Follow-up on Lungmen Issues

Department of Nuclear Regulation
Atomic Energy Council, Taiwan
July, 2013

Questions ?

- What's the vendor of Lungmen CTG (combustible gas turbine generator)? Is it a class 1E design?
- Does Lungmen have a recombiner?
- Is TPC required to revisit the ABWR COPS actuation set points? Hydrogen might leak through the drywell head seal before COPS actuated, according to Fukushima experience.
- Does Taiwan perform scenarios for various COPS setting by MELCOR or MAAP?
- What's the requirement for filtered vent in Taiwan?

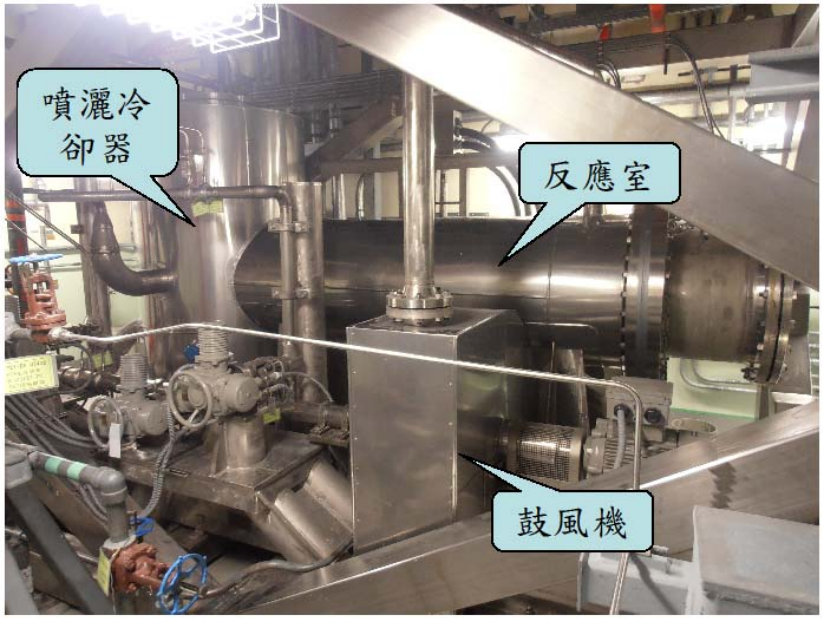
What's the vendor of Lungmen CTG (combustible gas turbine generator)? Is it a class 1E design?

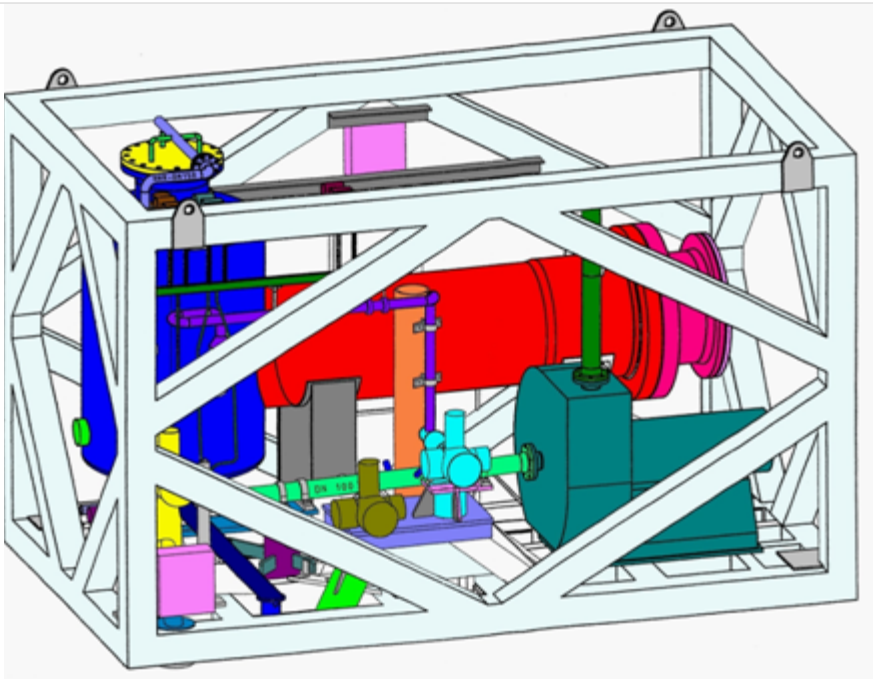
- Lungmen does not have Combustion Turbine Generator (CTG). After the award of contract, GE, under the request of Taipower, added the swing EDG (safety grade) to replace the CTG without approval of AEC.
- Taipower believed that swing EDG is much better (seismic qualified). However, AEC has different views after reviewing several NRC documents few years ago and thought CTG serves different purposes.

- **The capacity of CTG (~20MW) is much larger than EDG (~5MW). It could support one-train safety bus and one-train non-safety bus simultaneously during SBO. Each unit has one CTG.**
- **The swing EDG at Lungmen only can support one-train safety bus of one unit.**
- **It is AEC's regulatory decision to require Taipower to add Gas Turbine Generator (~50MW) at Lungmen NPP and the GTG (commercial grade) has to be located in a base isolated building at high ground in order to have better flooding and earthquake resistance.**

Does Lungmen have a recombiner?

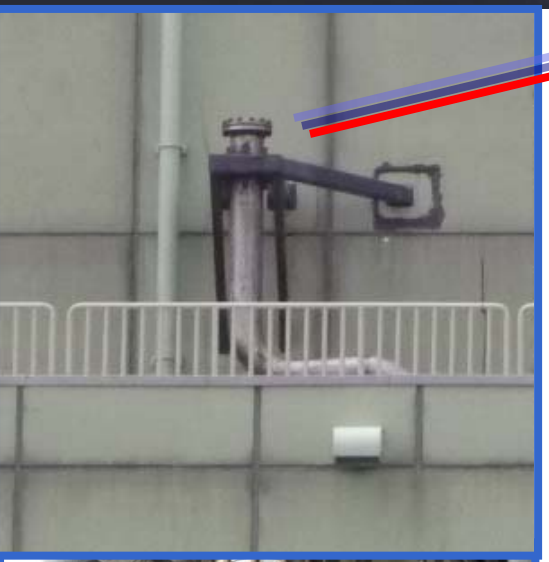
- **Lungmen has a recombiner in flammability control system(FCS).**
- **FCS has two divisions. And physical separation is considered between divisions.**

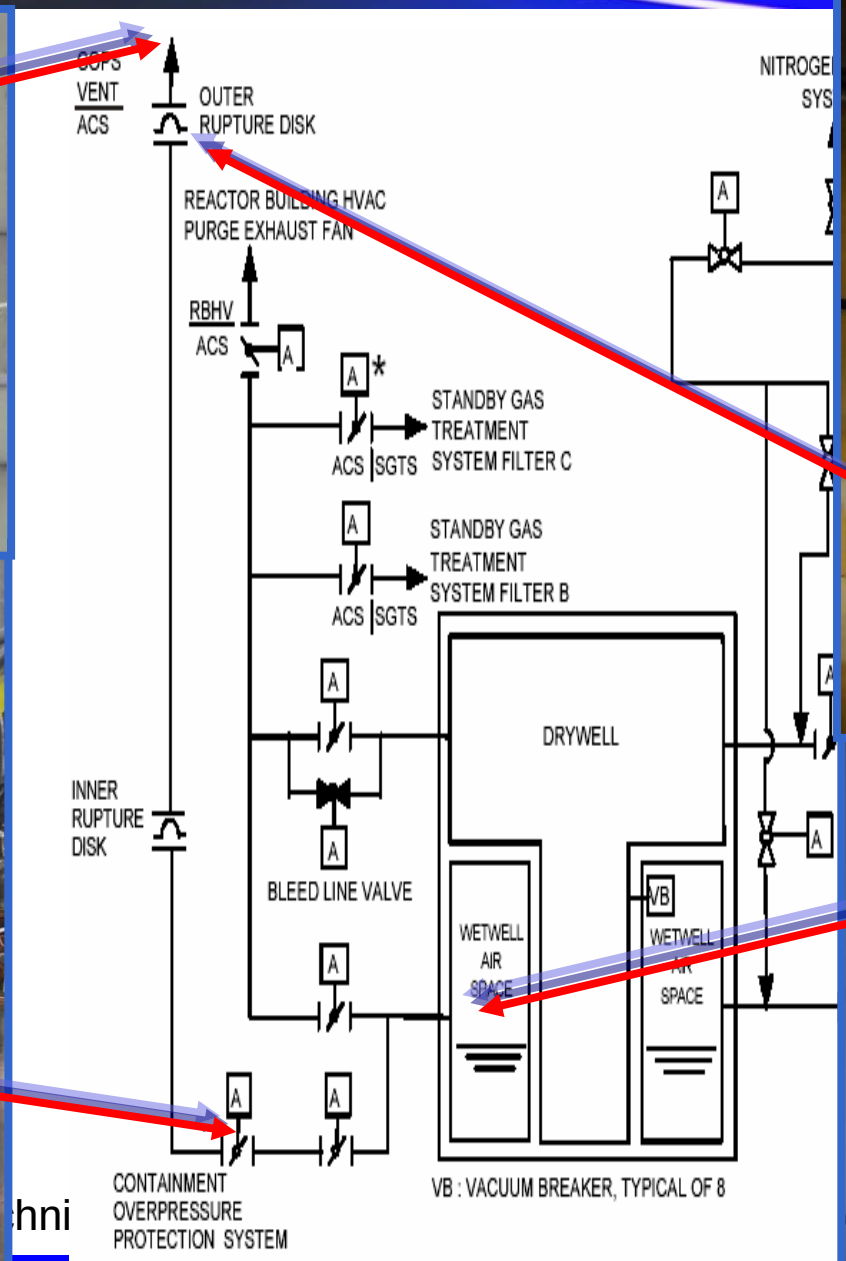




Is TPC required to revisit the ABWR COPS actuation set points? Hydrogen might leak through the drywell head seal before COPS actuated, according to Fukushima experience.

- **According to the result of revisit, the sustainable pressure of upper drywell head seal at 533K is 1.02MPa, and the rupture pressure of COPS inner rupture disk is 0.72MPa. Therefore, if all of the SSCs work as design, under the condition similar to Fukushima accident, hydrogen would not leak through the drywell head seal before COPS actuated.**
- **In our preliminary review, the COPS at Lungmen is NOT a RELIABLE hardened vent.**
- **Taipower will be required to submit the overall integrated plans in response to Commission Order (EA-12-050 is rescinded by EA-13-109).**

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ACS
OUTER
RUPTURE DISK
REACTOR BUILDING HVAC
PURGE EXHAUST FAN
RBHV
ACS
STANDBY GAS
TREATMENT
SYSTEM FILTER C
ACS SGTS
STANDBY GAS
TREATMENT
SYSTEM FILTER B
ACS SGTS
DRYWELL
INNER
RUPTURE
DISK
BLEED LINE VALVE
WETWELL
AIR
SPACE
VB
CONTAINMENT
OVERPRESSURE
PROTECTION SYSTEM
VB : VACUUM BREAKER, TYPICAL OF 8

Does Taiwan perform scenarios for various COPS setting by MELCOR or MAAP?

- **INER has established Lungmen model with both MELCOR v 1.8.5 and MAAP v5.0. The Lungmen model hasn't been updated to MELCOR v2.1 yet.**
- **No sensitivity analysis on the COPS failure setting are performed. Instead, we did roughly an effectiveness study on radioactive release for closing the valve in the COPS downstream path after the COPS bursts and containment pressure drops.**

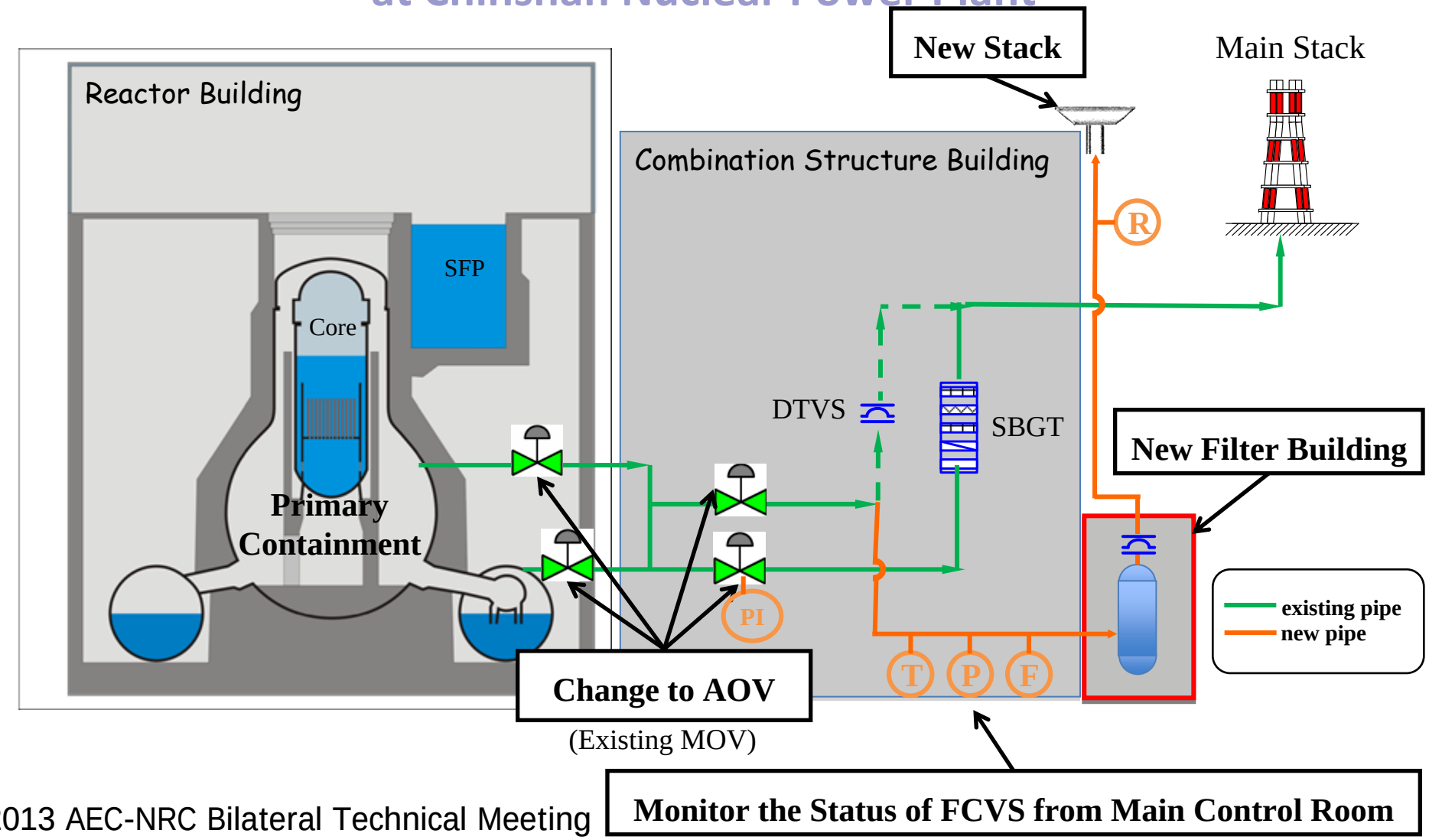
What's the requirement for filtered vent in Taiwan?

- AEC already required Taipower to add Filtered Containment Venting System to all three operating NPPs and also Lungmen NPP which is still under construction.
- The detailed requirements are still under development. Both the European experience and newly Japanese requirements will be considered.

- **Chinshan NPP Integrated Plan for FCVS**
  - **The FCVS designed and installed shall meet SECY-12-0157 NRC Staff draft recommendations listed in its Enclosure 7B Attachment 2 “Requirements For FCVS Capable of Operation Under SA Conditions”**
  - **The preferred DFs are based on BWROG March 14, 2012 FCVS White Paper Appendix A “Typical FCVS Commercially Available. ”**
    - **Decontamination Factor For Aerosols: 10,000**
    - **Decontamination Factor For Elemental Iodine: 500**
  - **Complete implementation of modification in May, 2017.**

Simplified Diagram of Filtered Containment Venting System

at Chinshan Nuclear Power Plant




Thank You