4. Activate cooling tower (fans).
5. Activate cooling water pump.

Operate air-cooling fans to cool water.

Operate pumps to circulate water.

Estimated time to reach boiling: approx. 24 hours
Anticipated time to restore function: 8 hours
Methods for Cooling High-Level Liquid Waste at Tokai Reprocessing Plant

[With ordinary cooling system]
1. Connect cables to emergency power supply connection panel
2. Switch power supply systems on power supply switchboard.
3. Power supply from mobile power generators (activate cooling tower, primary cooling water circulation pump, and secondary cooling water circulation pump).

Evaluated time to boiling point: 48 hours
Anticipated time to complete the process: 16 hours (estimation based on training experience)

[With pumper truck connected to secondary system of cooling heat exchanger]
1. Connect cables to emergency power supply connection panel
2. Connect hoses to heat exchanger and supply water.
3. Switch power supply systems on power supply switchboard.
4. Feed power from mobile power generators. (activate primary cooling water circulation pump)

Evaluated time to boiling point: 53 hours
Anticipated time to complete the process: 9 hours (estimation based on training experience)

[With ordinary ventilation system]
1. Connect cables to emergency power supply connection panel
2. Switch power supply systems on power supply switchboard.
3. Feed power from mobile power generators. (activate exhaust fan of cell ventilation system)

Evaluated time to boiling point: 27 hours
Anticipated time to complete the process: 9 hours (estimation based on training experience)

Legend
- : Common use
- : Temporary use (A: main use; B: auxiliary use in extraordinary conditions)

Permanently installed equipment: existing processing equipment adapted to implement emergency safety measures
Temporarily installed equipment: equipment newly installed to implement emergency safety measures
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Method for Restoring Hydrogen Retention Prevention Function at Rokkasho Reprocessing Plant

1. Start feeding power from the power source vehicles.
2. Each building receives power.
3. Activate the air compressors.
4. Activate the exhausters in the facilities that treat waste gas from towers and tanks, etc.

Estimated time to reach 4% of hydrogen concentration: approx. 35 hours
Anticipated time to restore function: 8 hours

Additional air is supplied from air storage tank to exhaust waste gas in order to prevent concentration of generated hydrogen from becoming combustible.

Facilities to treat waste gas from towers and tanks

Unless the air is scavenged, the hydrogen concentration will increase.

Hydrogen generated due to radiolysis.

Hydrogen discharged into the atmosphere.
Methods for Restoring Hydrogen Retention Prevention Function at Tokai Reprocessing Plant

[With ordinary hydrogen scavenging system]

1. Connect cables to emergency power supply connection panel.
2. Switch over power supply systems on power supply switchboard.
3. Feed power from mobile power generators.
   (activate hydrogen scavenging blower and tank ventilation system exhauster)

Estimated time to reach 4% of hydrogen concentration: 33 hours
Predicted time to complete the process: 17.5 hours
   (estimation based on training experience)

[Hydrogen scavenging with portable compressors]

1. Connect cables to emergency power supply connection panel.
2. Connect hoses to compressed air pipes for hydrogen scavenging.
3. Connect transformer to portable compressors via cable.
4. Switch over power supply systems on power supply switchboard.
5. Feed power from mobile power generators.
   (activate portable compressors and highly radioactive liquid waste storage tank system exhausters)

Estimated time to reach 4% of hydrogen concentration: 14 hours
Predicted time to complete the process: 10 hours
   (estimation based on training experience)

[Hydrogen scavenging with nitrogen cylinders]

2. Connect cables to emergency power supply connection panel.
3. Connect cables to power distribution board.
   Switch power supply systems on power supply switchboard.
4. Feed power from mobile power generators.
   (activate cell glove box system exhausters)

Estimated time to reach 4% of hydrogen concentration: 9.3 hours
Predicted time to complete the process
   - Restoration of function to prevent hydrogen retention by supplying nitrogen gas: 0.5 hours
   - Time to activate exhauster: 8 hours
   (estimation based on training experience)

Key

- Permanently installed equipment
- Temporarily installed equipment
  A: standard equipment; B: equipment to handle extraordinary circumstances

Plutonium conversion technology development facility

Permanent installation equipment: existing processing equipment adapted to implement emergency safety measures
Temporarily installed equipment: equipment newly installed to implement emergency safety measures
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