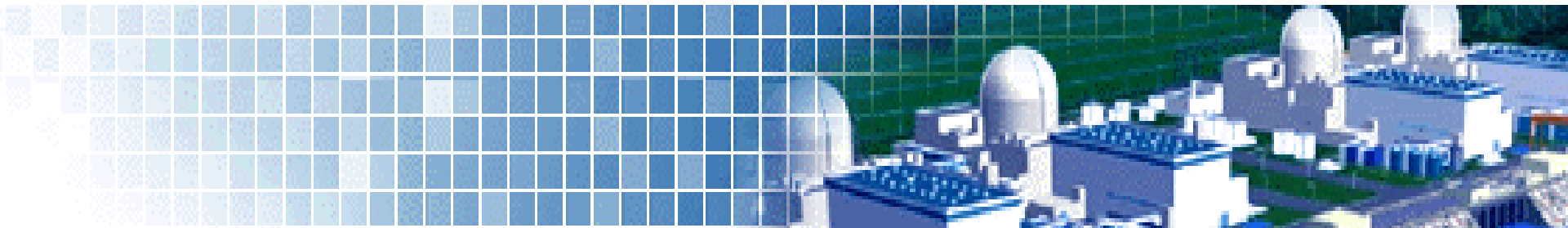


Improvements of ADR System

August 30, 2010

Ulchin NPP units 5&6



Contents

I. Brief Overview of ADR System

II. Existing problems

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I . Brief Overview of **ADR System**

1. Main function of ADR(Automatic Dose Reader) Sys.

Access Management Of Radiological Controlled area	Worker's information
	Entrance date
	ADR , TLD No. etc
Management of RWP	ERWP (Extended Radiation Work Permit)
	RRWP (Regular Radiation Work Permit)
	SRWP (Specific Radiation Work Permit)
Radiation dose management	Personnel dose management
	Collective dose management
	Regular dose management

I . Brief Overview of ADR System(Cont.)

2. Entrance procedure

To enter

Register
radiation worker

- Radiation Protection Training
- Whole Body Counting
- Medical Exam
- Issue TLD

Issue RWP

- ERWP
- RRWP
- SRWP

Take ADR

- Identification
- Setting alarm for alarm limit

Enter RCA

- Reader(Entrance)
 - ADR/TLD scan
 - Select RWP
 - Notice
- Open Turnstile

To exit

**After
work**


- ADR Reader(Exit)
- Portal Monitor

- ADR dose information
- Contamination
- Entrance and exit details
- Gate Open

Exit

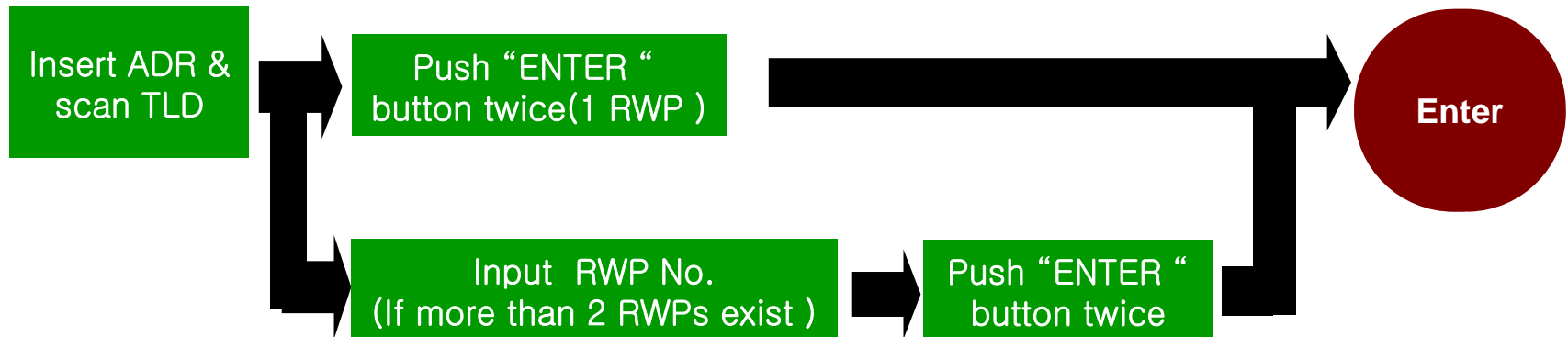
I . Brief Overview of **ADR System(Cont.)**

3. ADR(Automatic Dose Reader) Function

Picture	Characteristic
	<ul style="list-style-type: none">● Direct reading(real time reading)● Displaying dose , dose rate● Generating audible & visual alarms

II. Existing problems

1. Inconvenience and confusions due to **multi-access steps** for entrance



II. Existing problems(Cont.)

2. User's **inconvenience** due to inputting RWP No.

- Ex) RWP No. : 2010-5-E-0069

3. Occurrence of **system errors** with turnstile (In 2006)

- Turnstile error : 72 times (reading error of photo sensor)
- Communication error: 56 times (Between Reader and PC)

II. Existing problems(Cont.)

4. RWP No. **input errors** (if more than 2 RWPs exist)

- Inaccurate dose statistics with allocated tasks due to input errors on RWP No.
 - During O/H in 2006 : 540 times (#5: 293, #6: 247)
 - Operation period in 2006 : 56 times (#5: 37, #6: 19)
- Man power lost to correct RWP No. errors

II. Existing problems(Cont.)

5. Increasing purchase costs Difficulties in operation & maintenance

- Manufacturer : foreign supplier

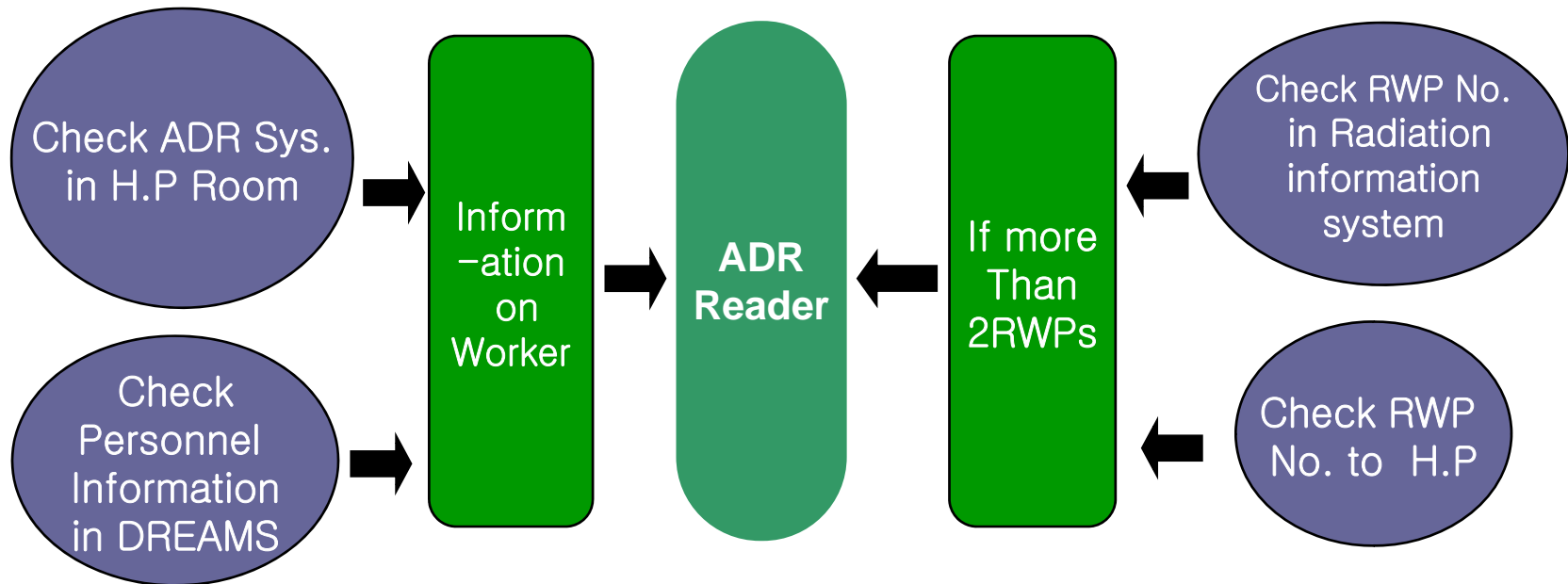
- Purchase costs Increase due to a monopolistic* supplier

* a monopolistic : in business it tries to control as much of an industry as it can and does not allow fair competition.(독점적인)

- Not easy for maintenance

II. Existing problems(Cont.)

6. LCD (4 Lines, 20 Characters per line) was **too small** to display all the information that workers need to know



II. Existing problems(Cont.)

Existing LCD picture(old model)



II. Existing problems(Cont.)

7. ADR System errors(turnstile & data transmission)

- Turnstile sensors sometimes were not recognized exactly.
- Using the hardwire cable between PC and Reader caused many data transmission errors.

III. Lessons learned from the use of ADR Sys.

1. To reduce ADR system failures and errors

2. To be convenient for users to access

3. Easy maintenance and cutting costs

★ New ADR System has been adopted from March, 2007

IV. Contents of improvements

1. Simplifying steps for easy access

Before	After
<ul style="list-style-type: none">● Scan ADR & TLD● Push “ENTER” button twice● Confirm RWP No. and input RWP No. (if more than 2 RWPs exist)● Enter radiological controlled area	<ul style="list-style-type: none">● Same as “Before”● None● Select the RWP shown on the touch screen● Enter radiological controlled area

IV. Contents of improvement(Cont.)

2. Redesign of displaying system for additional information about radiation worker

Before	After
<ul style="list-style-type: none">● None. but worker's RWP No.	<ul style="list-style-type: none">● Developed program to display most of information on the wide LCD screen<ul style="list-style-type: none">– Worker's radiation dose history– Protective equipments requirement– RWP, WBC, etc.

IV. Contents of improvement(Cont.)

Redesign small LCD to the wide touch screen



Before



After

IV. Contents of improvement(Cont.)

RWPs & Individual information on worker

상세 정보

작업허가서 상세정보

RWP No	E0086	출입호기	5
작업명	방사선 안전관리		
작업장소	ALL BLDG(C/V 및 고방사선구역제외)		
허가기간	2007-04-01 00:00 ~ 2007-04-30 23:59		

출입자 정보

TLD No	U33060	이름	전광훈
연간선량	0.00 mSv	5년선량	0.00 mSv
WBC	2007-02-23		

확 인 **RWP 검색/변경**

SFT

RWP 번호선택

허가서수 6 개

E0254	기타 열상점검	기간	060901~060913	장소	ALL BLDG
E0223	기타 열상점검	기간	060801~060930	장소	ALL BLDG
E0188	기타 열상점검	기간	060701~060731	장소	ALL BLDG
E0167	기타 열상점검	기간	060601~060630	장소	ALL BLDG
E0119	기타 열상점검	기간	060501~060531	장소	ALL BLDG

SFT

IV. Contents of improvement(Cont.)

Specific requirements and notices for radiation safety

작업 공지 사항		입 장
방호 장구 요건	1.방사선관리구역 후드	
	2.방사선관리구역 양말	
준수 사 항	1.안전사고에 유의	
	2.허가되지 않은 장소에 출입 또는 작업금지	
	3.방사성폐기물 발생최소화 및 지정장소에 폐기	
	4.관리구역을 나올 때 개인 및 물품오염검사 철저	
	5.물품 반출입 절차 준수	
	6.작업중 작업내용 변경시 HP의 사전승인 필요	
특기사항		

IV. Contents of improvement(Cont.)

3. Making system error and failure to zero

Before	After
<ul style="list-style-type: none">● 4 sensors inside turnstile● Use of a hardwire cable between PC and Reader	<ul style="list-style-type: none">● Added 2 photo sensors for exact acknowledge● Changed to LAN

IV. Contents of improvement(Cont.)

No access errors after adding photo sensors



Before



After

IV. Contents of improvement(Cont.)

4. Convenience of maintenance & Cost reduction

Before	After
<ul style="list-style-type: none">● Difficulties in repair and normalization of ADR system because of foreign supplier● Caused the price of ADR system and spare parts to keep being high	<ul style="list-style-type: none">● Localization of ADR system resulted in prompt maintenance supports from domestic supplier and decreased purchase price including cost for maintenance

V. Effects

1. Enhancement of system reliability

Item	Before (2006)	After (2007~2010)
System communication error	12	0
Turnstile sensor error	18	0
Input error of RWP No.	56	0

V. Effects(Cont.)

2. Cost reduction

◆ Ulchin units 5, 6 (for ten years)

(Unit : US\$)

Item	Purchase Cost		Cost Reduction
	Before	After	
● Cost of purchase			
– ADR system S/W(1set)	50,000	7,200	42,800
– ADR reader(20ea)	360,000	260,000	100,000
● Cost of Maintenance	100,000	50,000	50,000
Total	510,000	317,200	192,800

● Cost Reduction /year : 192,800,000Won / 10years \div 19,280 US\$ / year

V. Effects(Cont.)

3. Additional effects

- User's **satisfaction** due to simplified access step through ADR sys.
- **Enhanced efficiency of radiation safety management**
by providing prompt information for radiation safety
- **No extra man power** to correct the input errors, i.e. RWP No.
- **Localization** of ADR system ensured **secure supply**

Thank You for your attention!!!

KCHNP

