



# **Radiation management using Quality technique during outage**



**Radiation Safety team  
Hanul Nuclear Power Plant #1**



**HANUL -  
Nuclear Power Plant #1  
Radiation Safety team**

# **Subject :**

**Radiation management using quality technique during outage**



# Radiation management using quality technique during outage



ALARA committee

A

Pre-Job Briefing (PJB)

B

Radiation work permission

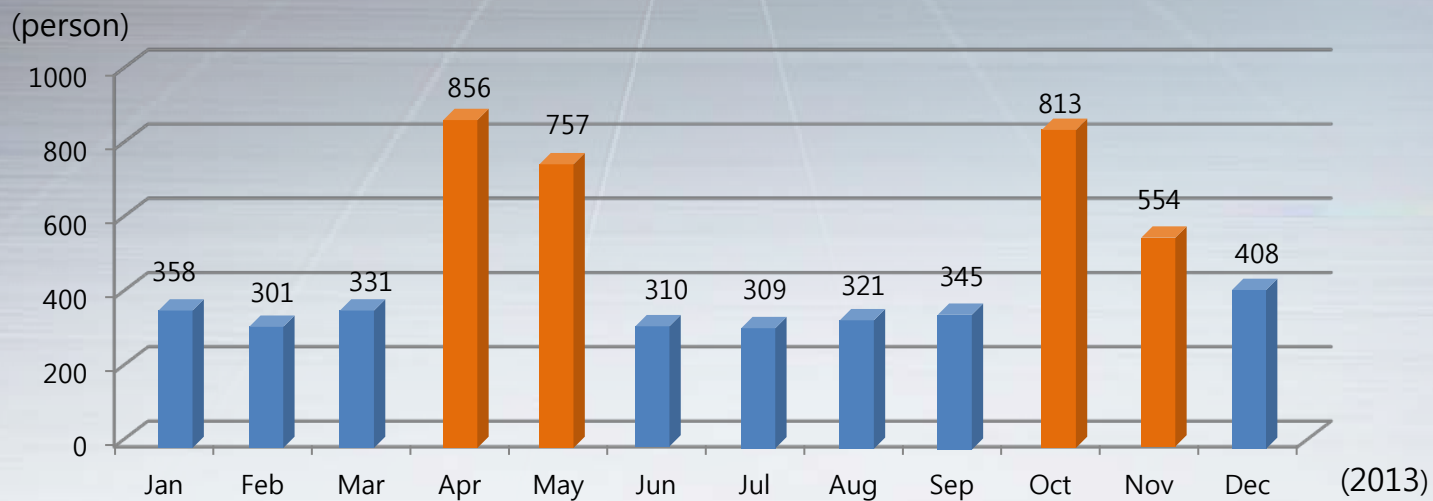
C

# Radiation management using quality technique during outage



 **Worker**

 **Worker (O/H)**



# Radiation management using quality technique during outage



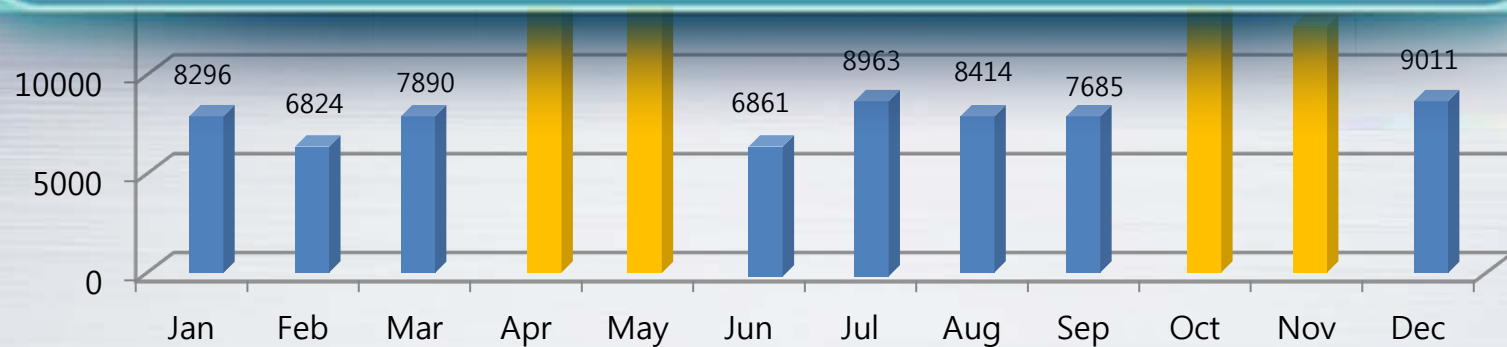
■ Working time

■ Working time (O/H)

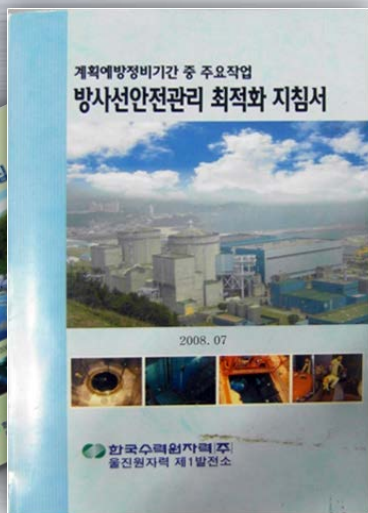
(Hour)  
35000

34702

**Unexpected exposure  
Spread of contamination  
Missing important steps**



# Radiation management using quality technique during outage



Teaching material

The image shows a 'Hold / Witness point' form titled '방사선안전관리 Hold/Witness Point 운영 점검표(참조차장)'. The form is a checklist with columns for '시점' (Point), '확인 사항' (Check items), '구분' (Category), and '확인' (Check). It lists various safety points for radiation management during an outage, such as '방사선안전관리 Hold/Witness Point 운영 점검표(참조차장)' and '방사선안전관리 Hold/Witness Point 운영 점검표(참조차장)'. The form is part of a larger document titled 'CRS 229 방사선안전관리분야 확인점 운영 계획'.

Hold / Witness point



Real-time monitoring system

# What is Hold / Witness point?



## Hold point

Hold Point is a mandatory verification point beyond which a work cannot proceed without approval by Inspector.

## Witness point

Witness Point is an identified point in the process where the Engineer or Consultant may review, witness, inspect method or process of work. The activities however may proceed.

# Hold / Witness Point for Radiation management



## Step 1

Choose important works from all radiation works.

- Considering collective exposure, radiation rate of work area, contamination and so on.

## Step 2

Select important point for each work (chose in step 1).

- 18th outage on Hanul unit 2 (2013) : 50 H/W point items
- 19th outage on Hanul unit 1 (2013) : 52 H/W point items



Choose

⋮



Select

11.01.01	11.01.01.01	11.01.01.02	11.01.01.03	11.01.01.04
11.01.02	11.01.02.01	11.01.02.02	11.01.02.03	11.01.02.04
11.01.03	11.01.03.01	11.01.03.02	11.01.03.03	11.01.03.04
11.01.04	11.01.04.01	11.01.04.02	11.01.04.03	11.01.04.04
11.01.05	11.01.05.01	11.01.05.02	11.01.05.03	11.01.05.04
11.01.06	11.01.06.01	11.01.06.02	11.01.06.03	11.01.06.04

ent



- General manager or Senior manager or RP



CH-119 방사선안전관리요령 확인일: 2016. 12. 26					
방사선안전관리 Hold/Withstand Point-용역 점검표(방사선안전관리원)					
대상 작업	시 기	확인 사항	구 분	확인	비고
			HP	WP	반복 점검 일시 (연월일)
S/C Lancing	수행 중	○ Lancing 수동 관여하지 않은 관통을 측정/기록하는 것이 확인		○	
				○	
				○	
				○	
				○	
S/C Lancing	열외 조치 후	○ Lancing 시 사용품 열외는 반드시 반영 후 평가사항을 적는다		○	
				○	
				○	
				○	
				○	
S/C 조각작업	재입력하여 평가중	○ 2각측 중측 뒤 - 작업 완료 후 소요 시간		○	
				○	
				○	
				○	
				○	
S/C 조각작업	2각측 종료 전	○ 이음통 유효범위 등 주사사항 점검 - 2각측 중측후 배선 전원 확인 - 측정 후 기록사항 (치수: 1.5/0.002 mm/y) ○ 내부 구멍이 없는 치수 Check - 용품 사용 및 이음통 유효범위		○	
				○	
				○	
				○	
				○	

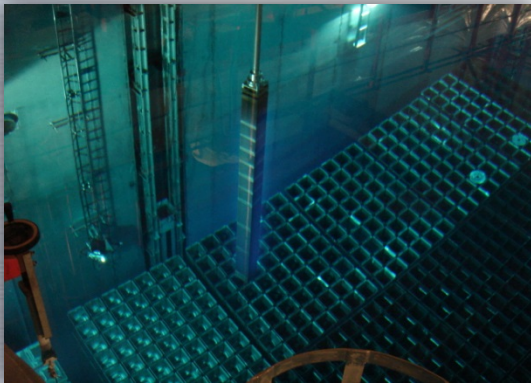
## Senior manager

RP

## Example of Hold / Witness point



### ❖ Refueling



Items to be confirmed

- Change KRT 011/012MA set point
- Block the way around transfer canal

Time

- Before and after refueling

Confirmed

- General manager

Purpose

- Important step
- Management exposure

## Example of Hold / Witness point



### ❖ Nozzle Dam



Items to be confirmed

- Check putting on Air-harness and protection goods

Time

- 10 minutes before start work

Confirmed

- General manager

Purpose

- Management contamination

## Example of Hold / Witness point



### ❖ Access to reactor vessel



Items to be confirmed

- Check thimble is withdrawn or not

Time

- Request hatch open

Confirmed

- Senior manager

Purpose

- Management exposure

## Example of Hold / Witness point



### ❖ Free Access of personnel hatch



Items to be confirmed

- Radioactive concentration and operation mode

Time

- Request hatch open (submit paper)

Confirmed

- RP

Purpose

- Important step

# Case of unexpected exposure



## Level 2 on the INES

\*\* Plant

- In-core thimbles were withdrawn, in preparation for a pressure test of the reactor pressure vessel.
- This activity started several hours earlier than originally planned. The change to the outage schedule had only been briefly discussed in the morning meeting.
- During the withdrawal of the In-core thimbles, the local dose rate increased to about 1500 mSv/h under vessel area where a maintenance technician and a radiation protection job supervisor were working to install a camera.
- Maintenance technician received a dose of 37.8 mSv, radiation protection job supervisor a dose of 25.4 mSv

## **Radiation management using quality technique during outage**





**Thank You !**