

# Safety Status and Topics @ J-PARC

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# Outline of this talk

- What is J-PARC?
  - Safety management system
- Risk management
- Crisis management and its drills
- Safety culture
- Review of Safety

**Rapid Cycle Synchrotron**  
3 GeV, 25 Hz  
1 MW (Design Power)

**Main Ring : 30 GeV**  
Fast extraction : 0.75 MW (Design)  
Slow extraction : > 0.1 MW (Design)

**LINAC**  
400 MeV

**Hadron Exp. Facility (HD)**

1000 m

2009年7月16日撮影

**Neutrino Exp. Facility (NU)**  
Beam to Kamioka (295 km away)

**Materials and Life Science  
Exp. Facility (MLF)**

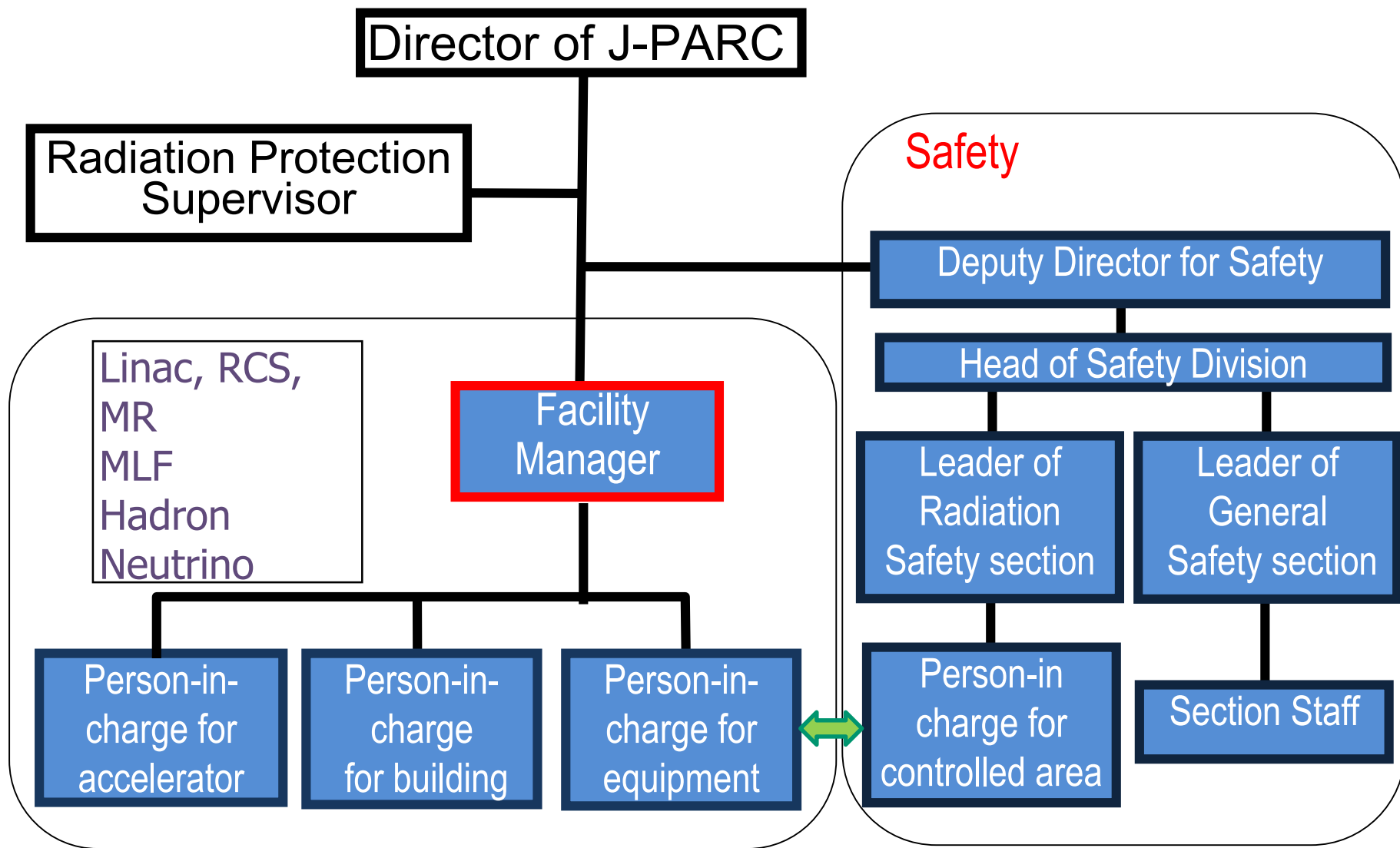
# Japan Proton Accelerator Research Complex (J-PARC)

Jointly operated by JAEA and KEK

- 3 accelerators
  - 400 MeV LINAC
  - 3 GeV RCS
  - 50 GeV MR (30 GeV operation)
- 3 user facilities
  - Materials and Life Science Experimental Facility (MLF)
  - Hadron Experimental Facility (HD)
  - Neutrino Experimental Facility (NU)

# Safety Management System in J-PARC

Facility/Division is responsible for the safety of each Facility/division



# Risk Management @ J-PARC



# Risk Management

## (1) Safety Review System in J-PARC - not to overlook risks -

### 1) Center-wide Committee

#### ➤ Radiation Safety Review Committee (RSRC)

##### Working Group under the RSRC

standing: interlock system, operation manual

ad-hoc: transportation container of MLF target vessel, new beamline

#### ➤ General Safety Review Committee (GSRC)

##### Expert Groups under the GSRC

standing: electrical, chemical, laser, high-pressure gasses,  
handling machinery

*inspection, review, preparation for manual or instruction, etc.*

ad-hoc: guideline for usage of liquid hydrogen target

### 2) Safety confirmation review in Division

### 3) Safety check in Section, Group

➤ Risk Assessments for each work, if necessary; hundreds of RAs / year

➤ KY/TBM\* : just before work, every morning

(\* KY: *Kiken Yochi* (risk prediction), TBM: Tool Box Meeting)



# Risk Management

## (2) Safety Patrol

- Patrol of facilities by section leaders(every month), by director (quarterly), and by expert team members.

We ask them to find not only bad points,  
but also  
**Good practices**





# Risk Management

## Good Examples: "3S"

Hadron  
Experimental Facility



### "Seiri"

Only necessary item  
should be placed.

3 GeV Synchrotron Building



### "Seiton"

Items should be placed in  
the appropriate location.

3NBT Building



### "Seisou"

Work place should be clean.

< Notice!! >

Let's take 3S activities by referring these good examples.



# Risk Management

## (3) Mindful of Others

### *Stop Work* → *Mindful of others @J-PARC*

- To encourage a person to caution others who are doing work irrelevant to him/her.
- There is no legal rule on 'Stop Work' in Japan  
(such as 10CFR851)



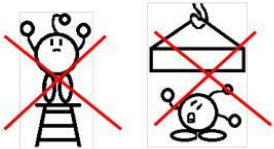
## Mindful of others

**Speak out, if you find an act of danger !**



- Certainly wear protectors (helmet, safety shoes, etc.).
- Be sure that you hook your safety belt on a support.
- Do not stand on a stepladder.
- Do not stay under heavy loads.

Thank you.  
That was close!



**Your attention save others.**

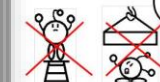


## Mindful of others

**危ない！**と思ったら、声をかけよう。



保護具(ヘルメット・安全靴)は必ず着用。  
安全帯のフック掛けは確実に。  
脚立の上には、立たない。  
吊り荷の下には、入らない。



助かった  
危なかったよ。

声をかけてくれて、ありがとう。



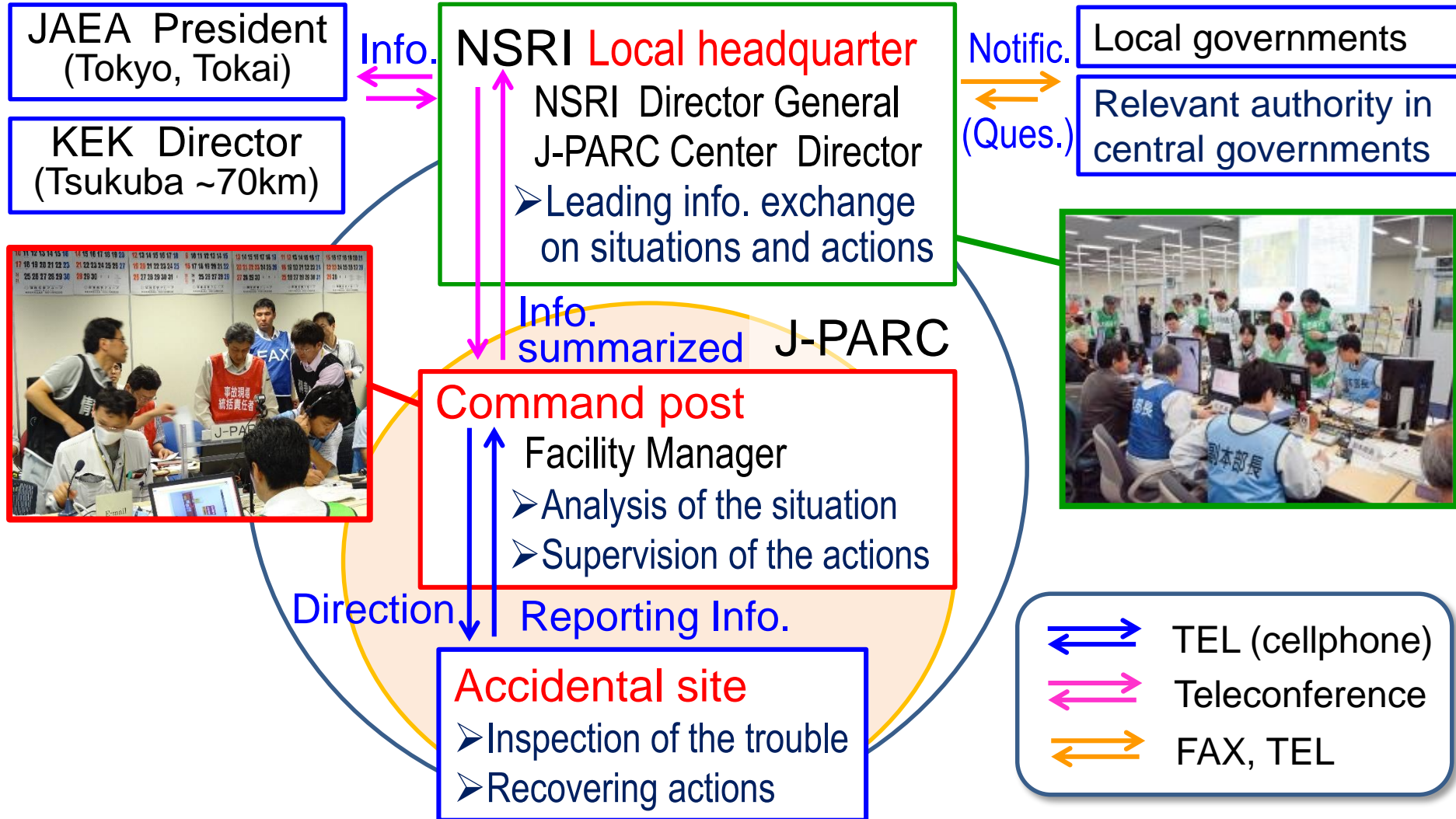
# Crisis Management @ J-PARC





# Crisis Management

In emergency, J-ARC act under the NSRI, where J-ARC located in.



**Information flow: Very complicated (tomorrow's talk)**



# Crisis Management

## (2) Emergency Drills at J-PARC, once a year

2014: Drill of radioactivity leak accident at Hadron

2015: Drill of radiation exposure accident in the MR tunnel at beam operation

2016: Drill of fire & injury at MLF

**Scenario of the drill was not informed to the MLF staff in advance.**

→ There were many confusions of information between the accident scene and the local headquarter of MLF.

We must improve the communication of information, keeping an actual accident in mind.



2017: Drill of body surface contamination with HTO at Neutrino Facility



# Crisis Management (Serious radiation exposure)

## Emergency Drill at J-PARC ( Nov. 11, 2015)

Hospital  
Local government  
(simulated)



Local headquarter  
(NSRI, JAEA)



Command post in  
accidental site  
(CCR, J-PARC)



Accidental site  
(MR)

Suppose that the beam is accelerated while a worker is still in the accelerator tunnel, and that the worker is seriously exposed by neutrons about 1 Gy.



@ CCR, J-PARC



Development of a method to estimate exposure dose:  
using the radiation level of  $^{24}\text{Na}$  produced by  $^{23}\text{Na}(n,\gamma)^{24}\text{Na}$   
in the body;  $7 \mu\text{Sv/h}$  @10cm  $\rightarrow$  1Gy of neutron irradiation



# Crisis Management (Other emergency)

## Evacuation after large disasters



Roll call in evacuation drill

Large earthquake

Large-Tsunami-Warning issued



Training on  
fire extinguisher



Training on AED



Training on SCBA  
(Self-Contained Breathing Apparatus)



# Safety Culture @ J-PARC



# Fostering a Safety Culture

## ➤ Workshop for Forstering Safety Culture at J-PARC

(5.23 Memorial-day of radioactivity leak incident in 2013)

- “ **Psychology of risk communication and crisis communication** ” by Prof. Tsuchida
- “ **Safety efforts in airlines and railways** ” by Mr. Abe (Japan Railway West)
- “ **SAFETY treasured at the Tokyo Disney Resort** ” by Mr. Hidemi Ishizaka

## ➤ Symposium on the Safety in Accelerator Facilities (every year)

to exchange/share information on safety issues at accelerator facilities

2<sup>nd</sup> (Mar., 2015) : invitation from CERN, PSI

3<sup>rd</sup> (Jan., 2016) : radio-activated materials, high-pressure gas facilities

4<sup>th</sup> (Jan., 2017) : emergency responses, electrical risks

5<sup>th</sup> (Jan., 2018) : Radiation-safety education, crane works, inv. CERN, J-Lab.



Dr. Trant (Invited talk, 2015)



Mr. Abe (JR West)



Mr. Ishizaka (Disney Resort)



# Fostering a Safety Culture

## ➤ Liaison committee on safety and health for contractors (every year)

- sharing safety mind with contractors
- participation of 70-80 companies
- sending e-mail to these companies every month, including a content of “safety at J-PARC”



## ➤ J-PARC Center Meeting (every month)

including **one talk on safety**

## ➤ Informal meeting between **safety division and other sections**

understanding each other better (nearly every month)

## ➤ Presenting the activities at International Safety Forum (ITSF), etc.

- ❑ Accident at the HD Facility and Reformation of the Safety Management (ITSF, 2014)
- ❑ Preventive Measures Against the Megathrust Earthquake and Tsunami (ITSF, 2016)
- ❑ Drills for the Various Emergency Situations (ITSF, 2016)
- ❑ Safety Guidelines on Liquid Hydrogen Target Systems (ITSF, 2017)
- ❑ DOE Accelerator Safety Workshop, Fermi lab. 2016 (attending)
- ❑ Symposium Industrial Safety, JAPN, 2016 (attending)



# Fostering a Safety Culture

- Upgrade of contents in safety portal site
  - to supply the staff with safety information
  - collecting *hiyari-hatto* (near miss) events and announcing them

Safety portal site

台車による運搬時の実験装置落下>

実験装置(約 120 kg)を台車に載せ移動していた。気密扉通過の際、扉の枠の段差を超えようと台車の取手を持ち上げるようにしたところ、バランスを崩し装置が落下した。  
(怪我人はなし。床の塗装が一部剥げた。)

※前輪側は問題なく段差を超えられた

(再発防止策) : 重量物は台車の中央(重心)に載せる。  
段差部分に板を敷き、台車がそのまま超えられるようにする。

[ポイント] : 台車運搬においても、適切な積荷状態を確保

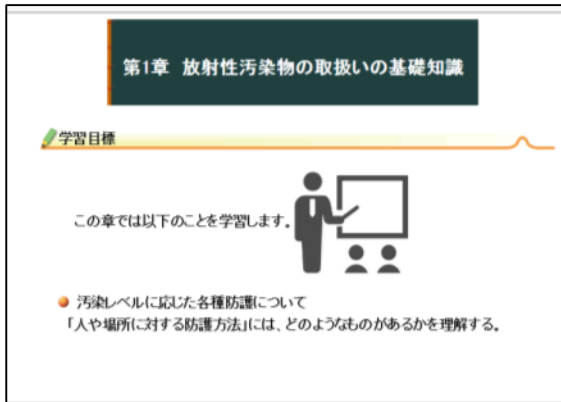
Example of the near miss events



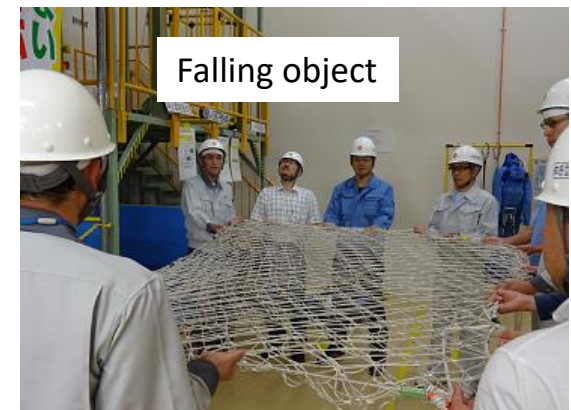
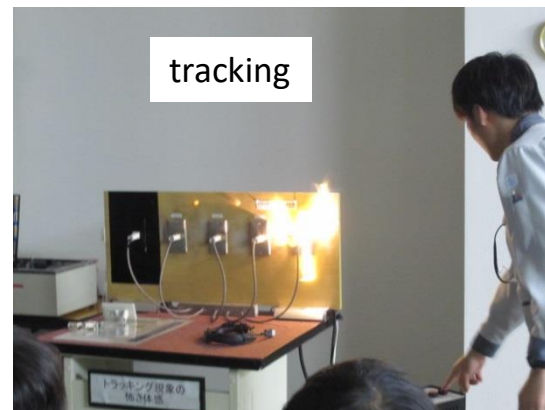
# Fostering a Safety Culture

## Education and Training

- **e-learning** (every year): preparation of a new course on radiation safety



- **Experience-based Hazard training (hazard simulation)**  
@ KUREHA or HITACHI Chemical Techno Service Co. Ltd  
20 persons each



# Review of Safety @ J-PARC



# Review of Safety of J-PARC

## (1) Safety and Health Committee (quarterly)

- in the committee, we report the activities on safety, review them, and make a plan.

## (2) Safety Audit (every year)

- reviewers: **external** experts
- interview Section leaders, Division heads and director, etc.
- review the effectiveness of safety management system, emergency system, and promotion of the safety culture





# Summary

## ➤ Risk Management

- In addition to risk assessment for each work, assessments of facilities from long-term perspectives and of enterprise risk were performed.
- Find out a good practice.
- Start a safety movement of “ Mindful of others”

## ➤ Crisis Management

- Emergency response system of NSRI, under which J-PARC acts in emergency, is well developed.
- J-PARC needs to improve an ability of initial response: preparation of a designated crisis room and staff doing initial correspondence, and better communication of information.

## ➤ Safety Culture

- We have continued and improved the accelerator safety symposium, liaison committees for contractors, and several education and training programs.
- We started “experience-based hazard training” in cooperation with two companies.

## ➤ Review of Safety

- Effectiveness of approach to safety at J-PARC is reviewed every year by external experts.