



Status of occupational exposure in Asian region

2010 NATC ISOE ALARA Symposium
11-13 January, 2010

Fort Lauderdale, Florida

ISOE Post Chairman
Wataru MIZUMACHI

Contents

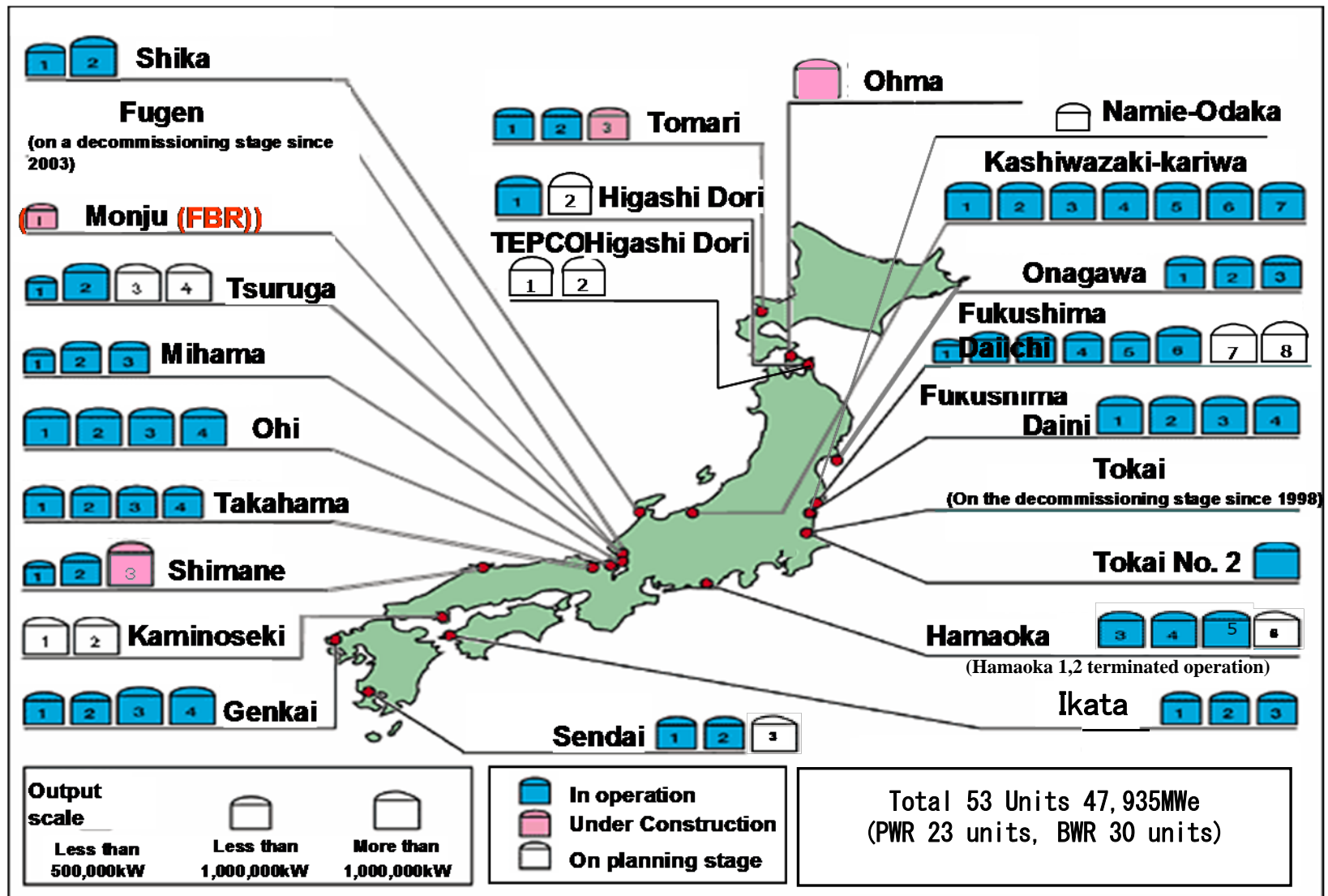
- 1. Status of Nuclear Power Plants in Japan**
- 2. Overview of Exposure in Asia**
- 3. Exposure of NPP in Japan**
- 4. 2009 ISOE Asian ALARA Symposium**
- 5. Other Topics**

1. Status of Nuclear Power Plants in Japan

as of March 31, 2009

		BWR	PWR	GCR	Total
In Operation	No. of Units	30	23	-	53
	Output (MWe)	28,569	19,366	-	47,935
Under Construction	No. of Units	2	1	-	3
	Output (MWe)	2,756	912	-	3,668
On Planning	No. of Units	9	3	-	12
	Output (MWe)	11,886	4,666	-	16,552
Preparing Decommissioning	No. of Units	2	-	-	2
	Output (MWe)	1380	-	-	1380
Under Decommissioning	No. of Units	-	-	1	1
	Output (MWe)	-	-	166	166

1. Status of Nuclear Power Plants in Japan



2. Overview of Exposure of NPP in Asia

Individual Dose in Fiscal Year 2008 (April 2008 – March 2009)

Japan

Average annual dose - Total of radiation workers (79,684) - Total exposure (84.04 person-Sv)	1.1 mSv
Highest annual dose	19.5 mSv
Number of worker: > 20mSv	0
Number of worker: 15-20mSv	254 (0.3%)

2. Overview of Exposure of NPP in Asia

Collective Dose in Fiscal Year 2008 (April 2008 – March 2009)

Japan

Plants	Units	Persons-Sv	Person-Sv /unit
BWR	32	46.29	1.45
PWR*	24	37.73	1.57
GCR**	1	0.02	0.02
Total	56	84.02 (LWR)	1.53 (LWR)

(*) Include reactor under test operation

(**) Under decommissioning

2. Overview of Exposure of NPP in Asia

Individual Dose in 2008

Korea

Average annual dose	0.94 mSv
Highest annual dose	33.6 mSv

2. Overview of Exposure of NPP in Asia

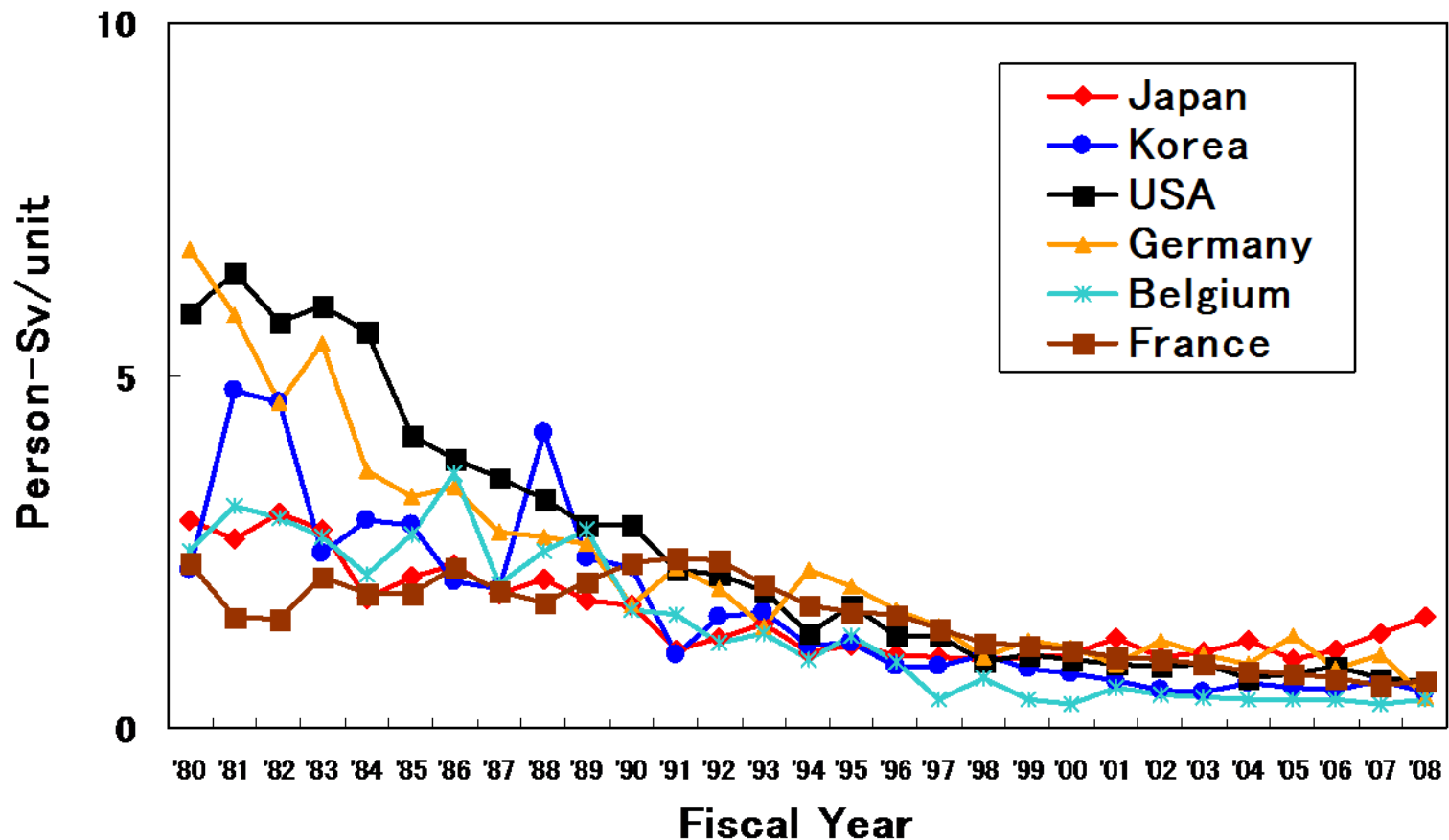
Collective Dose in 2008

Korea

Plants	Units	Person-Sv /unit
PWR	16	0.49
CANDU	4	0.59
Total	20	0.51

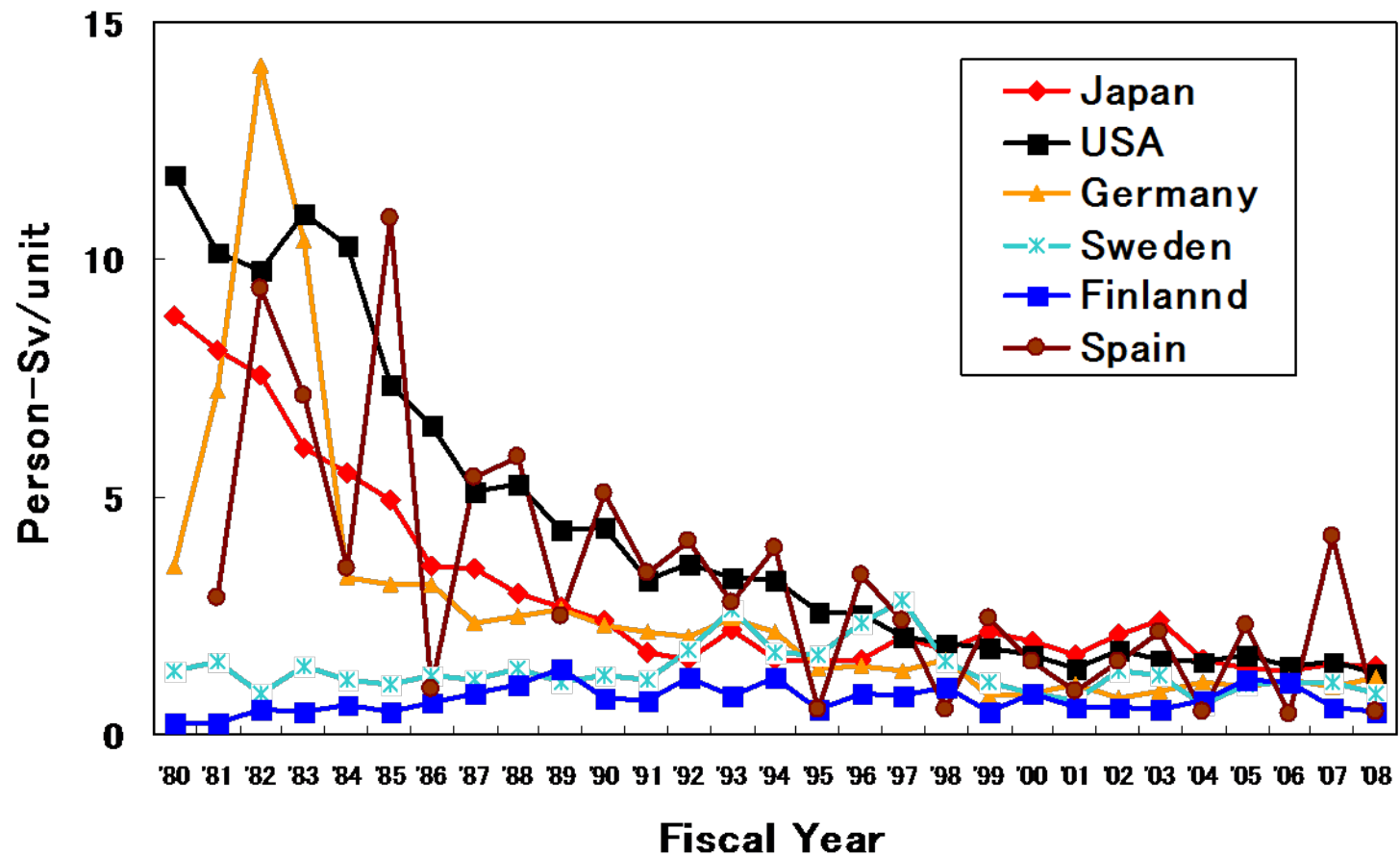
2. Overview of Exposure of NPP in Asia

PWR Average Collective Dose per Reactor by Country



2. Overview of Exposure of NPP in Asia

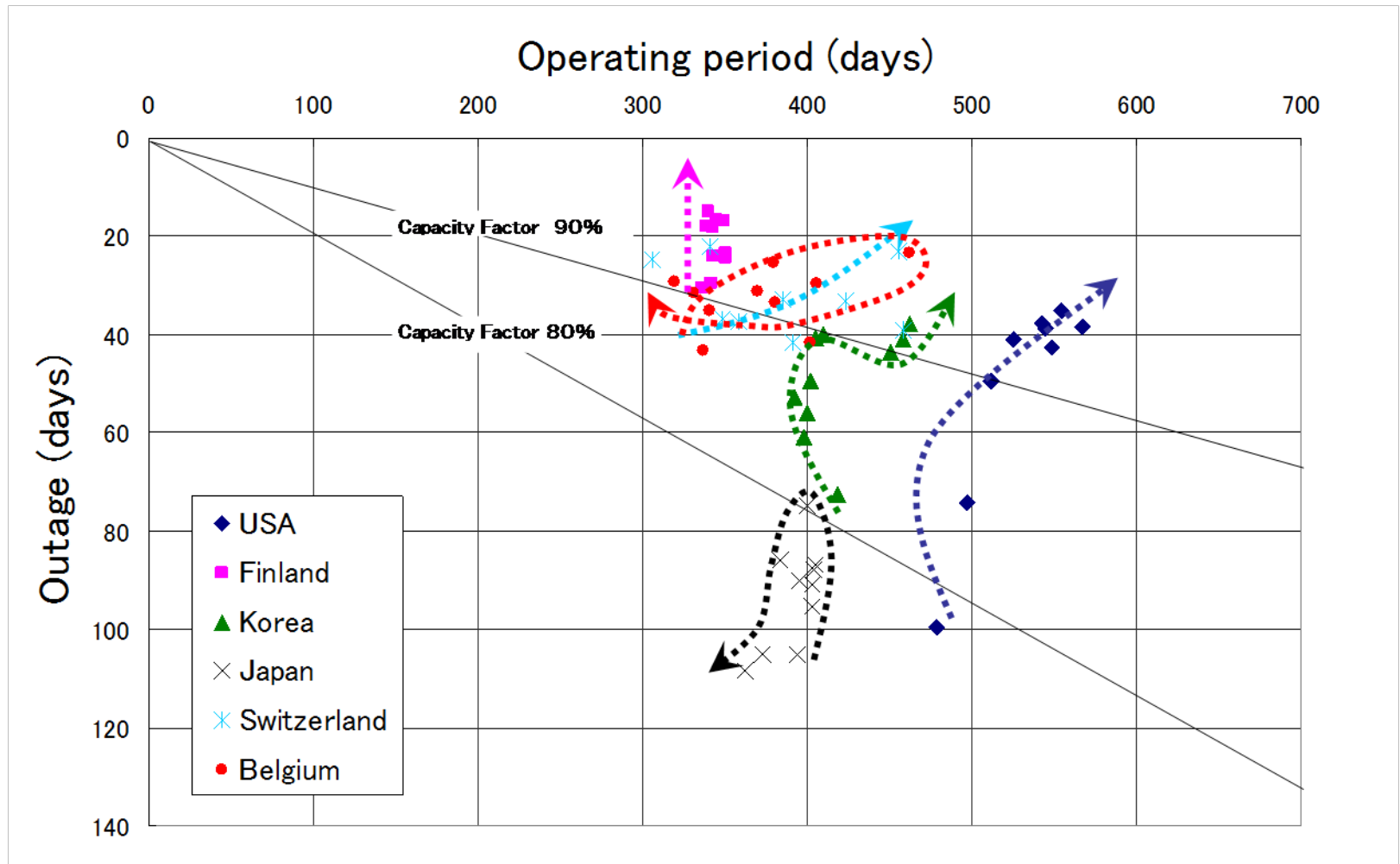
BWR Average Collective Dose per Reactor by Country



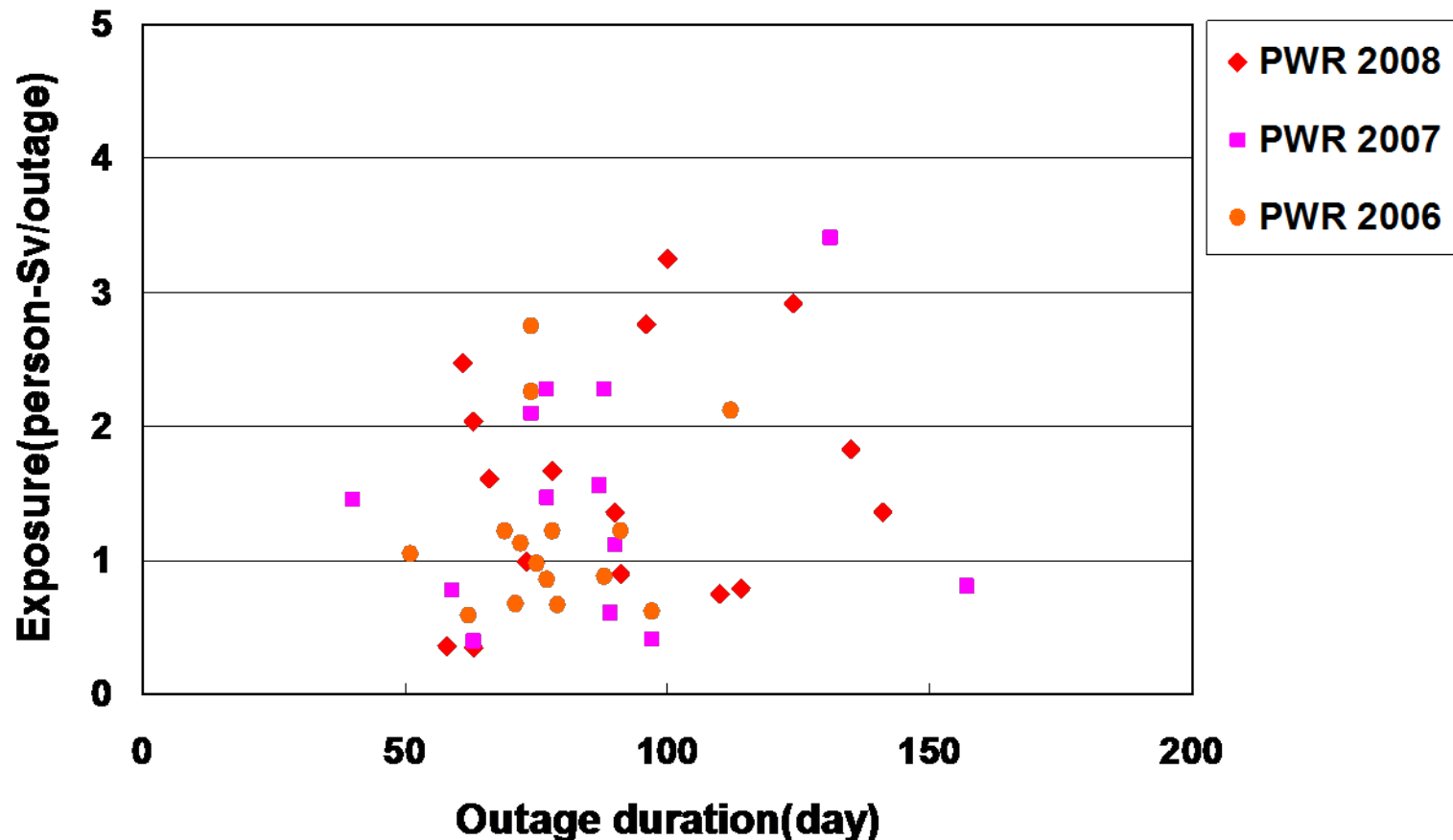
3. Exposure of NPP in Japan

- **Periodical inspections were completed at 11 BWRs and 21 PWRs.**
- **The average duration of outage for periodical inspection**
 - 138 days for BWRs and**
 - 144 days for PWRs**
- **Main works influencing exposure**
 - **Repair works of the steam generator Nozzle Stubs in PWR**
 - **The works for improvement of the seismic safety margin and replacement of strainer in BWR**

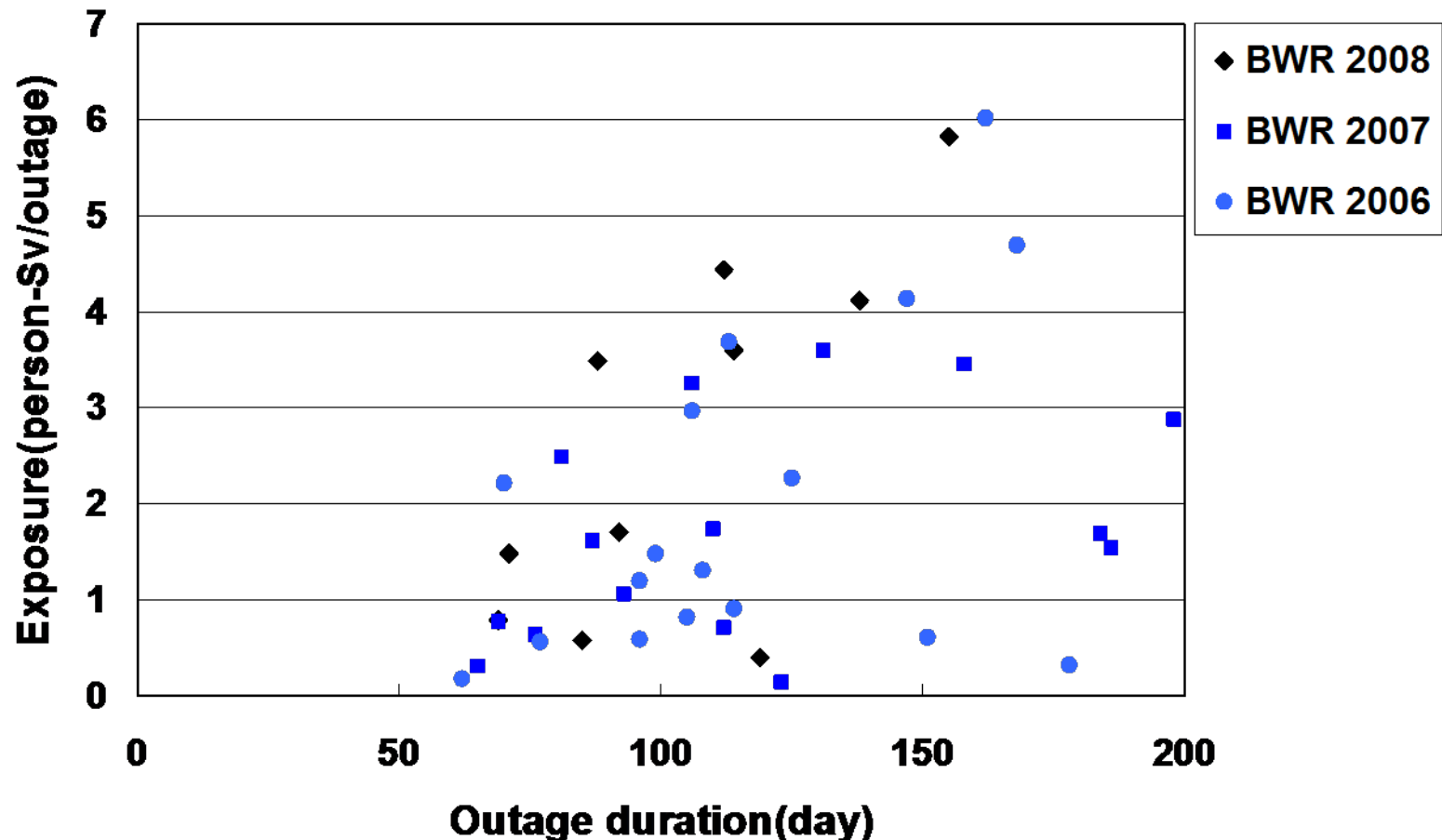
Operation Period and Maintenance Period by Country (1996-2005)



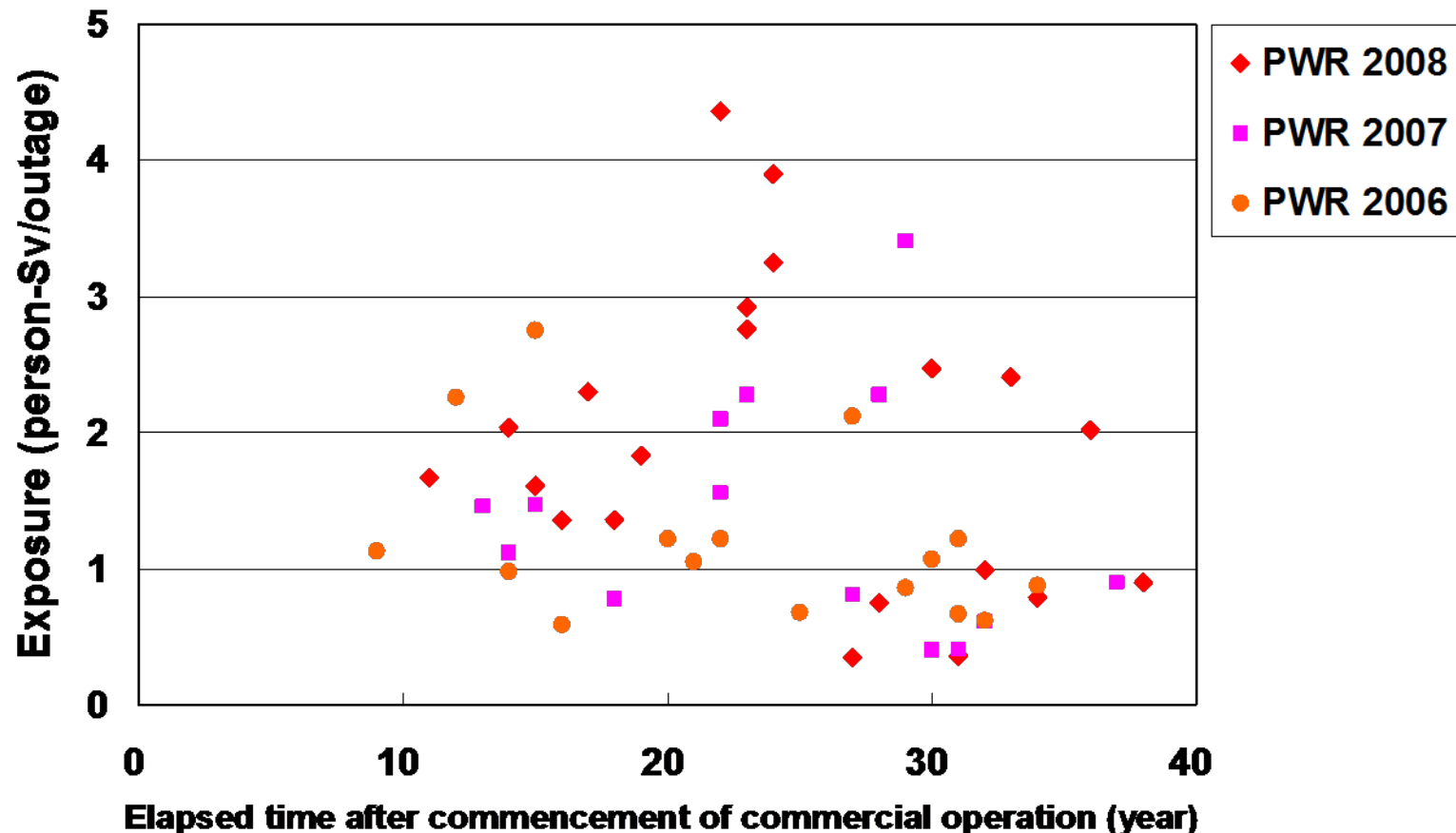
Correlation between Outage duration and Exposure per outage (Japanese PWR)



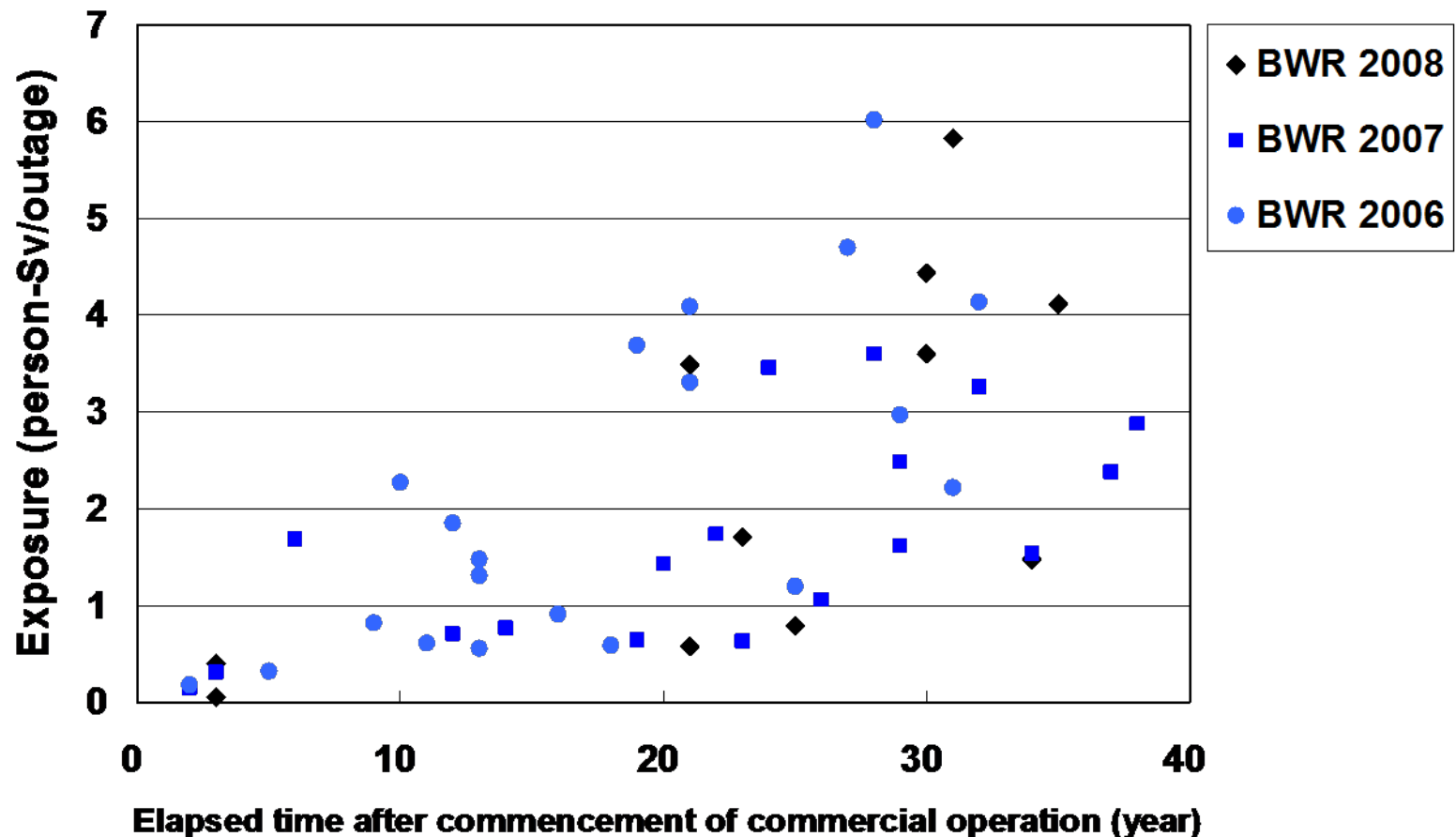
Correlation between Outage duration and Exposure per outage (Japanese BWR)



Correlation between Elapsed time after commencement of commercial operation and Exposure per outage (Japanese PWR)



Correlation between Elapsed time after commencement of commercial operation and Exposure per outage (Japanese BWR)



New Regulatory Inspection System(1/2)

- The new regulatory inspection system was implemented in January 2009.**
- The new inspection system is the system for safety activities based on the maintenance program, aiming for safety assurance as important action, and provides arrangements for guidelines on root cause analyses.**

New Regulatory Inspection System(2/2)

- In this system the inspection is shifted from a uniform inspection to a fine inspection according to the characteristic of each plant allowing 18 or 24 month operating periods which is 13 month now.**
- It is expected that the maintenance optimisation by the implemented improved inspection system will promote to decrease the exposure in Japanese plants.**

4. 2009 ISOE Asian ALARA Symposium

- **Date: September 8-11 , 2009**
- **Place: Aomori, Japan**
- **Organizer: JNES/ISOE-ATC**

- **Participants:
35 individuals
from Korea, USA
and Japan**



September 10: Tour to Higashidori unit1 NPP

**September 11: Tour to Muroran Plant of Japan Steel Works
(They are providing nuclear equipment)**

4. 2009 ISOE Asian ALARA Symposium

● Presentation Award

(Best Presentation)

- Dose Rate Reduction Methods at Shimane Nuclear Power Station
Tadashi Kanaoka (The Chugoku Electric Power Company, INC)

(Special award)

- Hot Topic Report of Bottom Header Defected, YGN 5 in 2003
Youn Young Ho (Korea Hydro & Nuclear Power Co. Ltd.)

(Technical award)

- Pre-Filming Method of Deducting Metal Release from Alloy 690 for SG in Primary Water of PWR
Akihiro Uehira (Sumitomo Metal Industries Ltd.)
- Reduction of radiation exposure by feed water heater tubes applied reducing content and pre-filming technology to reduce Cr and Co release
Tetsuo Yokoyama (Sumitomo Metal Industries Ltd.)

5 . Other Topics (ATC Database)

ATC provided the proprietary database for the Information for Occupational exposure on the ATC website.

- **“Status of Radioactive Waste Management and Occupational Radiation Exposure Management at Nuclear Facilities” in Japan between FY1979 - FY2007**
- **Dosimetric trends of NPPs in Chinese Taipei**

5. Other Topics (ATC Database)

“Status of Radioactive Waste Management and Occupational Radiation Exposure Management at Nuclear Facilities” in Japan

Welcome to ISOE HomePage | ISOE Asian Technical Center | ATC Database - Microsoft Internet Explorer

ファイル 編集 表示 お気に入り ツール ヘルプ

戻る 進む 検索 お気に入り

アドレス http://www.jnes.go.jp/isoe/english/atcdatabase/info_02_h11.html

ISOE Asian Technical Center
stem on Occupational Exposure

ABOUT ISOE | ISOE INFORMATION | ISOE ACTIVITIES | ATC ACTIVITIES | ALARA SYMPOSIUM | ATC DATABASE | CHAIRMAN'S ROOM

Japan | Korea

Home > ATC Database > Japan > Fiscal Year 1998 Records

ATC Database (Japan)

Status of Radioactive Waste Management and Occupational Radiation Exposure Management
Fiscal Year 1998 Records

Status of Radioactive Waste Management at Commercial Reactor Facilities	
(1) Released Amount of Radioactive Gaseous and Liquid Waste	
Status of Gaseous and Liquid Waste Management (FY 1998)	
(2) Status of Solid-Waste Management	
Status of Solid-Waste Management	
(1) Solid Waste Storehouses (FY 1998)	
(2) Steam Generator Storehouses	
(3) Spent Fuel Pools, Storage Bunkers, Tanks, etc.	
Reference documents	
1. Release of Radioactive Noble Gas in Gaseous Waste by Fiscal Year	
2. Release of Radioactive Iodine in Gaseous Waste by Fiscal Year	
3. Release of Radioactive Substance (Excluding Tritium) in Liquid Waste by Fiscal Year	

http://www.jnes.go.jp/isoe/english/index.html

Reference document 4. Release of Tritium in Liquid Waste by Fiscal Year (Unit: Bq)

Power station	FY	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Japan Atomic Power Company Co., Ltd.											
Tokai Power Station		5.2×10 ¹²	3.7×10 ¹²	1.4×10 ¹²	8.3×10 ¹¹	2.4×10 ¹²	5.1×10 ¹²	9.2×10 ¹²	1.4×10 ¹³	2.0×10 ¹³	1.2×10 ¹³
Japan Atomic Power Company Co., Ltd.		1.1×10 ¹²	9.8×10 ¹¹	1.4×10 ¹²	1.3×10 ¹²	8.3×10 ¹¹	1.5×10 ¹²	1.7×10 ¹²	1.2×10 ¹²	1.8×10 ¹²	
Tokai Daiichi Power Station		1.2×10 ¹²	2.3×10 ¹²	3.1×10 ¹²	7.4×10 ¹¹	1.6×10 ¹²	1.3×10 ¹²	1.9×10 ¹²	1.4×10 ¹²	2.1×10 ¹²	2.0×10 ¹²
Onagawa Power Station		7.5×10 ⁸	4.8×10 ⁸	5.8×10 ⁸	3.4×10 ⁸	9.0×10 ⁸	1.5×10 ⁹	8.5×10 ⁸	2.1×10 ⁹	4.4×10 ⁸	2.5×10 ⁸
Onagawa Nuclear Power Station		2.4×10 ¹²	2.7×10 ¹²	2.4×10 ¹²	2.1×10 ¹²	1.8×10 ¹²	1.4×10 ¹²	1.1×10 ¹²	1.1×10 ¹²	1.4×10 ¹²	1.1×10 ¹²
Fukushima Daiichi Nuclear Power Station		1.3×10 ¹²	1.1×10 ¹²	8.7×10 ¹¹	4.4×10 ¹¹	5.8×10 ¹¹	5.0×10 ¹¹	6.9×10 ¹¹	5.7×10 ¹¹	1.0×10 ¹²	6.0×10 ¹¹
Fukushima Daiichi Nuclear Power Station		1.7×10 ¹²	1.5×10 ¹²	4.2×10 ¹¹	3.4×10 ¹¹	1.6×10 ¹²	1.4×10 ¹²	1.3×10 ¹²	1.7×10 ¹²	8.0×10 ¹¹	4.5×10 ¹¹
Kashiwazaki-Kariwa Nuclear Power Station		1.3×10 ¹²	2.1×10 ¹²	1.3×10 ¹²	1.4×10 ¹²	1.4×10 ¹²	1.3×10 ¹²	1.0×10 ¹²	6.8×10 ¹¹	6.0×10 ¹¹	1.3×10 ¹²
Hamaoka Nuclear Power Station		—	—	—	3.4×10 ⁸	1.6×10 ⁸	5.7×10 ⁸	1.4×10 ⁹	1.7×10 ⁹	2.0×10 ⁹	3.3×10 ⁹
Shika Nuclear Power Station		2.4×10 ¹²	4.3×10 ¹²	5.1×10 ¹²	4.2×10 ¹²	5.7×10 ¹²	1.0×10 ¹³	7.3×10 ¹²	1.2×10 ¹³	7.2×10 ¹²	3.1×10 ¹²
Shikoku Nuclear Power Station		2.1×10 ¹²	1.4×10 ¹²	1.1×10 ¹²	2.1×10 ¹²	2.4×10 ¹²	2.1×10 ¹²	1.9×10 ¹²	2.4×10 ¹²	3.0×10 ¹²	2.4×10 ¹²
Tsurumi Power Station		1.3×10 ¹²	2.4×10 ¹²	1.3×10 ¹²	1.2×10 ¹²	1.8×10 ¹²	1.1×10 ¹²	1.7×10 ¹²	1.7×10 ¹²	1.4×10 ¹²	1.4×10 ¹²
Ono Nuclear Power Station		4.0×10 ¹²	3.5×10 ¹²	3.0×10 ¹²	5.5×10 ¹²	6.9×10 ¹²	3.3×10 ¹²	3.7×10 ¹²	5.7×10 ¹²	6.4×10 ¹²	6.2×10 ¹²
Ono Nuclear Power Station		2.4×10 ¹²	1.4×10 ¹²	2.0×10 ¹²	2.4×10 ¹²	4.2×10 ¹²	4.3×10 ¹²	6.1×10 ¹²	5.9×10 ¹²	4.6×10 ¹²	5.7×10 ¹²
Ono Nuclear Power Station		2.4×10 ¹²	3.3×10 ¹²	2.0×10 ¹²	2.5×10 ¹²	3.2×10 ¹²	3.0×10 ¹²	5.2×10 ¹²	4.8×10 ¹²	4.5×10 ¹²	5.5×10 ¹²
Kyushu Electric Power Co., Inc.		2.4×10 ¹²	3.4×10 ¹²	2.4×10 ¹²	2.4×10 ¹²	5.6×10 ¹²	5.8×10 ¹²	4.4×10 ¹²	6.1×10 ¹²	8.1×10 ¹²	
Kyushu Electric Power Co., Inc.		3.4×10 ¹²	3.7×10 ¹²	3.4×10 ¹²	4.4×10 ¹²	3.9×10 ¹²	3.1×10 ¹²	4.2×10 ¹²	5.0×10 ¹²	3.4×10 ¹²	3.3×10 ¹²
Kyushu Electric Power Co., Inc.		1.4×10 ¹²	2.25×10 ¹²	2.4×10 ¹²	2.25×10 ¹²	2.4×10 ¹²	2.4×10 ¹²	3.11×10 ¹²	3.15×10 ¹²	3.24×10 ¹²	3.76×10 ¹²
(including N.D.)											

Note: The data for Ono reactors and FBR reactors after FY1985 include the sum of Tritium released from secondary sources.

<http://www.jnes.go.jp/isoe/english/index.html>

5 . Other Topics (ATC Database)

“Status of Radioactive Waste Management and Occupational Radiation Exposure Management at Nuclear Facilities” in Japan

Following Data are shown in the ATC Data Base

< Status of Radioactive Waste Management > (Power Reactors, Fuel Cycle Facilities)

- Release of Gaseous Radioactive Waste**
- Release of Liquid Radioactive Waste**
- Release of Solid Radioactive Waste**

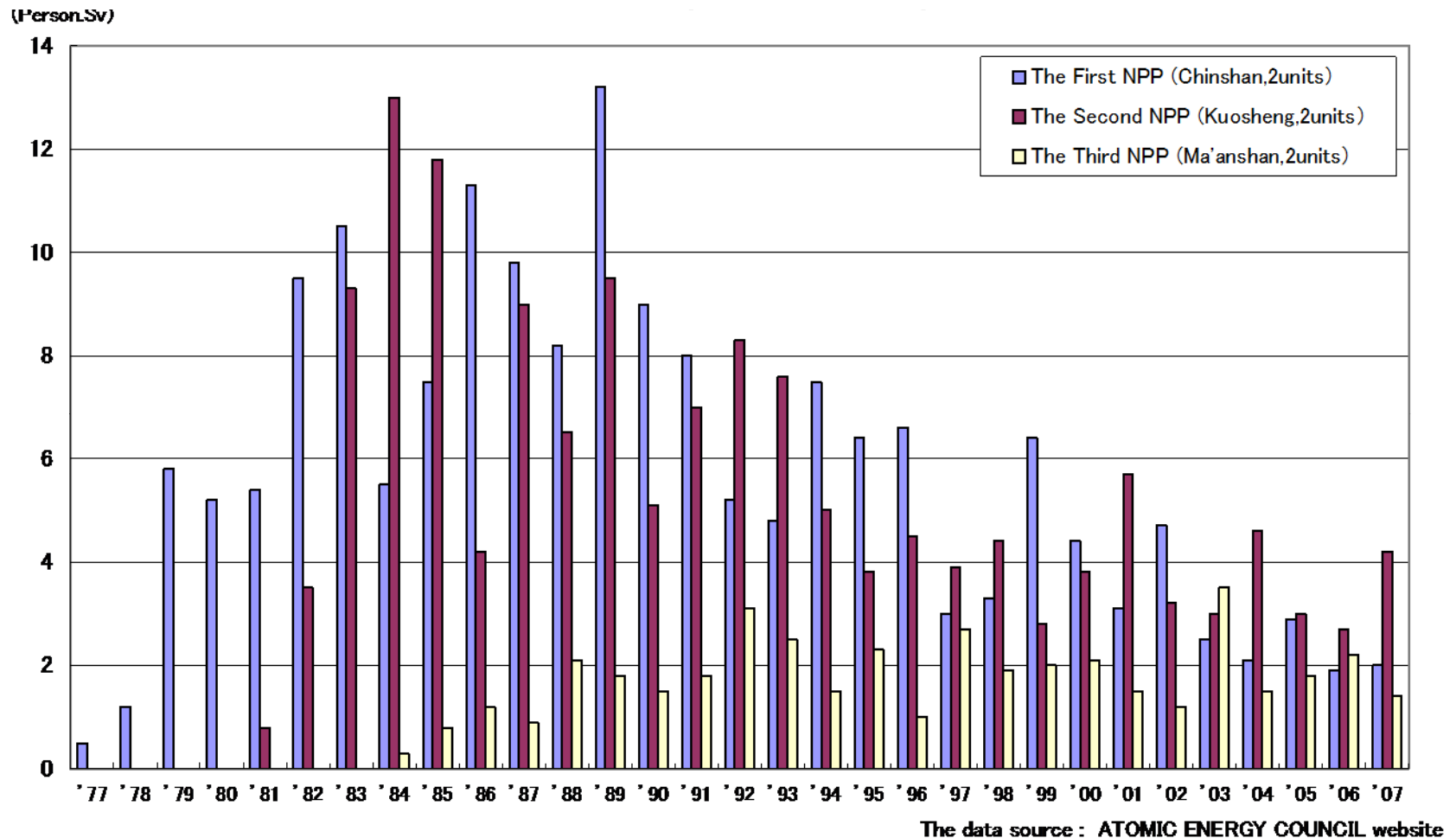
< Status of Occupational Radiation Exposure Management > (Power Reactors, Fuel Cycle Facilities)

- Exposure Distribution of Personnel Engaged in Radiation Work**
- Three-month Radiation Exposure Distribution of Female Personnel Engaged in Radiation Work**

Data obtained since 1979 have been provided.

5 . Other Topics (ATC Database)

Collective Dose per Site in Chinese Taipei



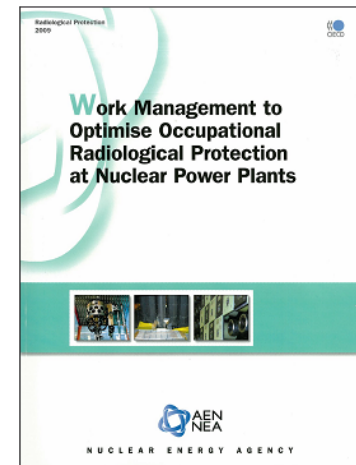
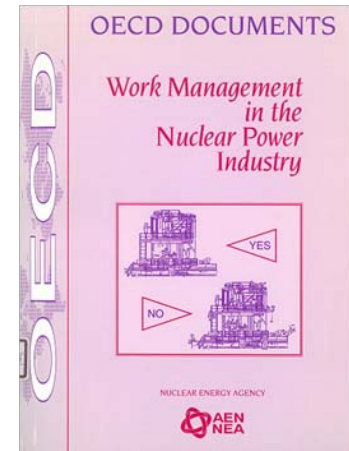
5 . Other Topics (Greenbook)

1997: “Work Management in the Nuclear Industry” (Pinkbook) was issued.

- Ten years has past, and knowledge, technologies and experiences in occupational radiation protection has been obtained.



- Revised to “Greenbook”



“Work Management to Optimise Occupational Radiation Protection in The Nuclear Power Industry ”

EGWM Members

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Mr. V. Simionov **Cernavoda NPP, Romania**

Mr. S. Zorrilla **Laguna Verde NPP, Mexico**

Dr. D. Steinel **Germany**

5 . Other Topics (Greenbook)

This book provides practical guidance in the key areas of work management to optimise occupational radiation protection.

- 1. Introduction**
- 2. Regulatory aspects**
- 3. ALARA management policy**
- 4. Worker involvement and performance .**
- 5. Work planning and scheduling**
- 6. Work preparation**
- 7. Work implementation**
- 8. Work assessment and feedback**
- 9. Ensuring continuous improvement**
- 10. Conclusions**

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Japanese |

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ISOE: Information System on Occupational Exposure
Provide a forum for radiation protection experts from both utilities and national regulatory authorities to discuss, promote and co-ordinate international co-operative undertakings for the radiological protection of workers at nuclear power plants.

What's new [Back Issues](#)

- 2009.01.02 | 2008 NASTC Joint Process One of the Year Awards
- 2009.11.03 | 2009 ISOE International ALARA Symposium held in Tokyo
- 2009.11.03 | 17th Meeting of the ISOE Management Committee held in Kyoto
- 2009.06.26 | 2009 ISOE European ALARA Conference held in Toulouse
- 2009.05.20 | 63th Meeting of the ICRP held in Paris
- 2009.02.10 | 4th Cooperative Work Management Meeting held in Paris
- 2009.01.01 | Opening speech by the ISOE Chairman at the 2009 ISOE North American ALARA Symposium held in Florida, U.S.A.
- 2007.11.02 | 17th Meeting of the ISOE Steering Group held in Paris
- 2007.08.02 | 2007 ISOE Asian ALARA Symposium held in Seoul

The Chairman's Room

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- ISOE European Technical Center
- ISOE North American Technical Center
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