Overview of ABWR Safety Features

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- Wilmington, NC, USA
- Tokyo, Japan
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- Peterborough, ON, Canada

- Nuclear Power Plants: ABWR, ESBWR and PRISM
- Nuclear Services
- Advanced Programs ... Recycling
- Uranium Enrichment ... Third Generation Technology
- Nuclear Fuel Fabrication ....BWR and CANDU
- CANDU Services
- Fuel Engineering and Support Services
- GENUSA European Fuel Joint Venture

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BWR legacy around the world

Vallecitos – USA
Dresden 1 – USA
Laguna Verde – Mexico
Dodewaard – Netherlands
Garigliano – Italy
Santa María de Garoña – Spain
KKM – Switzerland
KRB – Germany
Lungmen – Taiwan
Tarapur 1&2 – India

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Recent project experience

Kashiwazaki-Kariwa 6/7 ABWR
COD 1996/1997

Hamaoka-5 ABWR
COD 2005

Shika-2 ABWR
COD 2006

Continuously building for 58 years
Current project status

Ohma ABWR
  - Under Construction

Shimane-3 ABWR
  - Under Construction

Lungmen-1/2 ABWR
  - Under Construction

Ohma 1
  - 38% complete

Shimane 3
  - 94% complete
  - Approaching fuel load

Lungmen 1&2
  - 94% complete
  - Startup and Pre-Op testing

Continuously building for 58 years
GE Hitachi’s new reactor portfolio

ABWR

Operational Gen III technology

- Lowest core damage frequency of any Generation III reactor
- Extensive operational experience since 1996
- Licensed in US, Taiwan & Japan

ESBWR

Evolutionary Gen III+ technology

- Lowest core damage frequency of any Generation III+ reactor
- Passive cooling for >7 days w/o AC power or operator action
- Lowest projected operations, maintenance and staffing costs
- 25% fewer pumps, valves and motors than active safety plants

PRISM

Revolutionary technology with a rich, 40-year heritage

- Passive air-cooling; no operator or mechanical actions needed
- The answer to the used fuel dilemma - can reduce nuclear waste to ~300-year radiotoxicity while generating electricity

1 Claims based on the U.S. DOE commissioned ‘Study of Construction Technologies and Schedules, O&M Staffing and Cost, and Decommissioning Costs and Funding Requirements for Advanced Reactor Designs’ and an ESBWR staffing study performed by a leading independent firm
2 To reach the same level of radiotoxicity as natural uranium
ABWR Basic Parameters

3,926 Megawatt core thermal power

~1,360 MWe gross
  • Nominal summer rating

Reactor Recirculation with Internal Pumps
  • External recirculation piping eliminated

Active safety systems
  • 72 hours automated capability

Operating cycle length of 12 to 24 months
BWR Evolution

Dresden 1

KRB

Dresden 2

Oyster Creek

ABWR

ESBWR
Containment Evolution

Dry

Mark I

Mark II

Mark III

ABWR

ESBWR
ECCS Systems Evolution

**Typical BWR/4**
- High pressure capacity: 5000
- Low Pressure capacity: 42000
- No. of large pipes below core: 12
- Peak clad temperature: 1600 (°F)
- Operator action: Required

**Typical BWR/5 BWR/6**
- High pressure capacity: 1900
- Low Pressure capacity: 29000
- No. of large pipes below core: 12
- Peak clad temperature: 1100 (°F)
- Operator action: Required

**ABWR**
- High pressure capacity: 2800
- Low Pressure capacity: 19000
- No. of large pipes below core: 0
- Peak clad temperature: No uncovery
- Operator action: Automated >72 hours
Emergency Core Cooling

Core is always under water
ABWR Reactor Core Isolation Cooling (RCIC)
ABWR High Pressure Core Flooder (HPCF)
ABWR Residual Heat Removal (RHR)
Automatic Depressurization System (ADS)
Severe Accident Features

ABWR passive features which mitigate severe accidents:

• Inerted Containment
• Lower Drywell flood capability
• Lower Drywell special concrete & sump protection
• Suppression pool - fission products scrubbing & retention
• Containment overpressure protection
AC Independent Water Addition (ACIWA)

Hard piped fire water connections
Seismic Category 1
On-site fire protection system connection
Truck connection
• Ties to RHR C
References

ABWR

Design Certification Document, Rev. 4: http://www.nrc.gov/reactors/new-reactors/design-cert/abwr.html#dcd


Revision 5 of the ABWR DCD can be found here: http://pbadupws.nrc.gov/docs/ML1100/ML110040323.html

Reference BWR (Grand Gulf NPP) NUREG-1150 http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1150/