

Improvement of the Existing Respirators Capability in of Abnormal Situation.





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100 times air pollution level
compared to normal condition (H3)

Increase of dealing time due to
limitation of protection devices

**Abnormal
Situation**

**High
Radioactivity**

**Limitations of
Protection
Devices**

**Dealing Time
Increase**

**Necessity of
Protection
Measures
Improvement**

**Dramatic rise of site
radiation level**

**Lack of respirators in whole-
plant range diffusion situation**

**Improvement of working
environment by dealing
time shortening**

■ Example of Abnormal Situation

◇ D₂O Leakage at Wolsung Unit 2 in 2004

▷ Tritium Density in Reactor Building

☞ Main Access Area (R-002, 201) : 33 ~ 88 DAC

☞ Leakage Concerned Work Area (R-108) : 591 DAC

※ 1DAC = 0.01mSv

▷ Current State of Abnormal Situation Dealing

☞ Annual Personnel Access : 71 persons

☞ Dealing Time : '04. 06. 17 06 : 00 ~ 06. 21 09 : 00 (99h)

☞ Used Respirator : Self-Contained Breathing Apparatus (SCBA)

※ Source : Nuclear Safety Information Center in Korea Institute of Nuclear Safety

■ Standard of Respirator Use

Classification	Wearing Range (Tritium)	Operating Radius
Tritium Respirator	1 ~ 10 DAC	Wide Area
Air-line Respirator	Over 10 DAC	Narrow Area
SCBA	Over 50 DAC	Wide Area
Plastic Respirator	Over 50 DAC	Narrow Area

※ Feature of Heavey Water Reacor :

D₂O is used for coolants and moderators

In abnormal situation, tritium protection respiator is used

■ Feature of Respirator

SCBA



Feature

- High air pollution level
and frequent moving case
- Unlimited Working Range
- Limited Using Time
(Time Available : about 20 minutes)
- Using Point : In Abnormal situation

■ Feature of Respirator

Plastic Respirator



Feature

- High air pollution level
and short moving range
- Unlimited Using time
- **Cannot used in abnormal situation**
- Using point : In expectable work
- ※ light-water reactor : continuous air-line worksuit

■ Problems in Abnormal Situation

SCBA

Limited air-volume
☞ Limited using time

Wearing SCBA
☞ Inaccessible to narrow area

Plastic Respirator

Using by connecting with the work
area B/A
☞ Unusable in abnormal situation

■ Problems in Abnormal Situation

SCBA

Time Limited

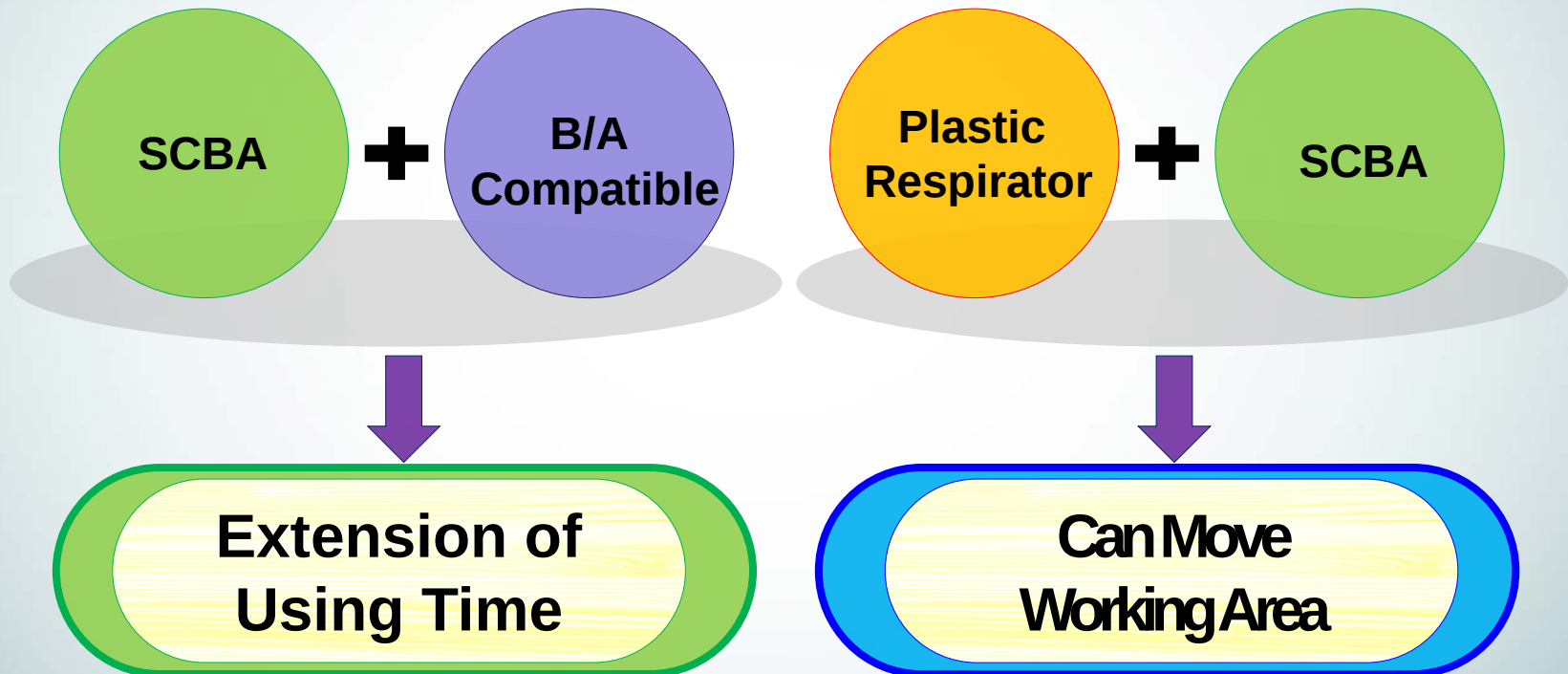
A white SCBA cylinder with a black hose and a pressure gauge. The gauge has a red needle and a green needle.

Plastic Respirator

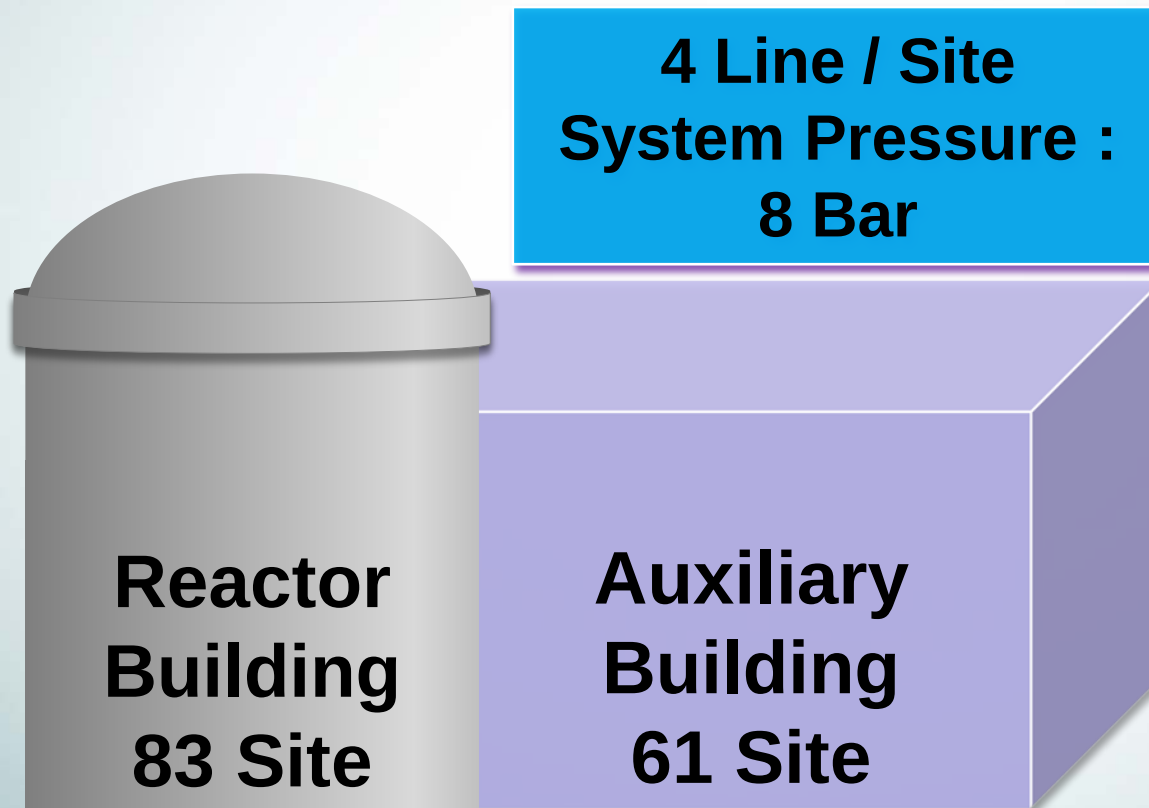
Unavailable

A person wearing a white plastic respirator suit with a clear face shield. The person is standing in a laboratory or industrial setting.

■ Development Goals



■ Current State of Breathing Air (Wolsung Unit 1) (Light-water Reactor : Service Air)



■ SCBA - SCA 680

(SCBA : Self-Contained Breathing apparatus)



Main Feature

Using Time		About 45 min (40L/min)
Total Weight		Less than 9kg
Cylinder	Mateirals	Carbon Composite
	Internal Volume	More than 6.8L
	Maximum Charing Pressure	300 bar
	Pressure Proof Testing Pressure	500 bar
	Maximum Charge Amount	About 2,040L
Weight		About 3.6kg

1. SCBA Connector

■ Outline

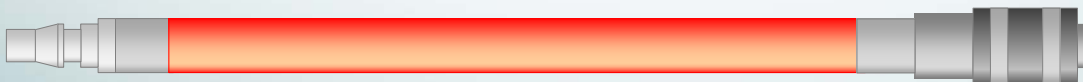
Secure the **compatible with B/A sysem**

Extense the using time of SCBA



B/A plug

Mail mask coupling



1. SCBA Connector

■ Test product and trial performance

SCBA Connector



2. Plastic Respirator Connector

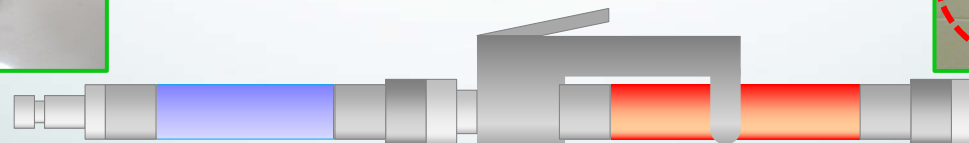
■ Outline

Give a mobility to plastic respirator

Can be used in abnormal situation



Button Type Valve



SCBA Plug

Plastic Respirator Plug

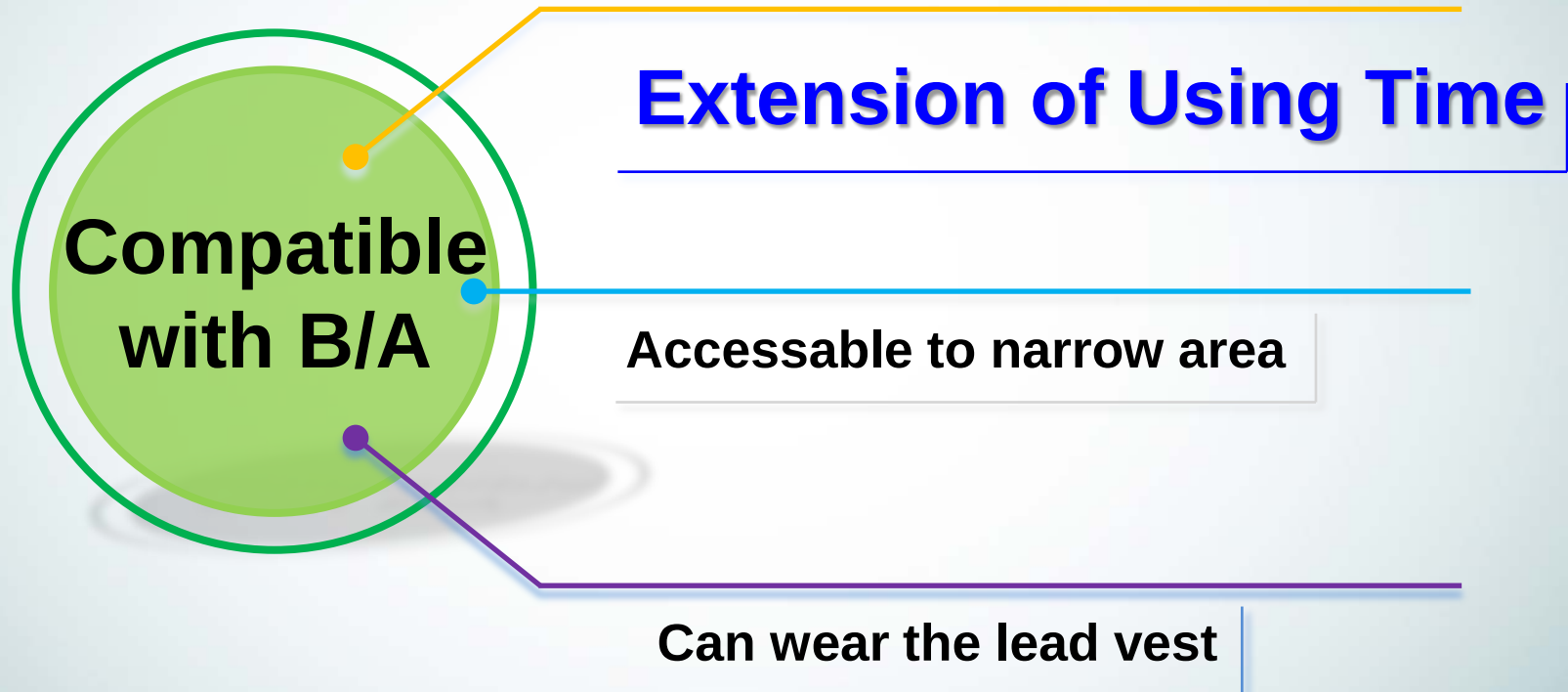
2. Plastic Respirator Connector

■ Test product and trial performance

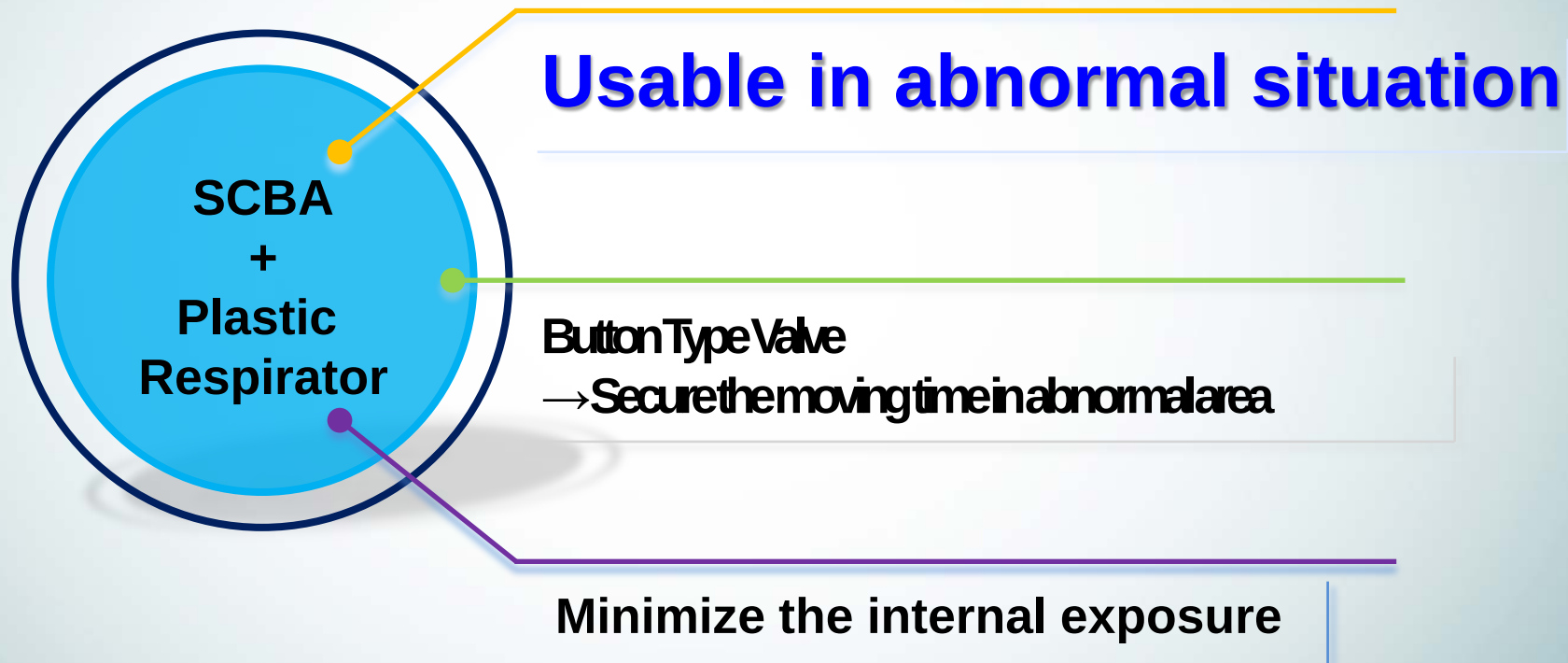
Plastic Respirator
Connector



1. SCBA Connector



2. Plastic Respirator Connector



3. After Connector Application (case of 2004)

Classification	Wolsung Unit 2 in 2004	After Connector Application	Note
Real SCBA Using Time	20 minutes	more than 1 hour	3 times extended
Abnormal Situation Dealing Time	8 hours	4 hours	1/2 lessened
Abnormal Situation Dealing Workers	71 persons	20 persons	2/3 lessened
The Amount of Used Protection Device	1 drum	1/3 drum	2/3 lessened



1

Enlargement of convenience by additional improvement of connector

2

Promote an application plan such as work site equipping in power plant

3

Review the compatibility with other plant's protection device

4

Promote for patent and utility model registrations

Thank YOU!

