



# Status of JAEA-ISOL

**Akihiko OSA**

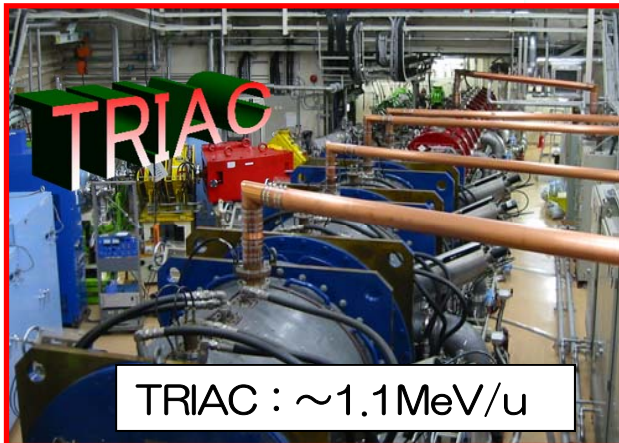
**Tandem Accelerator section, JAEA**



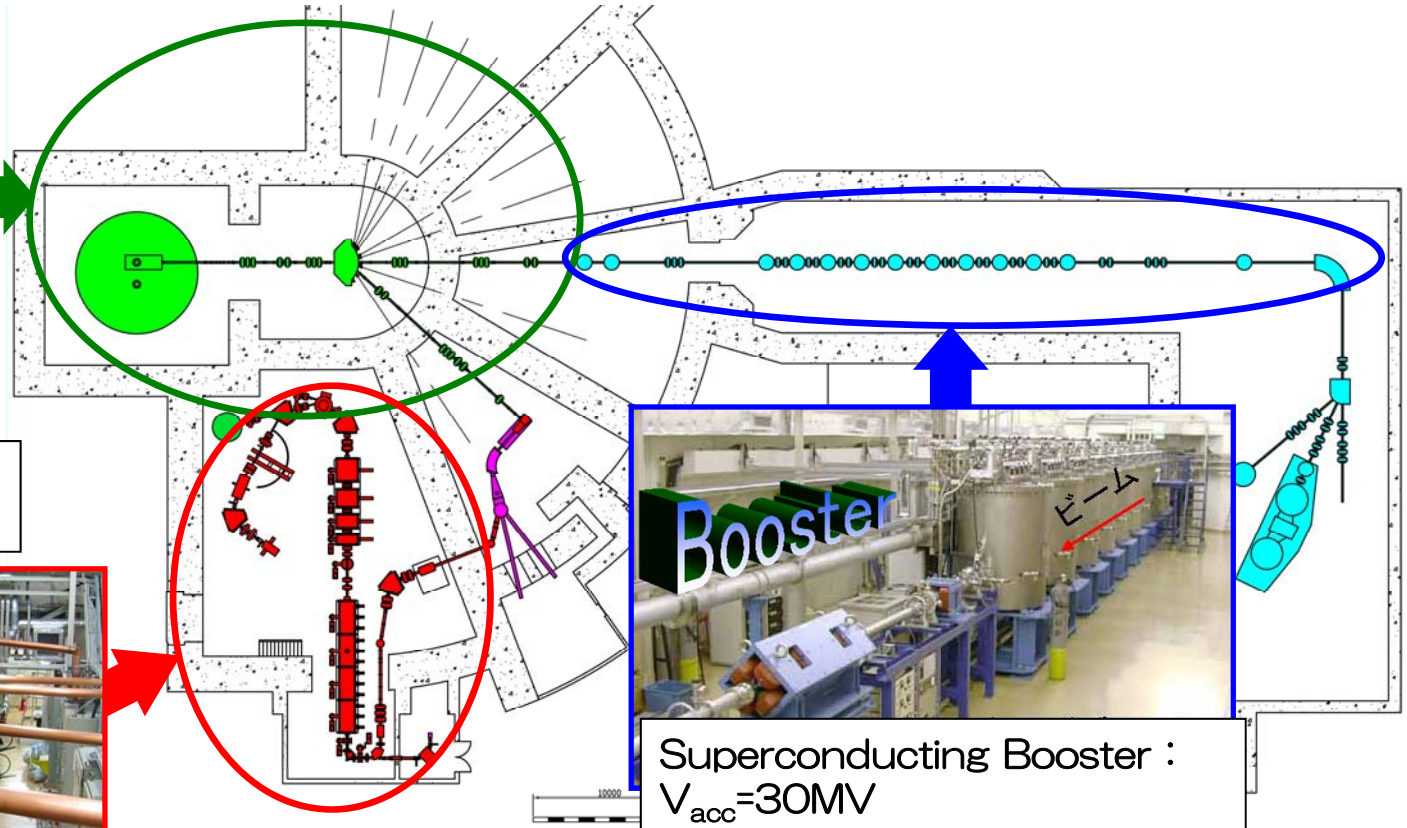
# JAEA-Tandem facility



Tandem Accelerator :  
 $V_T=18\text{MV}$



TRIAC :  $\sim 1.1\text{MeV/u}$



Superconducting Booster :  
 $V_{acc}=30\text{MV}$

	<u>Completion</u>
JAEA-Tandem Accelerator	Aug. 1982
Superconducting Booster	Sep. 1994
TRIAC	Mar. 2005-Dec. 2011(closed)

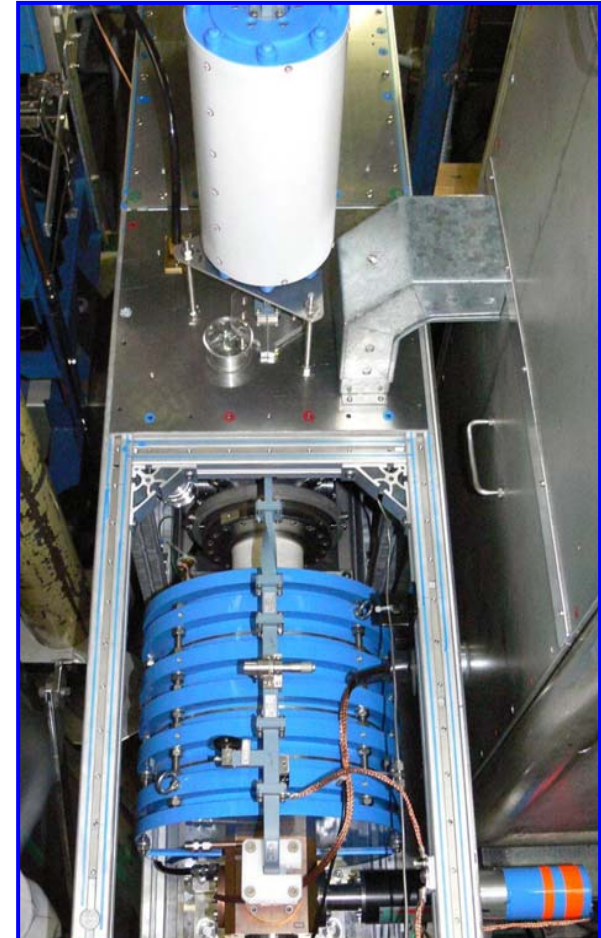
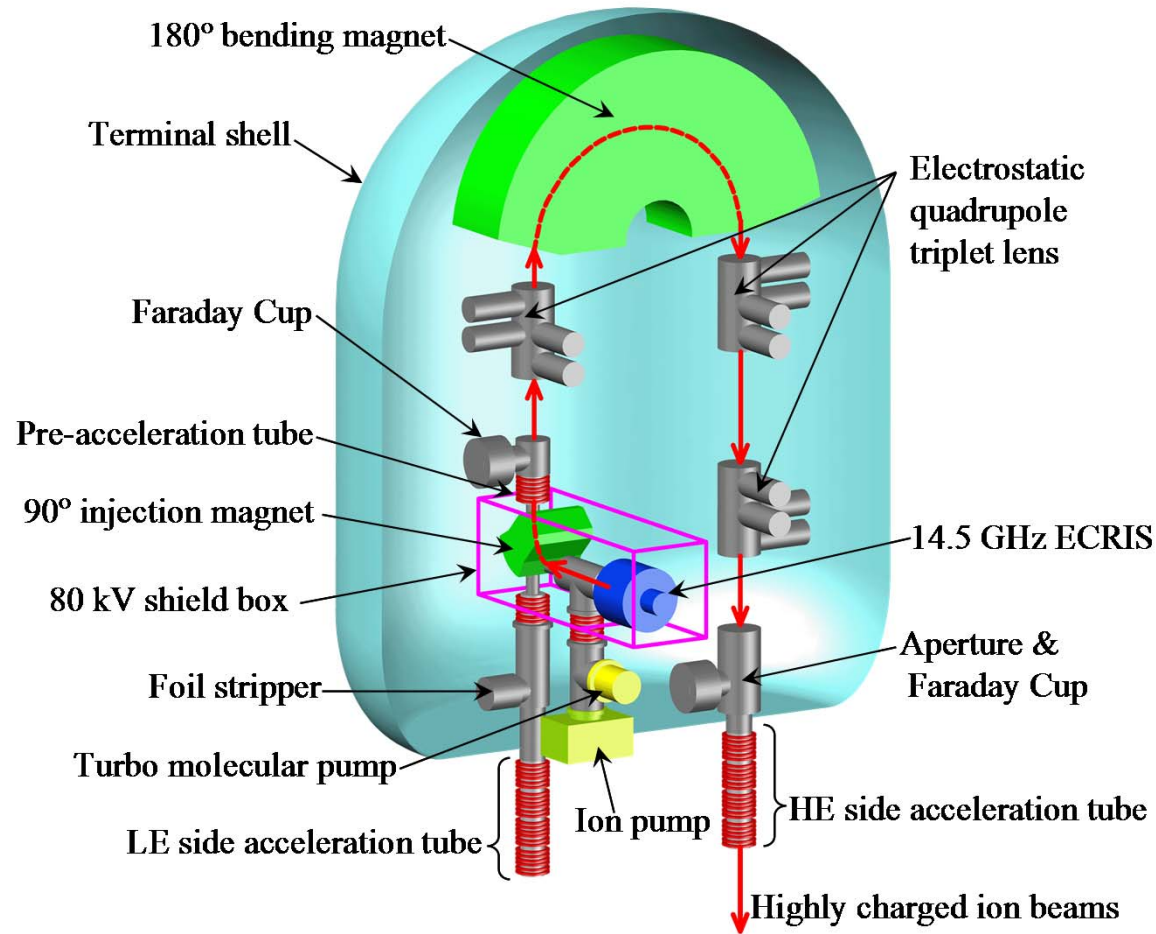


# Main parameters of JAEA-Tandem Accelerator

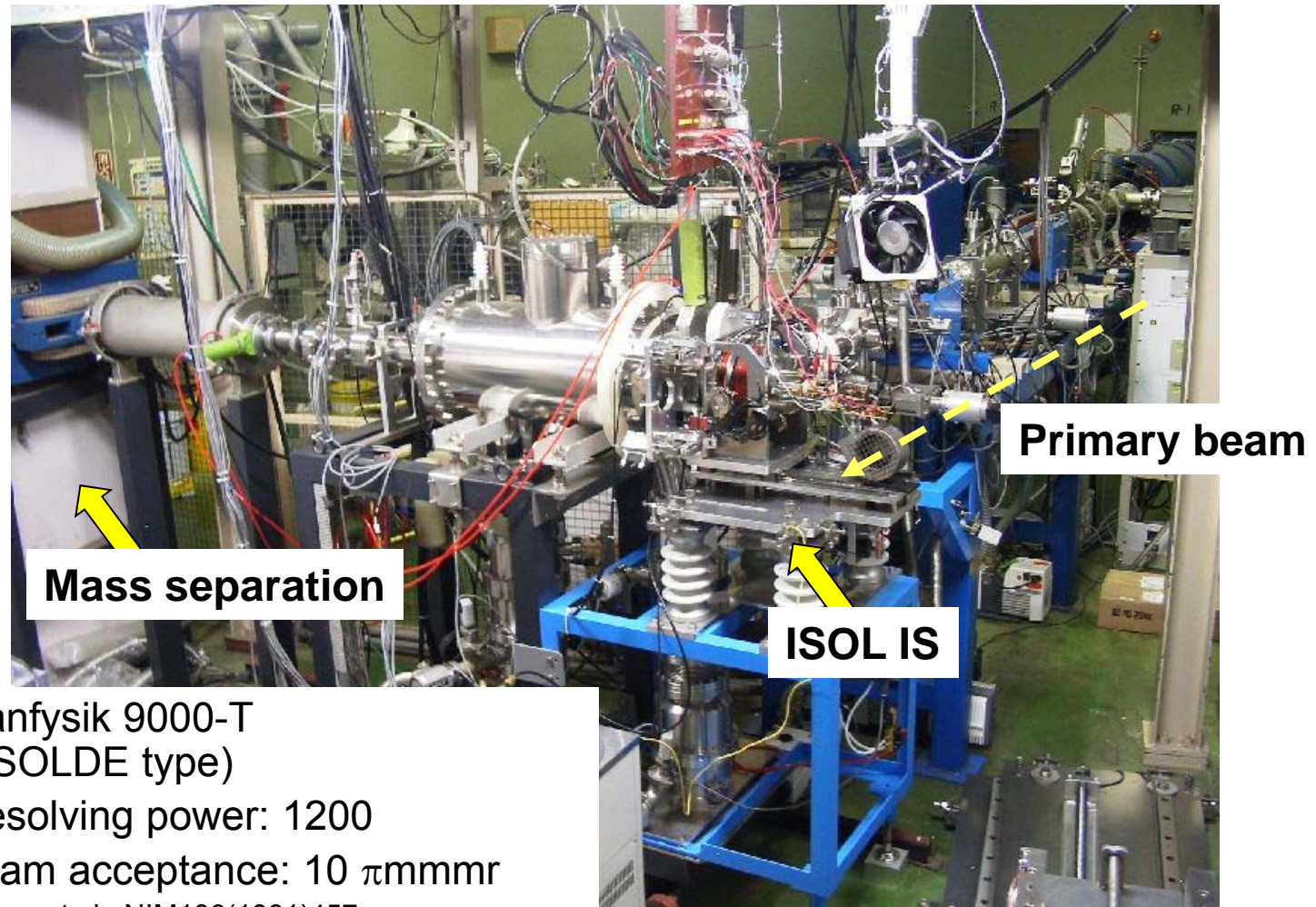
Terminal voltage	2.5-18MV
Available ions	From hydrogen to bismuth (3 SNICS & 1 <b>Terminal ECRIS</b> )
Incident energy of negative Ions	200keV
Example of beam current	proton: 3 $\mu$ A, chlorine, iodine: 0.5 p $\mu$ A
Method of dividing voltage	divided by resisters
Charging device	double pellet chains
Insulation gas	Sulfur hexafluoride SF <sub>6</sub> (0.65MPa)
Target room	6 rooms, 12 beam lines and 1booster target room, 3 beam lines



# 14.5 GHz Terminal ECRIS



14.5GHz ECRIS



- Danfysik 9000-T (ISOLDE type)
  - Resolving power: 1200
  - beam acceptance:  $10 \pi \text{mm} \text{m} \text{r}$
- S. Ichikawa et al., NIM186(1981)457.

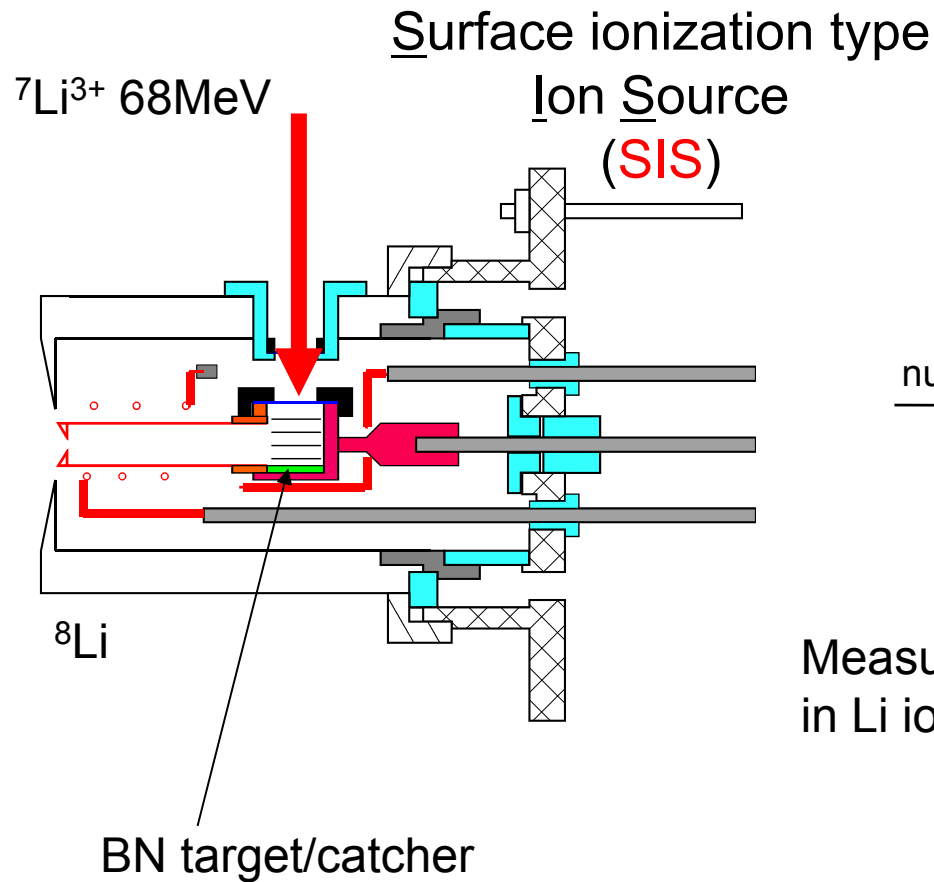
Development of Ion source (Y. Otokawa, T. K. Sato)



# Research subjects and Requests

Research subject	Request
Measurement of Li diffusion coefficients in Li ionic conductors.	$^8\text{Li}(10^6\text{pps})$ <a href="#"><u>Surface Ionization Ion source (SIS)</u></a>
Measurement of the first ionization potential of Lawrencium and decay spectroscopy	n-rich lanthanides/actinides <a href="#"><u>Gas-jet coupled Surface Ionization Ion source</u></a>
Decay heat study for Fukushima (under planning)	Fission products
RNB injector	FEBIAD IS U target SIS U target FEBIAD IS

# Ion sources for JAEA-ISOL



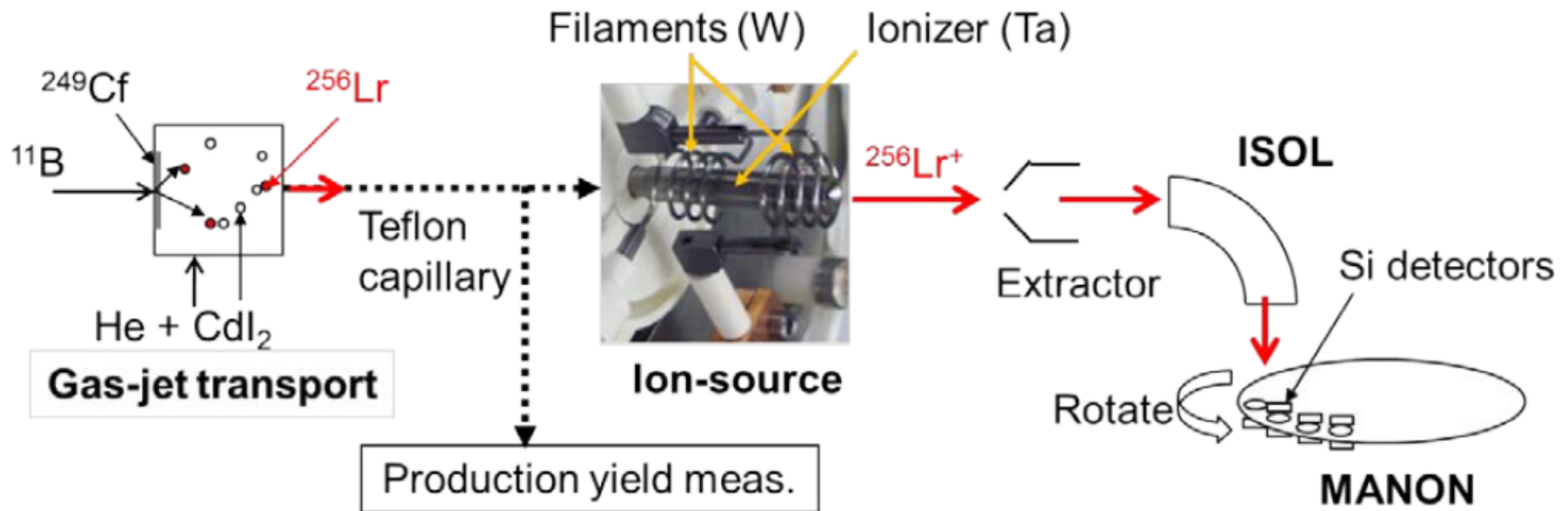
nuclide	Intensity (pps/300pnA)	Primary beam	target
${}^8\text{Li}$	$1 \times 10^7$	${}^7\text{Li}$	BN

Measurement of Li diffusion coefficients in Li ionic conductors.



# Gas-jet coupled Surface Ionization Ion source

Measurement of the first ionization potential of Lawrencium and decay spectroscopy of actinides







# Weak points of JAEA-ISOL

- Laboratory-scale apparatus  
**Unfitted for heavy irradiation**  
Shortage of radiation shield  
→ Bungle of TMP Controller  
Narrow space around target position  
Inadequate equipment for handling  
Target/Ion Source



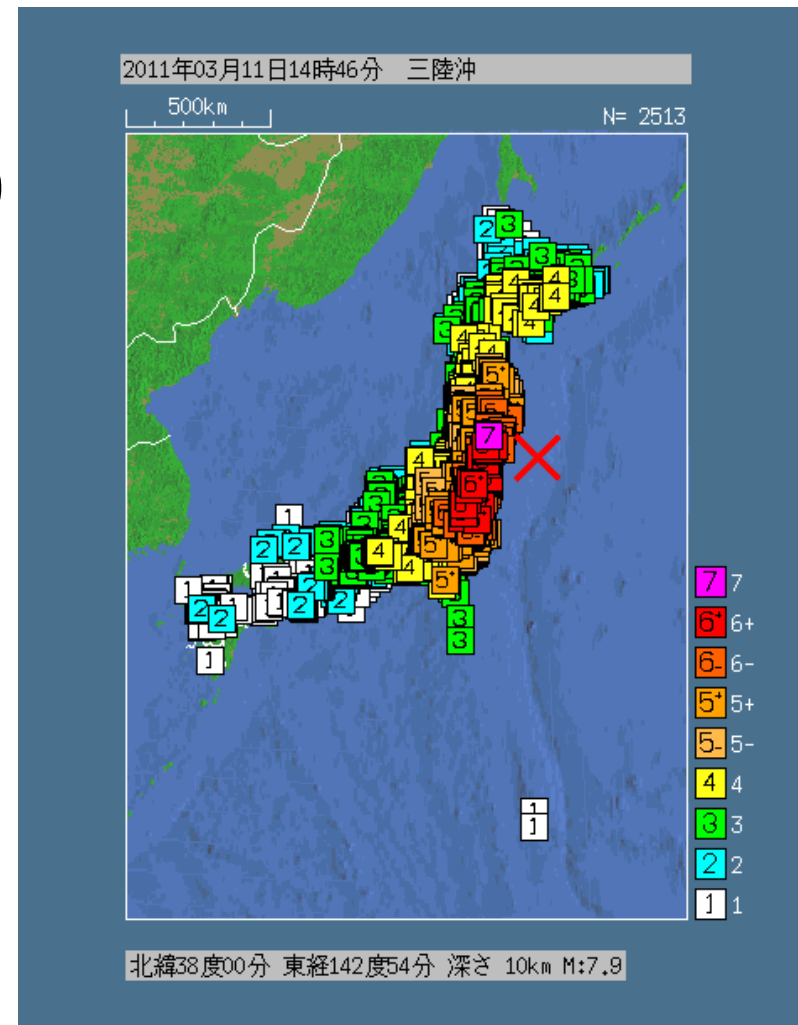
# Business challenge

- Budget cut  
Cut cost of operation into 1/6 !!



# The Great East Japan Earthquake 11 March 2011

- 14:46  
Focus: offshore of Sanriku, M9.0  
Tokai area→intensity 6 lower (Japanese Scale)
- Accelerator was operating.
  - Automatic stopped by seismometer signal.
  - Closed Gas Containment Valves
  - After evacuation, blackout





# Damage ①

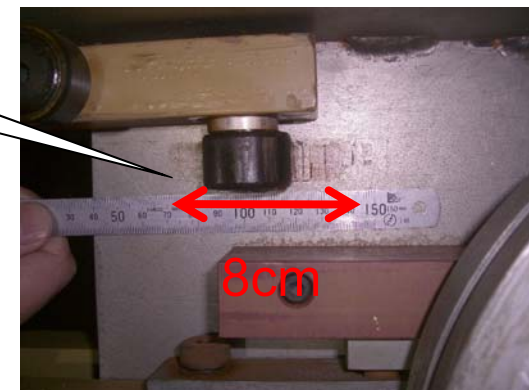
Seismic isolator: An isolator (1 of 6) was tripped.

Amplitude of vibration: ~8cm (the length of scratch mark at oil dampers.)

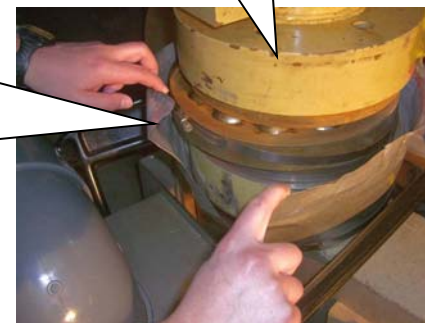
Recovered in early August, 2011. (Jack up the structure ~1mm)



Scratch mark

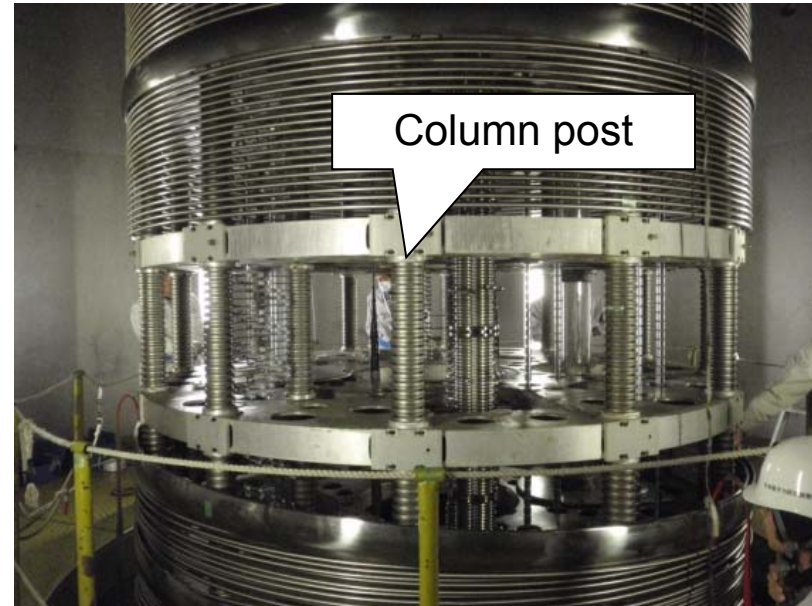


Tripped isolator





# Damage ②



Exchanging work

Cracked column post :33 of 240 (broken post:4)

27 posts were exchanged; brand-new/spare: 20, recycle after shearing test: 7.



Thank you for your attention!