


# IAEA,NEA ISOE国際 シンポジウム出張報告

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IAEA,NEA ISOE委員会第7代議長  
Severe Accident Management会議議長

JNES

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# Lessons Learned from the Fukushima NPS Accidents

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Fort Lauderdale, Florida

IAEA, OECD/NEA ISOE Committee 7th Chairman  
JNES

Wataru MIZUMACHI

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# 1. North East Japan Earthquake and Tsunami

# 4th Largest Earthquake in the World

At 14.46 **Magnitude 9.0** Earthquake

14.51 Largest Tsunami (**39.8m height**)

**133 feet** high : ten story building

So far , **20 thousands people were killed.**

**300 billion US Dollar damage is  
estimated.**

**No one is killed by the radiation at Fukushima**

## 4. IAEA Expert Group

# IAEA Expert Group conclusion on Fukushima



IAEA  
International Atomic Energy Agency

IAEA  
Original English

- This June, IAEA expert group visited Fukushima.
- This group is composed by **18 experts from 12 countries** headed by Mr **Weightman** from HSE, UK.
- There is Jennifer **Uhle** from **USNRC**.
- They summarized **15 conclusion** and **16 recommendation**.

## MISSION REPORT

### THE GREAT EAST JAPAN EARTHQUAKE EXPERT MISSION

### IAEA INTERNATIONAL FACT FINDING EXPERT MISSION OF THE FUKUSHIMA DAI-ICHI NPP ACCIDENT FOLLOWING THE GREAT EAST JAPAN EARTHQUAKE AND TSUNAMI

Tokyo, Fukushima Dai-ichi NPP, Fukushima Dai-ni NPP and  
Tokai Dai-ni NPP, Japan

*24 May – 2 June 2011*

IAEA MISSION REPORT

DIVISION OF NUCLEAR INSTALLATION SAFETY  
DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

## IAEA Expert Group conclusion on Fukushima

1. There is a need to consider the **periodic alignment** of national regulations in particular of the impact of external hazards.

**(every ten years)**

For Fukushima, the original design condition of the tsunami was **3.1m high** and **in 2002**

they revised to **5.7m** and ACRS member

indicated there is the evidence of **15m**

**tsunami** at **Jorgan Earthquake in 869.**

The **actual tsunami** was **14.5m** this time .



# List of earthquakes in Japan

From Wikipedia, the free encyclopedia

This is a **list of earthquakes in Japan** with a magnitude of 7.0 or above or which caused significant damage or casualties. As indicated below, magnitude is measured on the Richter magnitude scale ( $M_L$ ) or the moment magnitude scale ( $M_w$ ), or the surface wave magnitude scale ( $M_s$ ) for very old earthquakes. The present list is not exhaustive and reliable and precise magnitude data is scarce for earthquakes that occurred prior to the development of modern measuring instruments.

*This list is incomplete; you can help by expanding it ([http://en.wikipedia.org/w/index.php?title=List\\_of\\_earthquakes\\_in\\_Japan&action=edit](http://en.wikipedia.org/w/index.php?title=List_of_earthquakes_in_Japan&action=edit)).*

~BC 200 Year

Yayoi Earthquake

Date <span>☒</span>	Magnitude <span>☒</span>	Name of quake	Japanese name	Rōmaj
November 29, 684	8.0–8.4 (unknown scale)	Hakuko Nankai earthquake	白鳳南海地震	Hakuko Nankai
June 5, 745	7.9 $M_s$	occurred at Minoh		
<b>July13, 869</b>	8.3 M	869 Sanriku earthquake and tsunami	貞観三陸地震	Jōgan s jishin

# 56th Emperor Seiwa

Present Emperor is 125th.

All victims by the Tsunami have no responsibilities.

I have all responsibility because the god punished my activities as the emperor.

Do not take any tax from these areas attacked by the tsunami.

I will pray at Ise Temple and the officers should go there and help all victims.

Clean up the mass of rubble.



858~876 as Emperor

Jorkan Earthquake and Tsunami attacked the same area in 869.

## IAEA Expert Group conclusion on Fukushima

2. **Strengthen the management** in the case of the **severe accident**.

The **training and education** are very important.

In Japan, there is the **special training on the severe accident at the job site including the prime minister once a year**. But it is a kind of **ceremony** which means that they do not believe the severe accident really happens.

The **complicated structures and organizations** can result in delay in urgent decision making.

# IAEA Expert Group conclusion on Fukushima

3. 2007 IRRS (Integrated Regulatory Review Service) indicated the complicated regulatory organizations.

There is no answer on this issue from Japanese Government .



IAEA-NSNI-IRRS-2007/01  
20 December 2007  
ORIGINAL: English

# INTEGRATED REGULATORY REVIEW SERVICE (IRRS) TO JAPAN

Tokyo, Japan

*25 to 30 June 2007*

DIVISION OF NUCLEAR INSTALLATION SAFETY  
DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

R1 **Recommendation:** The role of NISA as the regulatory body and that of NSC, especially in producing safety guides, should be clarified.

## RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S1 **Suggestion:** NISA is effectively independent from ANRE, in correspondence with the GS-R-1. This situation could be reflected in the legislation more clearly in future.

## Number of sufferers

Area	Number of people
Evacuation area	About 78,000 (population in this area)
Deliberate evacuation area	About 10,000 (population in this area)

## 6. Radiation Exposure for the workers

## Distribution of exposure dosage of workers engaged in emergency radiation work in the Fukushima-Daiichi of TEPCO

( Cumulative doses from March to November in 2011 )

classification (mSv)	March - October			March - November			Fluctuation		
	TEPCO	Contractor	Total	TEPCO	Contractor	Total	TEPCO	Contractor	Total
Over 250	6	0	6	6	0	6	0	0	0
Over 200 - 250 or less	1	2	3	1	2	3	0	0	0
Over 150 - 200 or less	19	2	21	21	2	23	2	0	2
Over 100 - 150 or less	116	23	139	116	23	139	0	0	0
Over 50 - 100 or less	354	308	662	366	320	686	12	12	24
Over 20 - 50 or less	627	1,686	2,313	631	1,824	2,455	4	138	142
Over 10 - 20 or less	493	2,320	2,813	474	2,452	2,926	-19	132	113
10 or less	1,648	10,175	11,823	1,701	10,907	12,608	53	732	785
Total	3,264	14,516	17,780	3,316	15,530	18,846	52	1,014	1,066
Max. (mSv)	678.80	238.42	678.80	678.80	238.42	678.80	-	-	-
Ave. (mSv)	23.36	9.38	11.95	23.52	9.25	11.76	-	-	-

Dec 27, 2011



# Radiation Exposure for the workers

Radiation exposure limit for the workers in the Emergency case by IAEA is 500mSv/year, but Japanese government determined the Limit as 250mSv/year.

The radiation exposure tables made by TEPCO show that there were 6 people above this limit on March, but there is no one who exceeded the limit after March.

But there 137 people above 100mSv and 2,683 people above 20mSv by August 31.

アメリカ、ヨーロッパでも福島は  
人事ではなく、真剣に対応



# Potential Impacts

Terry J. Brown, CHP, RSO, PMP  
Projects Director DC Cook Nuclear Station  
January 9, 2012

# Why are these initiatives important

- Heavy Snowfall in Montana: Photo Taken June 17, 2011



- Spring Snow Melt Flows to Missouri & Mississippi Rivers.



# Why are these initiatives important

- Fort Calhoun PWR Station  
Nebraska, USA



# Why are these initiatives important



# Why are these initiatives important

- Cooper BWR Station on Mississippi River,  
Summer 2011



# RECOMMENDATIONS FOR ENHANCING REACTOR SAFETY IN THE 21<sup>ST</sup> CENTURY

THE NEAR-TERM TASK FORCE  
REVIEW OF INSIGHTS FROM THE  
FUKUSHIMA DAI-ICHI ACCIDENT





# 「21世紀の原子炉の安全性を目指した勧告」

- Dedication 献辞

この報告書を、日本の人々、福島で原子力事故に果敢に立ち向かった人々に捧げる。

- Executive Summary

短期対策タスクフォースは、NRCの指示により、福島事故を踏まえ、NRCの規制の各プロセスを体系的にレビューし、NRCの規制体系の更なる改善事項を勧告する

- 結論 : アメリカの原子力発電所では、福島事故の一連の事象に対し、炉心損傷、放射性物質の放出の可能性を低減させる緩和処置が既に講じられており、運転継続は差し迫ったリスクとならない。但し、NRCの深層防護の原理を、よりバランス良く適用することで、論理的に一貫性のある理解し易い規制の枠組みが出来上がる。

# 「21世紀の原子炉の安全性を目指した勧告」 12項目

- 設計基準地震及び洪水に対する防御機能を再評価し、必要なら改良を行う。また10年毎に再確認。
- 外部電源喪失及び所内AC電源なしで、8時間炉心損傷（Melt Down）しないこと、及び核燃料と使用済み燃料は72時間冷却状態を保てること。
- 全電源喪失及び複数の原子炉が巻き込まれる事態に対する緊急時計画の策定。
- 使用済み燃料プールの冷却設備の追加（冷却水、計装）
- Mark-I及びII型BWRの信頼性のあるベント設計。
- 所内緊急時対応能力の強化・統合。
- 格納容器内及び他の建屋の水素制御及び緩和対策。

# フランスのル・ブレイエ原子力発電所



シンシアによる被害 (EDF)

2010年2月27日 暴風雨 シンシア

*CNPE du BLAYAIS*



# 9. Conclusion on Fukushima Accident

1. Nuclear Power Plant contains a lot of the high radioactive materials and we should not release these to the public. Fukushima made the **bad organizational mistakes in TEPCO and regulatory body.**
2. We have to remember the **basic safety philosophy of the nuke.**
3. **The complicated structures and organizations can result in delay in urgent decision making.**
4. **In the case of severe accident, the water , the electricity and the instrumentation are essential.**
5. **Right now, the temperatures in the reactor cores were under 70 degree which mean stable.**

# Conclusion on Nuclear Renaissance

1. Before Fukushima accident, 438 new NPSs will be expected to start operation by 2025.
2. After Fukushima, Germany, Italy, Switzerland, Spain will quit the new construction of NPSs.
3. USA and Japan will delay the new construction.
4. China, India, Finland, and the new countries like Vietnam and UAE will continue to construct NPSs.
5. On Oct 30, 2011 there are 7 billion people in the world and we need more energy. We have to make the required modifications for the public to feel the safety of the nuclear and continue its new constructions



*Thank you for your attention*

*For more information, please visit:*

[www.isoe-network.net](http://www.isoe-network.net)

[www.nea.fr](http://www.nea.fr)

# 結論

- アメリカでは、福島を大変重要な事態と認識し、規制側のNRCは「21世紀の原子炉の安全性を目指した勧告」を纏め、14項目の具体的な安全強化を命じている。
  - 電力側も積極的に安全強化のため、104プラントが協力して対応している。
  - ヨーロッパでも、148プラントのプラント全般のストレス・テストを終了し、IAEAのピア・レビューと評価をする予定である。

日本こそが総括的な評価を早急にして再起動すべき