



July 9, 2011
PAC Meeting

J-PARC Status

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J-PARC Center

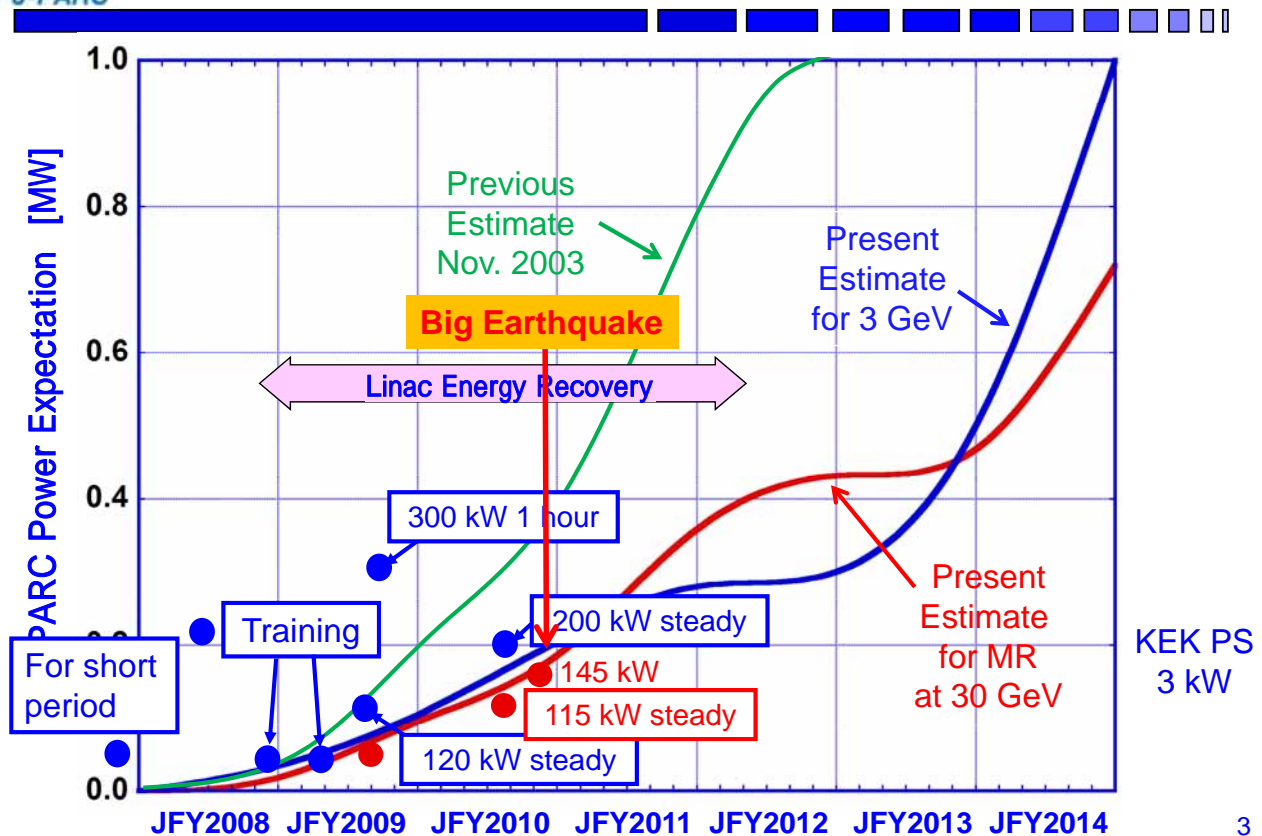
**Japan Atomic Energy Agency (JAEA)
High Energy Accelerator Research Organization (KEK)**

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Before the Earthquake

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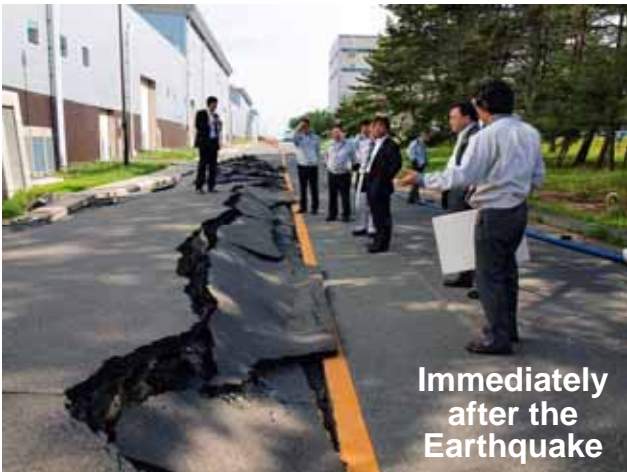
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Summary Until March 11, 2011

- Highlights before March 11, 2011 (Earthquake)
 - Beam power has been steadily increasing: 200 kW for 3 GeV, 145 kW for Main Ring at 30 GeV.
 - 400kW long-run test completed. Goal is 1 MW.
 - Neutrino Facility: Started to take data at Super Kamiokande. 6 electron-neutrino candidate events were detected. Possibility of large θ_{13} . Encouragement to go to CP measurement.
 - Hadron Facility: About ready to run for many experiments. First data for penta-quark search were completed.
 - Materials and Life Facility: Neutron and muon beams already produced many fruitful data and the results are being published.
 - Need more and serious efforts towards "international usage" and toward creating "lively academic atmosphere".
 - Also, need more effort toward "industrial usage" of J-PARC

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After the Earthquake



In front of Linac



Present

Urgent recovery of cooling water system is required.

Linac Tunnel as of March 24

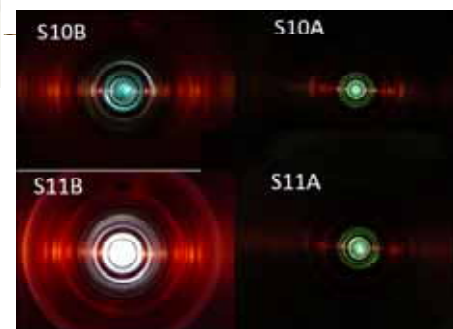


On March 17 the water level was only 1 cm, but it increased to 10 cm (100 tons) on March 24. The water was pumped out with an in-house electric generator, and the problems were resolved afterwards.

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Floor sagged ~4 cm in the middle. However, other places, except beam monitors, were normal. (Beam was aligned step by step through repetition of dropping the beam power and being bent by magnets. A perfect alignment is planned in the next year.)



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Current Status of Linac

Big Issues

- **Cooling water** (Being restored in September)
- **Electricity** (Low voltage is OK, and high voltage will be OK when wiring is repaired.)
- **Crane** (Will be operating shortly)
- **Alignment** (Operation with straight line will be in the next year.)



Inspection of crane in the tunnel

Confirming it can be operated with a weight limit.



Close inspection of substructure of building with impact elastic wave method and taking cores

~80 cm void was found. The repair plan is discussed. Floor leveling is also investigated.



Repair of water leaks in the tunnel

The leakages were stopped by injection of a foaming urethane material.

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Road Condition around 3 GeV



Immediately after the Earthquake

Wavy road!

The beam pipe was present underneath a bump in the middle. Both sides were sinking.

The road was repaved by the end of June. It provides an access to the cooling tower beyond this point. Repair of the electric power supply facility near here has been also kicked-off.



End of June

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3 GeV Electric Power Supply, Condenser (Capacitor) Bank, Cooling Tower, etc



Leaned to the left.

Around the building entrance, approximately 100 cables had been buried, and all of them were distorted.

A condenser (capacitor) bank was waved. Cables were distorted due to its weight.



Repair of Electric Power Supplies

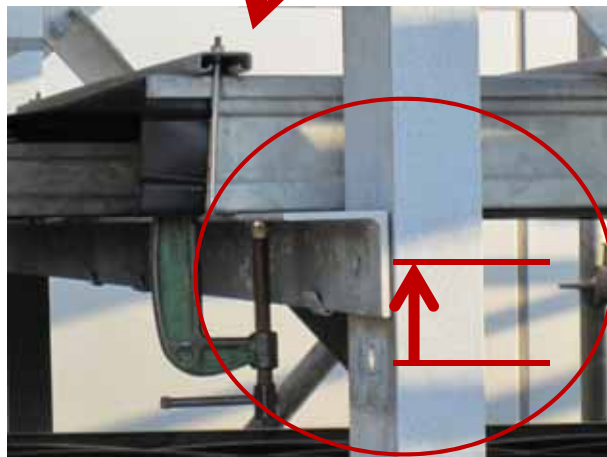


Repair of Cooling Tower & Removal of Pipes



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Repair of Condenser (Capacitor) Bank



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3 GeV Main Ring



No obvious damages were observed.
(Photo taken on March 29)

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50 GeV Main Ring



No damages were observed through an inspection from the outside alone.
(Photo taken on March 17)



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Current Status of MR (50 GeV)

Recovery has been progressing smoothly.

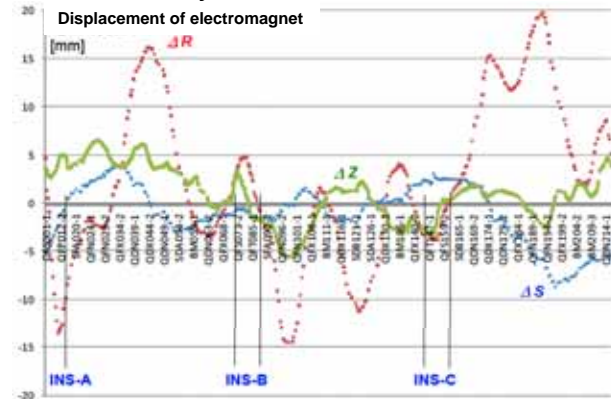
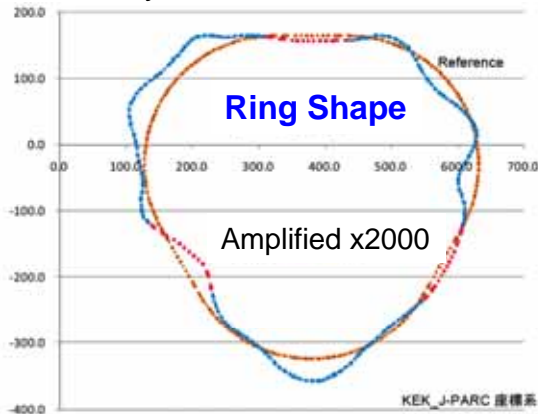
Repairing the leakages in the tunnel is almost completed.

Conducting test (concurrent?) of a power supply for a main electromagnet

- No specific problems in electric current and temperature as well as noises and smells.
- Confirming the soundness of submerged electromagnet.

Completing examination for making a repair plan of the high-frequency system

Preliminary Results of Circumference Measurement by Laser Trucker



- It appeared there was a large misalignment in both horizontal and vertical directions.
- ~20 electromagnet mounts shifted more than a limit of simple adjustment.
- All electromagnets will be realigned. Three teams will be done between August and October.

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Material and Life Science Experimental Facility (MLF) Area



Immediately after the Earthquake
Road at the west side of the MLF building felled in ~1.5 m



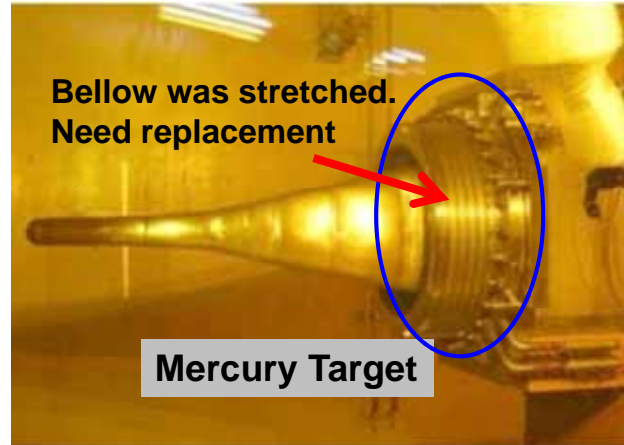
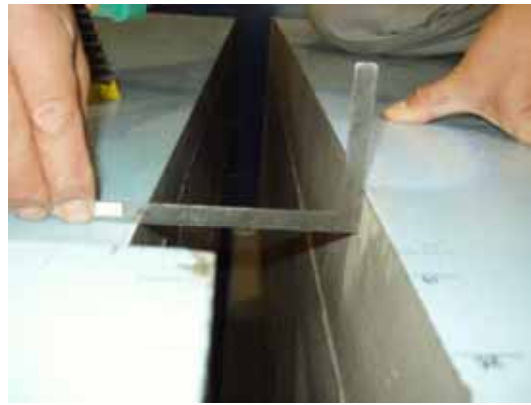
Present

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Shielding Walls for Neutron & Target



Displacement of shielding walls in MLF
1st Hall: BL04 Area (left)
2nd Hall: BL20 Area (right top)



Bellow of the target shifted ~30 cm.
Replacement is planned.

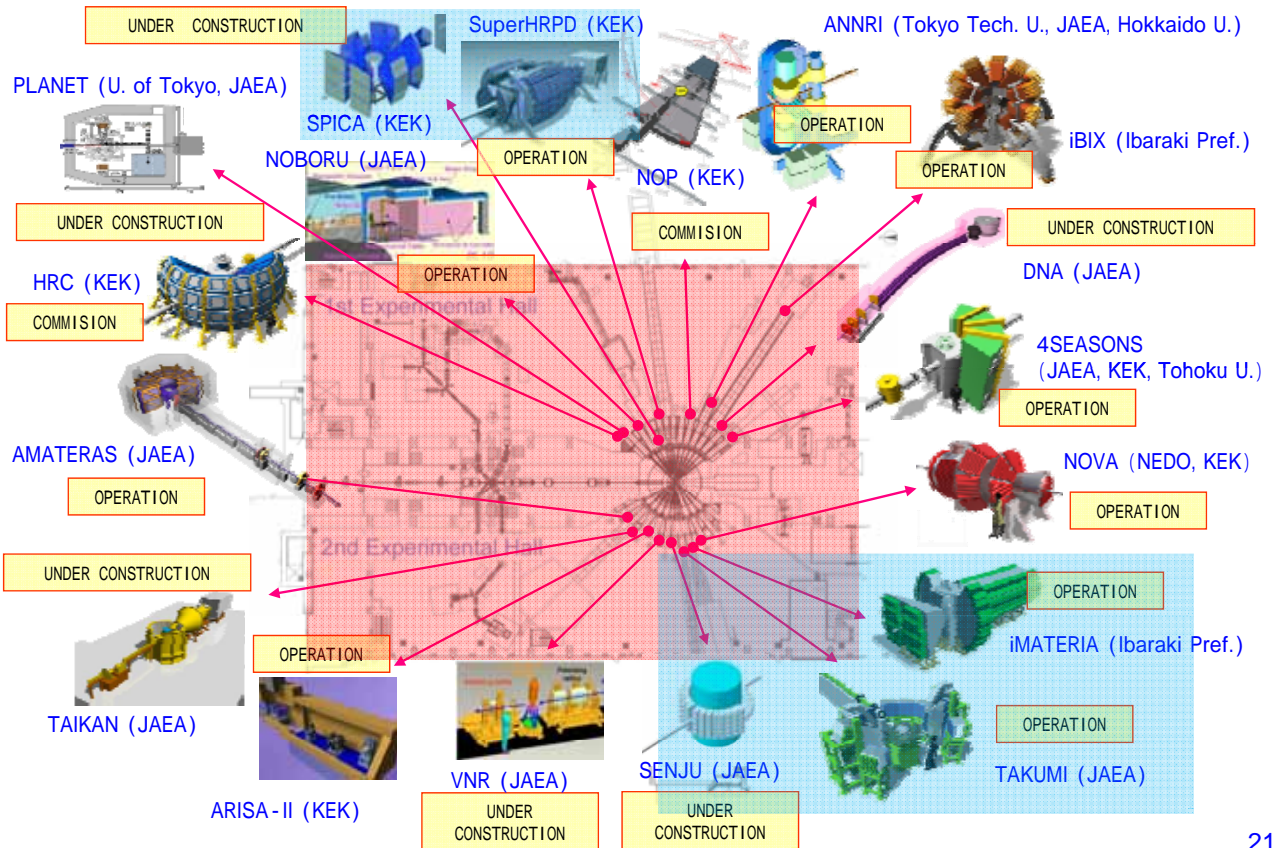


Reassembling of the shield device is in progress in the MLF. Fortunately the counter hall was not required for repairing.



Neutron Instruments at Materials and Life Science Facility

In operation: 10, Beam commissioning: 2, Under construction: 6



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MLF West-side Added Building



A 30 cm gap between the MFL and the west-side added building (left)
 BL18, BL19 and BL20 were damaged.
 Dropped shield (right)
 The repair has been already completed.

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Beam Transfer System of 3 GeV

MLF sagged, being 12 mm lower compared to RCS (3 GeV synchrotron).



Surveying work in the 3NBT tunnel

Mending cracks of walls and floors by injection of plastics

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Muon and the Other

Investigating a status of the Muon facility with removing the shield



Inspection of the Muon Target



Inspection of Expansion Turbine

Checking up the Super Low Temperature Hydrogen System, including Expansion Turbine

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Neutrino: Air Conditioning and Beam Dump



Air Conditioning

Immediately
after the
Earthquake



Beam Dump

Immediately
after the
Earthquake



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Remote
maintenance
guide cell for
Neutrino
Horn
Very
dangerous
situation, but
it was
repaired
(below).

Guiderail for the Horn and On Site Detector



No significant damages through outside
inspection. About 1 cm deep water at the bottom.
This problem has been already solved.

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Current Status of Neutrino

Recovery has been progressing smoothly.

Building, electric & machine facilities have been almost restored.

Electromagnets

(normal conductivity & superconductivity)

- There are no serious damages. A sealing efficiency of superconductivity magnet has been also confirmed though conducting current test.
- Submerged cables and connectors will be replaced.
- 31 out of 35 magnets will be realigned.



Submerged cables and connectors

Target Station

- Inspection of inside of a He container has begun.
- All three magnet horns shifted a few – 10 mm horizontally. All bolts to maintain the horizontal level were broken, but no damages in vertical bolts.
- While continuous current test will be conducted on all horns, the 1st horn will be replaced.
- The carbon target will be also replaced.



Measuring radiation level with opening a cover of the station.

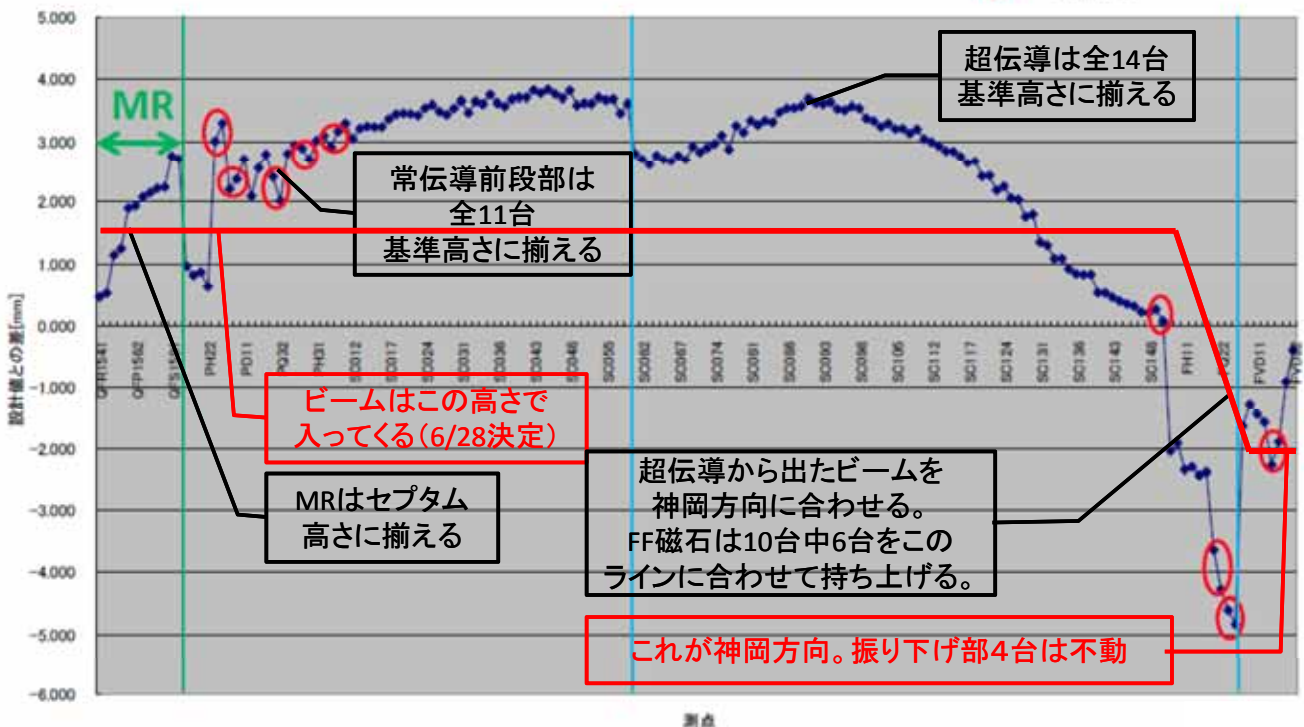
Pre-detector

- Visual inspection and current test have been conducted. No problems were found.

LTによる磁石高さ測定 2011.5

LaserTrackerによる高さ測定 設計値との差

○ Q磁石



Superconducting Beam Line for Neutrino (below) and the Beam Line for Hadrons (right)

Switchyard Electromagnets

- Need to be aligned.
- To minimize the restoring time, the beam orbit will be adjusted with using steering magnets.



Beam Line for Hadrons

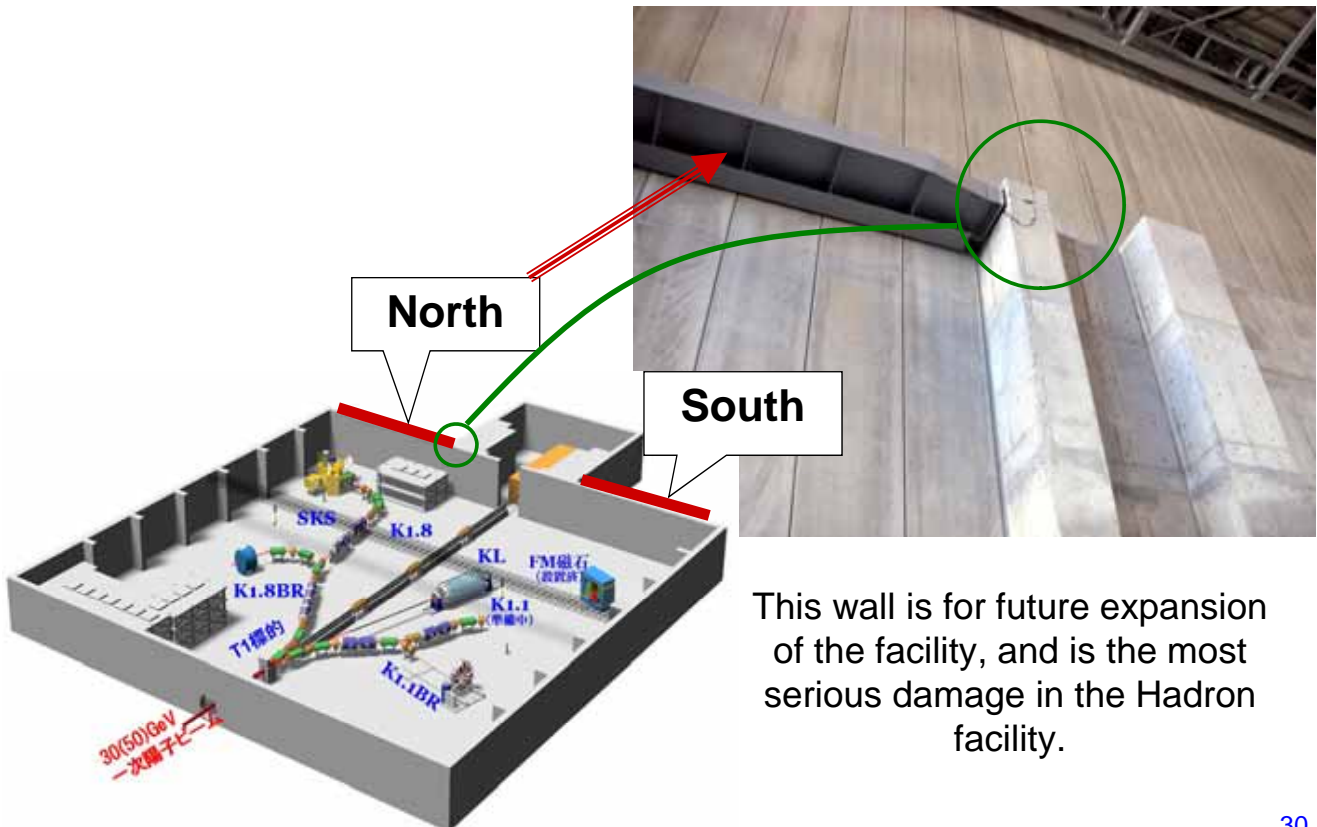


Superconducting Beam Line (very healthy)



Realignment of switchyard electrodemagnets is in progress.

Outside Wall of the Hadron Hall

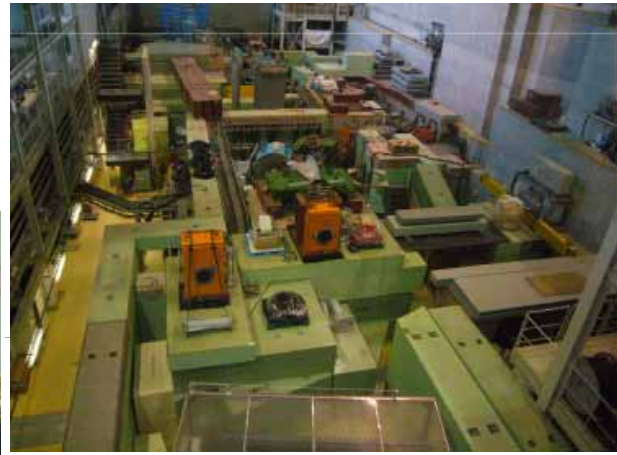


This wall is for future expansion of the facility, and is the most serious damage in the Hadron facility.

Hadron Experimental Hall



Examinations of beam-line electrometrode, wiring of power-supply, and plumbing of cooling water are in progress in order to confirm their soundness. However, thousands tons of the shield has to be removed for these tests.



Removed Shield

Outside of the Hadron Hall



Immediately after the Earthquake



A sagged access root to an entrance for trailers was repaired. It allows to transport heavy items.

Current Status of Each Facility in J-PARC

(4 month after the Earthquake: July 6, 2011)

Linac

- Void was found under floor of the building. Cooling water system has not yet restored. Crane can be operated with a weight limit.
- Restoring work of instruments, including realignment, is progressing smoothly.

RCS (3 GeV synchrotron)

- Restoring work of building, including repaving a road, is progressing smoothly.
- Results of instrument inspection in the tunnel are satisfied ones. However, high electric power test in the future would be challenging one.

MR (50 GeV synchrotron)

- Electric power supplies & cooling water facility have been almost restored. Repair of water leakages has been completed.
- All electromagnets need to be aligned in the future.



RCS (3 GeV synchrotron)

Restoring work of a surrounding road has been completed.

MLF (Material and life science experimental facility)

- Restoring work of building is progressing smoothly.
- Reassembling of the shield is continued.

Neutrino

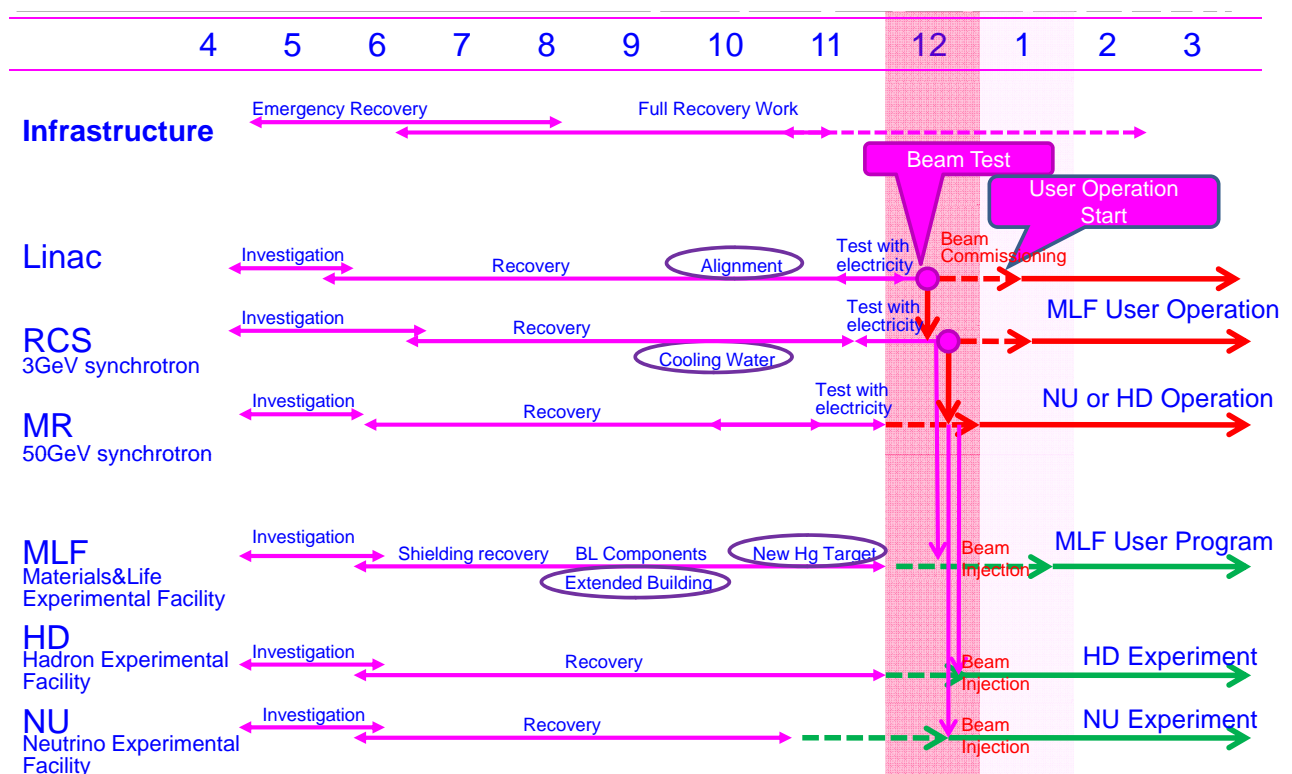
- Restoring work of building has been almost completed.
- Inspection of the target station and replacement of electromagnet horn will be conducted.

Hadrons

- Restoring work of building has been almost completed.
- Inspection of instruments in the shield and alignment of switchyard electromagnets need to be conducted.

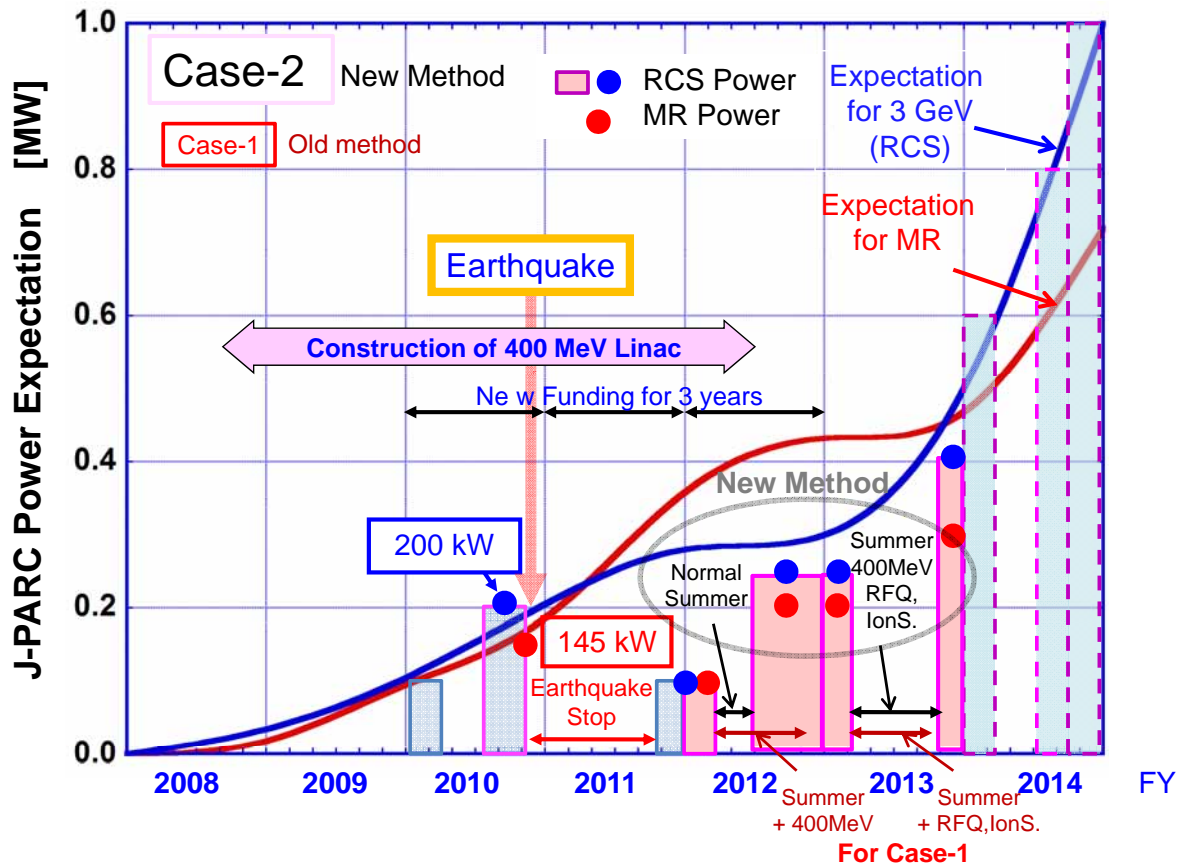
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J-PARC Recovery Schedule (@2011.5.20)



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Operational Plan for JFY2012 and JFY2013



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Summary of Damages

- No Tsunami Effect
 - We prepared for up to 8 m Tsunami.
- Main Buildings were almost OK
 - Many underpins for major buildings.
- However, many utility buildings, roads, and added buildings had significant damages.
- When to recover ?
 - Aiming at recovering by the end of this year.
 - Expect to have 2 cycle (about 2 month) running this year.
- Operation of Next Fiscal Year
 - Full 9 cycle (200 day) operations for users

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Thank you!