

generation

*mPower*

## *Reactor Pressure Vessel (RPV) Internals*

September 17, 2013  
(Redacted Version)

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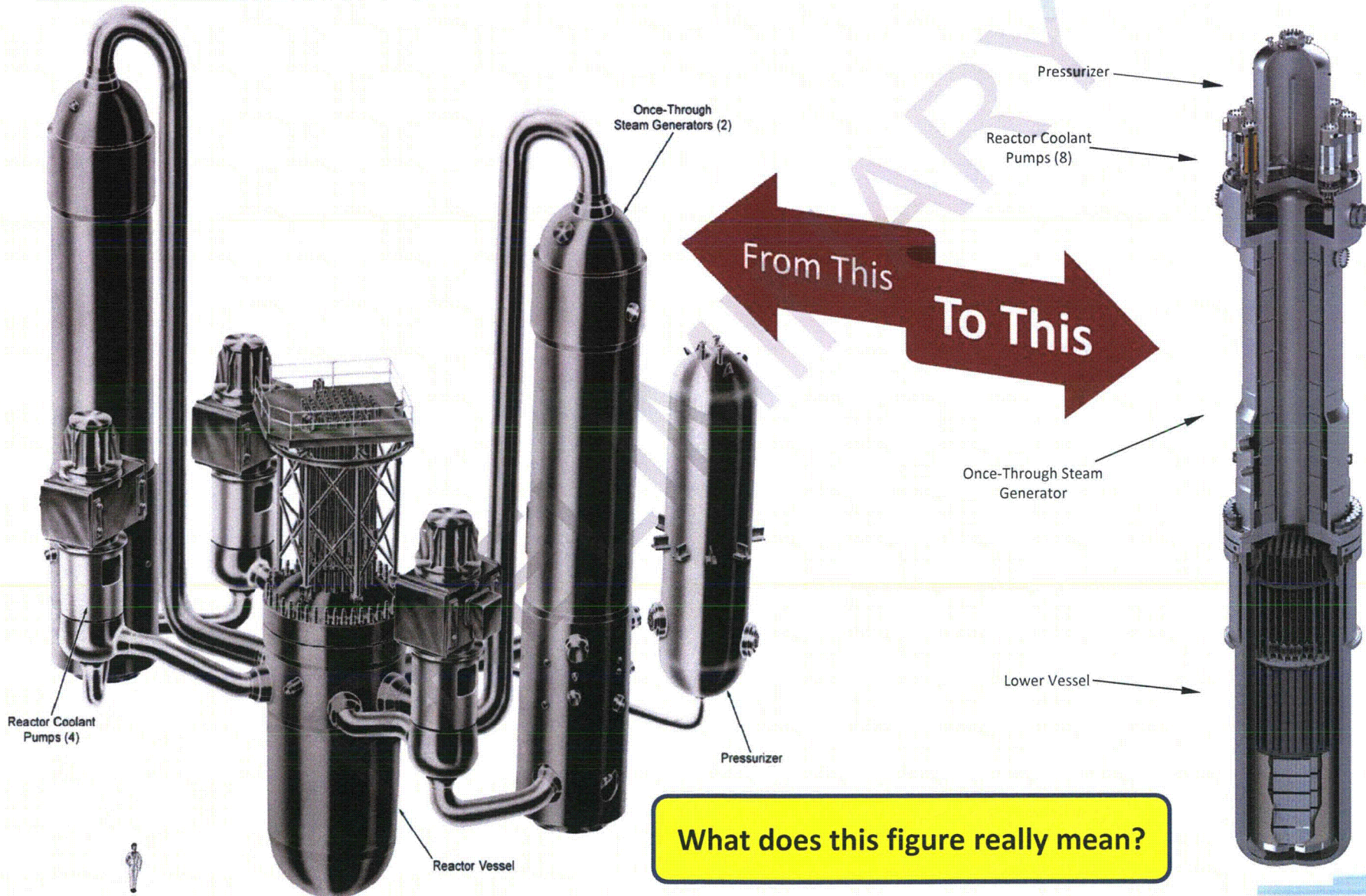
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This is a pre-application document and includes preliminary B&W mPower Reactor™ design or design supporting information and is subject to further internal review, revision, or verification.

- Overview of the mPower™ reactor design
- Definition of the Reactor Pressure Vessel (RPV) internals
- ASME Code classification of RPV internals
- Achieve alignment of terminology between mPower and NRC

PRELIMINARY

# Integral Reactor Definition



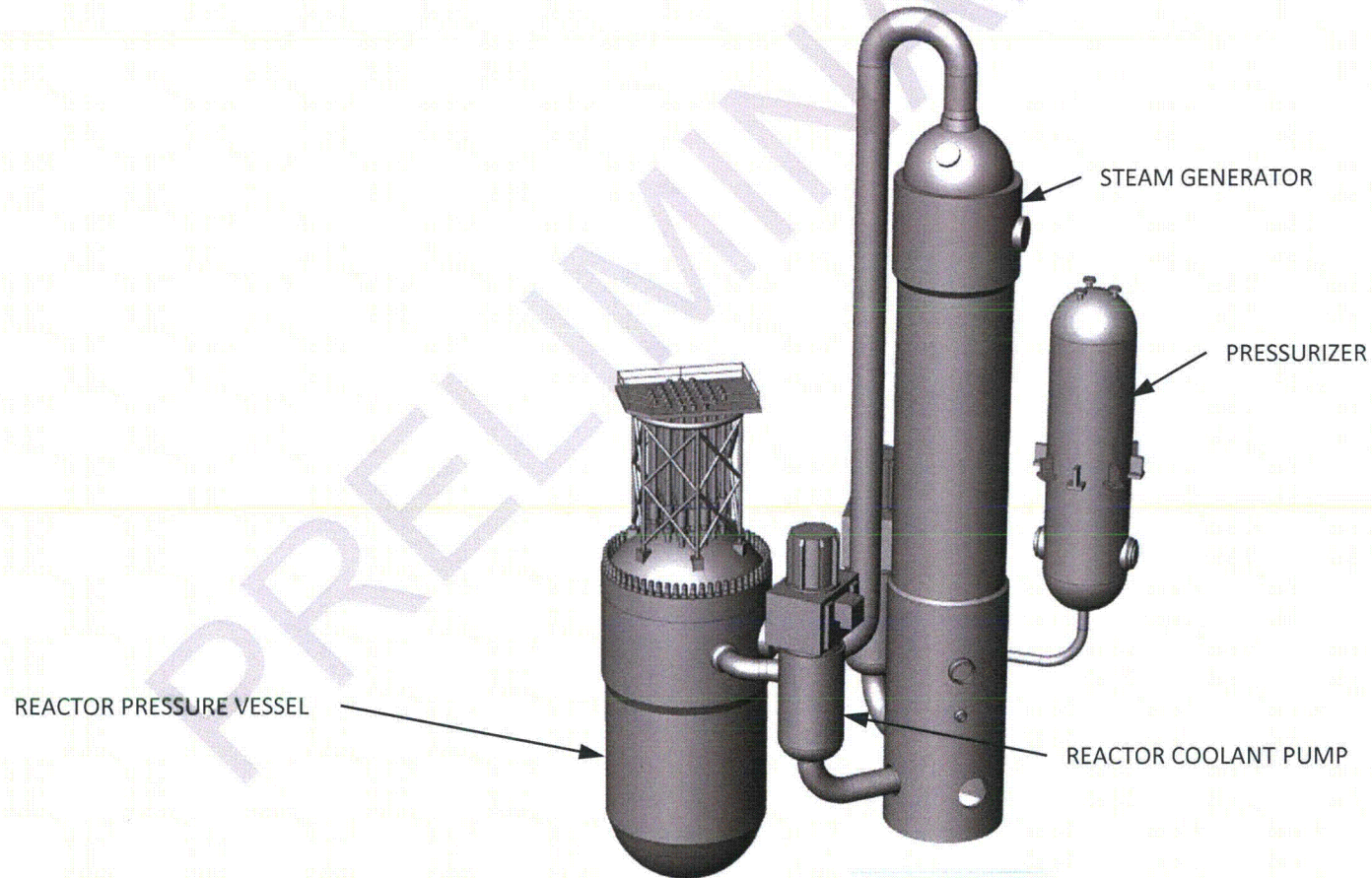
**What does this figure really mean?**

## Traditional Reactor



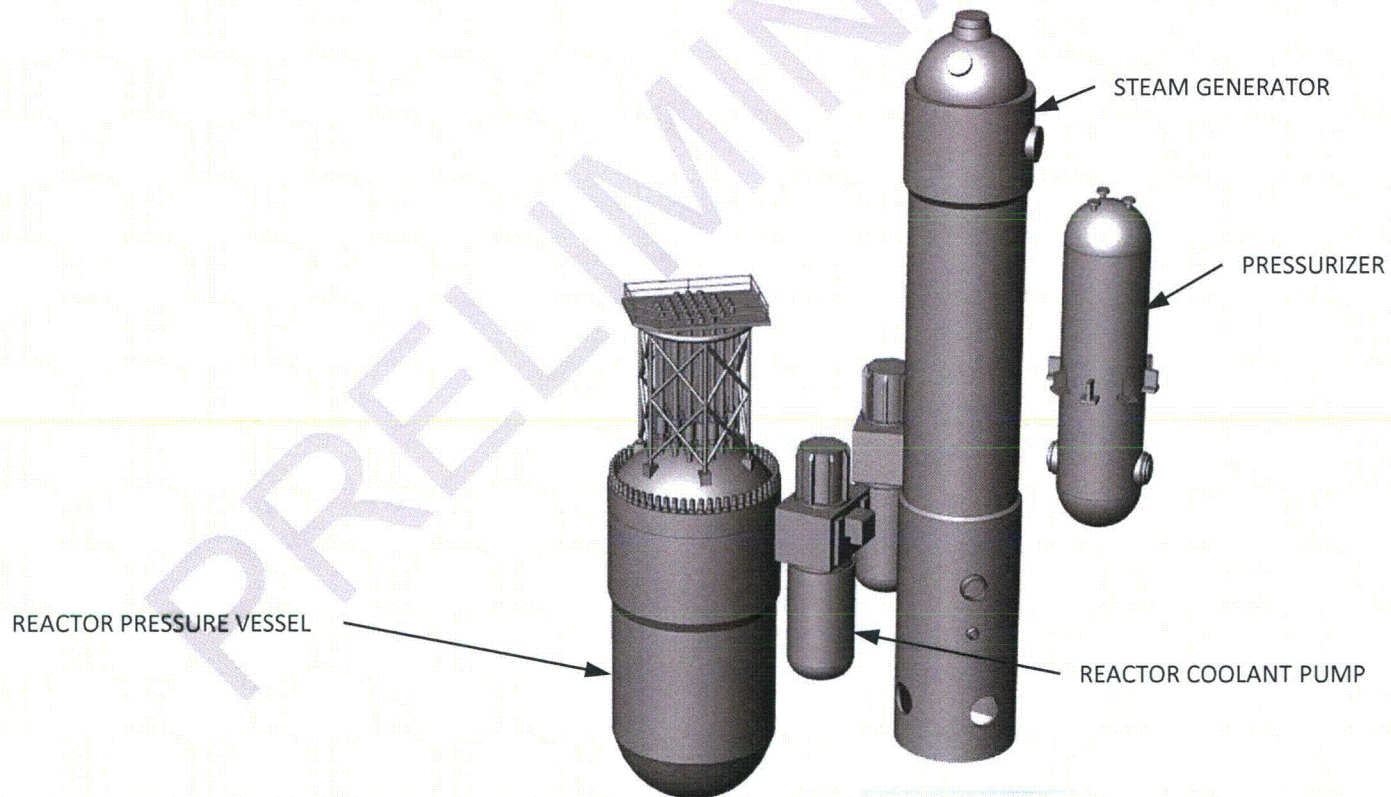
## Reactor Evolution

- Single loop



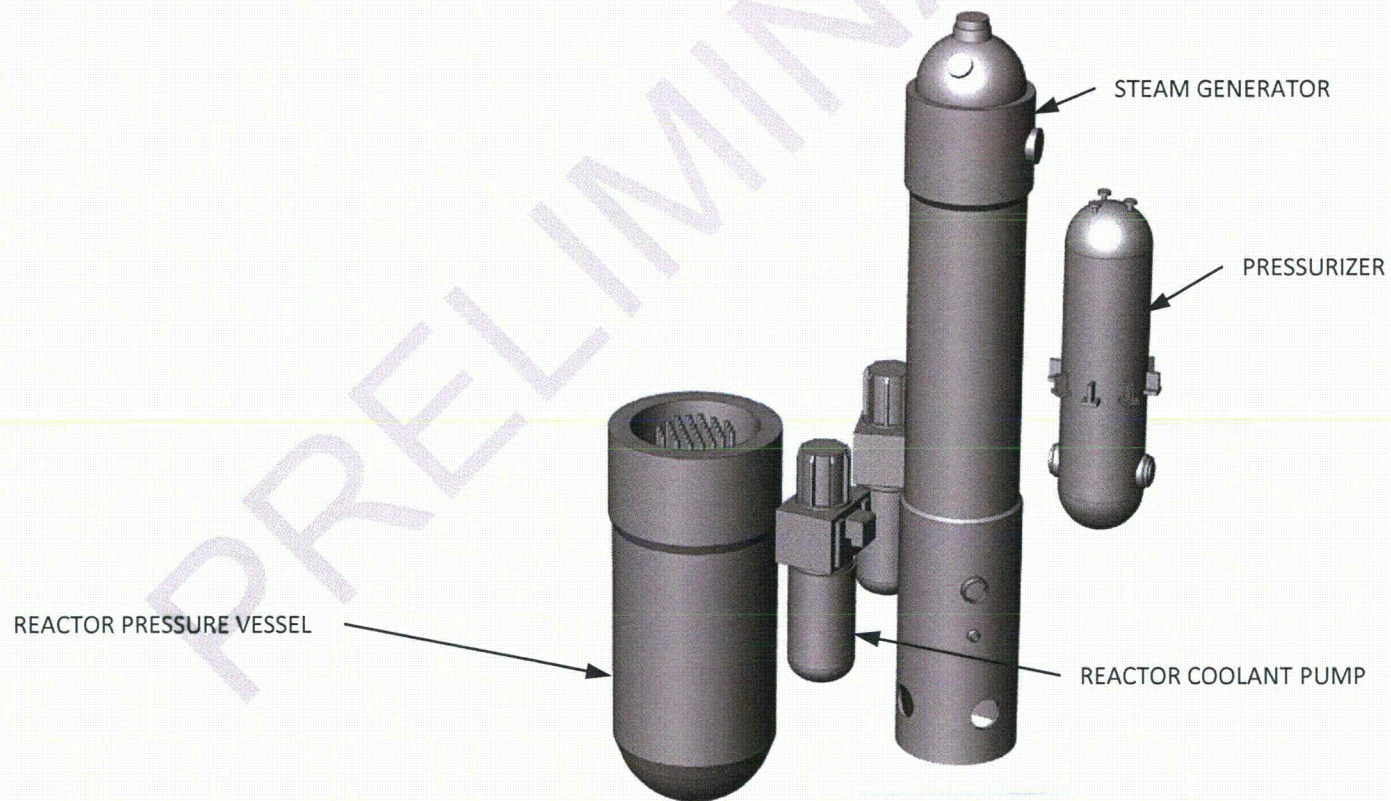
## Reactor Evolution

- Single loop
- No loop piping



## Reactor Evolution

- Single loop
- No loop piping
- Internal CRDMs



## Reactor Evolution

- Single loop
- No loop piping
- Internal CRDMs
- Integral SG





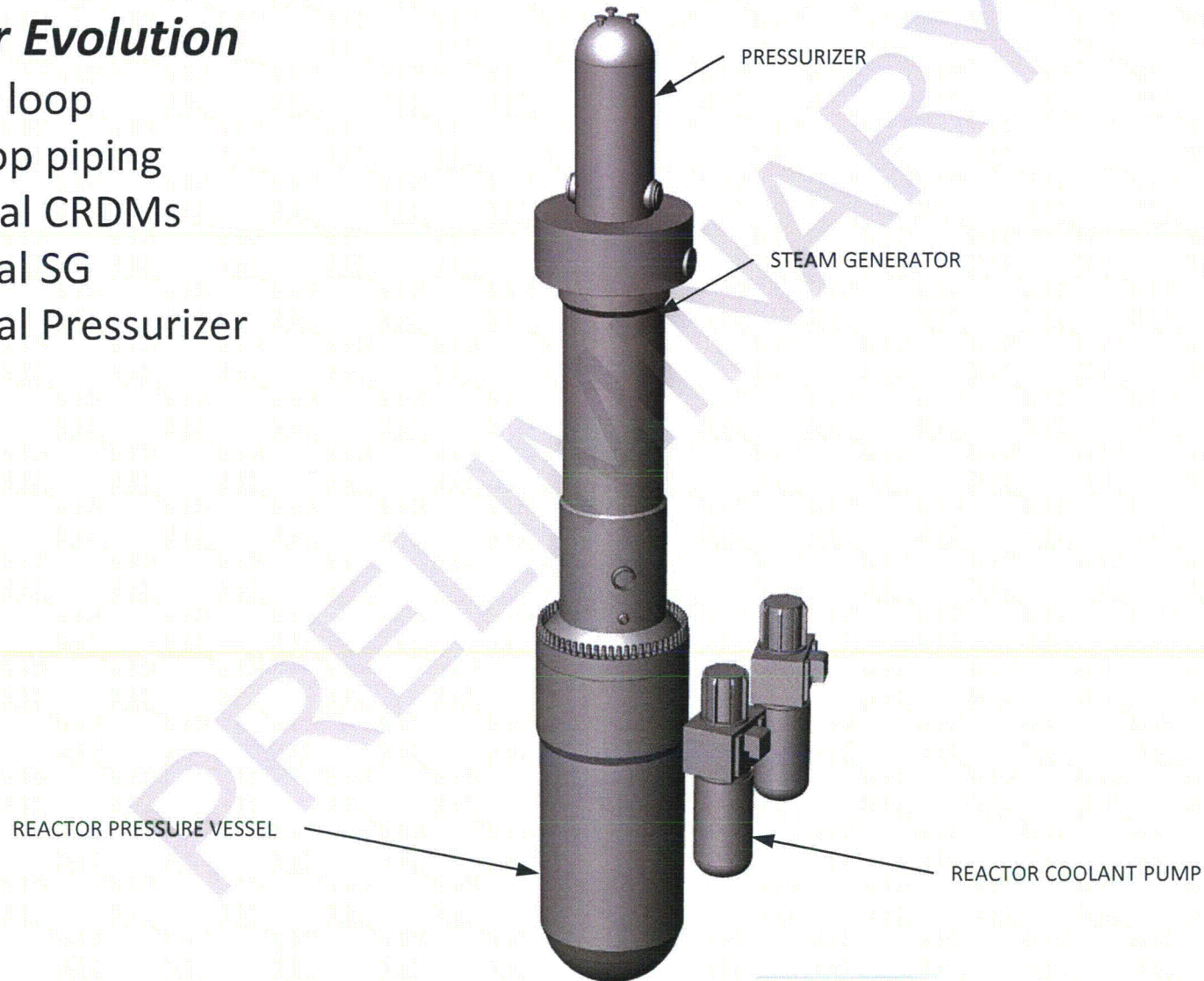
## Reactor Evolution

- Single loop
- No loop piping
- Internal CRDMs
- Integral SG



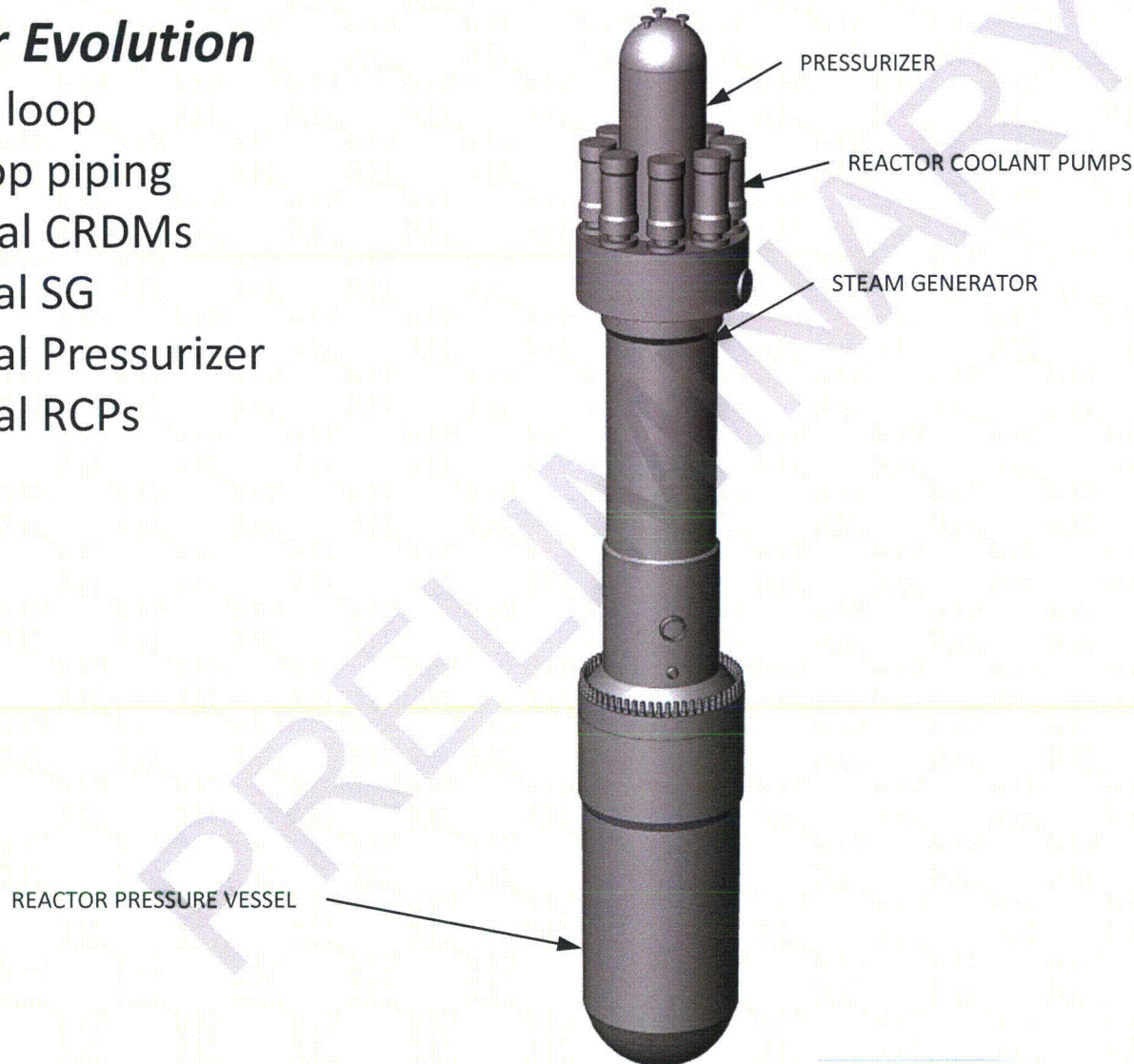
## Reactor Evolution

- Single loop
- No loop piping
- Internal CRDMs
- Integral SG
- Integral Pressurizer



## Reactor Evolution

- Single loop
- No loop piping
- Internal CRDMs
- Integral SG
- Integral Pressurizer
- Integral RCPs

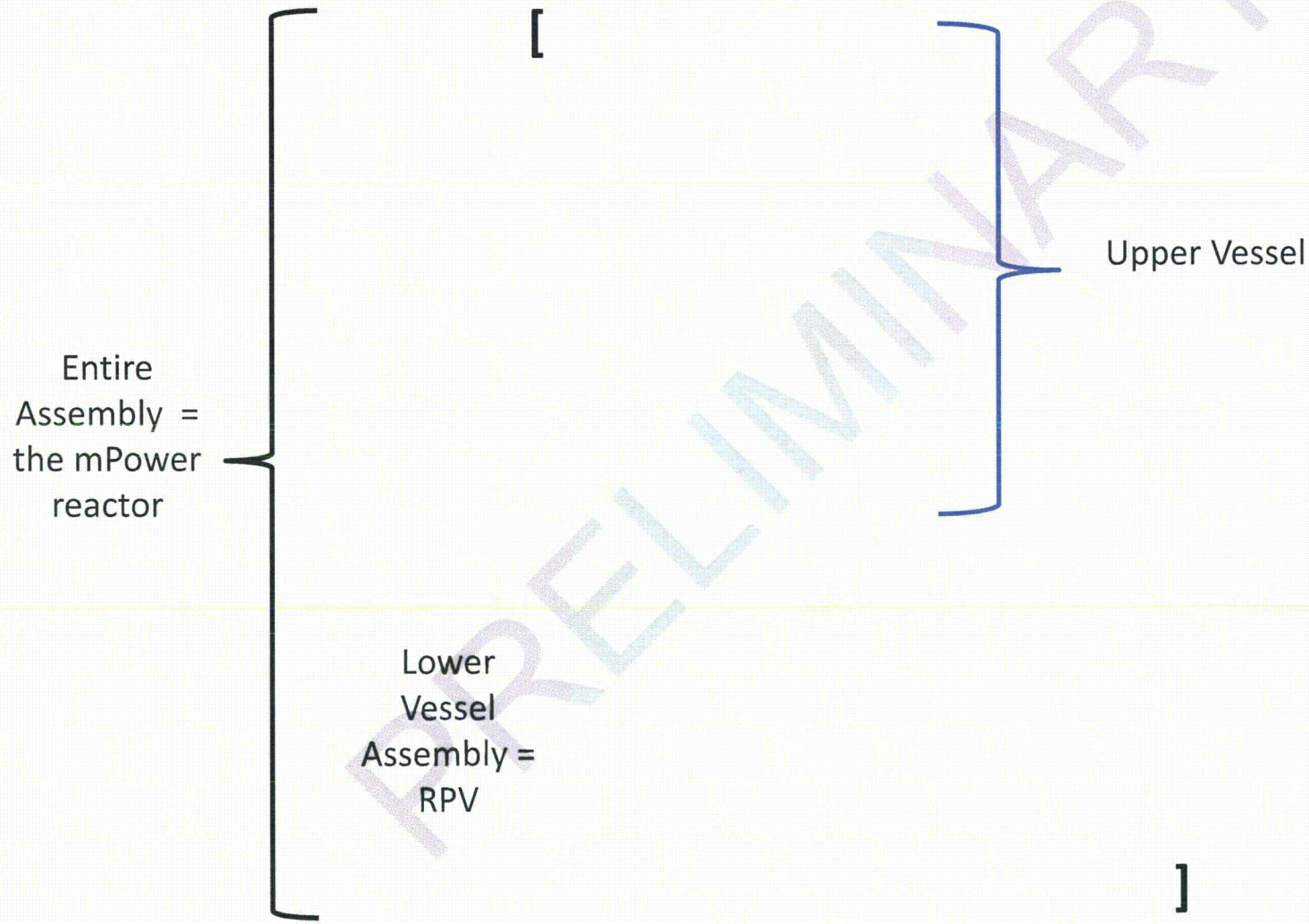


## ***B&W mPower Reactor*** [

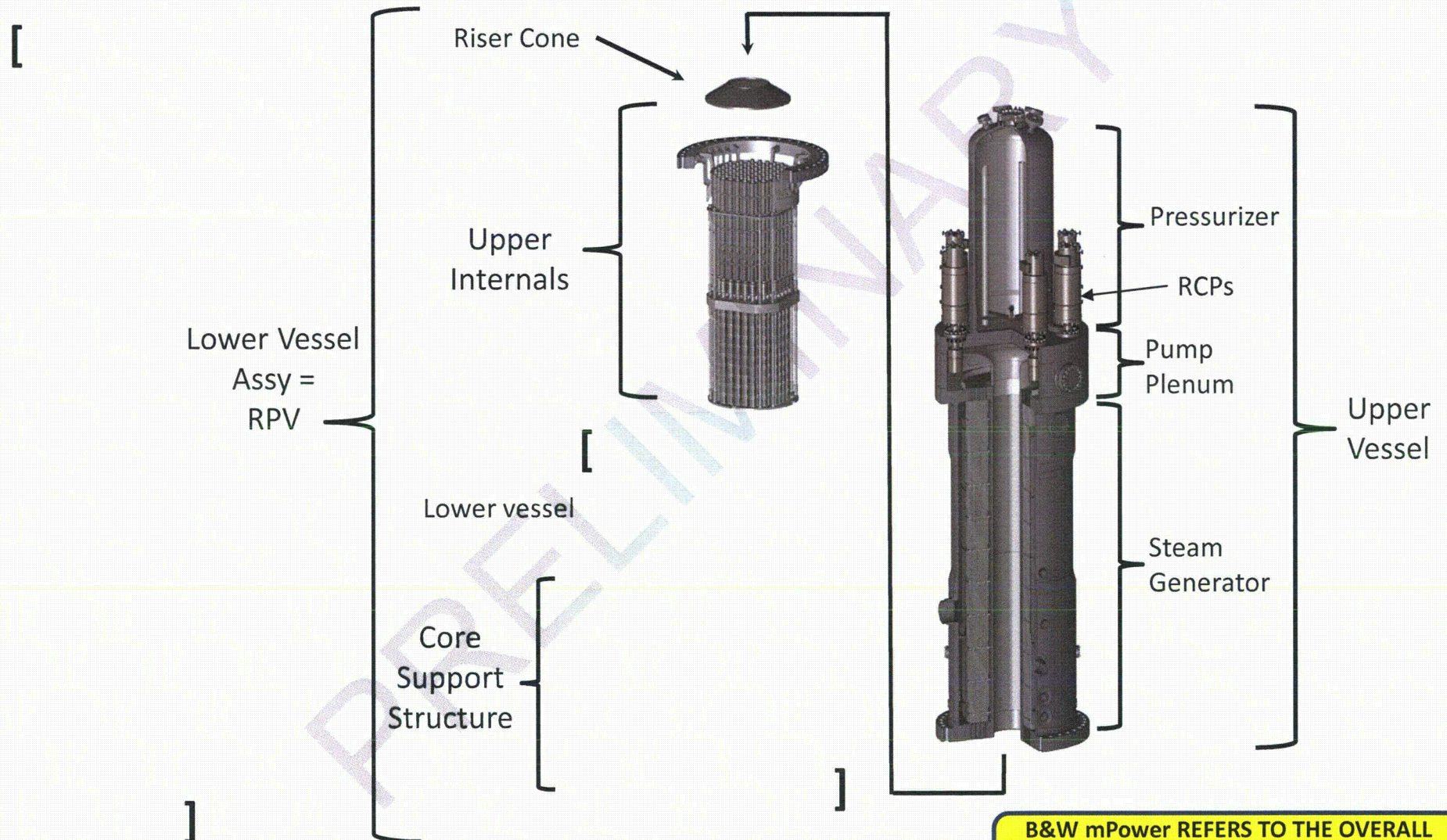
- Single loop
- No loop piping
- Internal CRDMs
- Integral SG
- Integral Pressurizer
- Integral RCPs
- [ ]

PRELIMINARY

# Overview of the mPower Reactor



# Reactor Component Breakdown



**B&W mPower REFERS TO THE OVERALL ASSEMBLY OF THESE COMPONENTS AS THE REACTOR**

# RPV Lower Internals (Core Support Structure)

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PRELIMINARY

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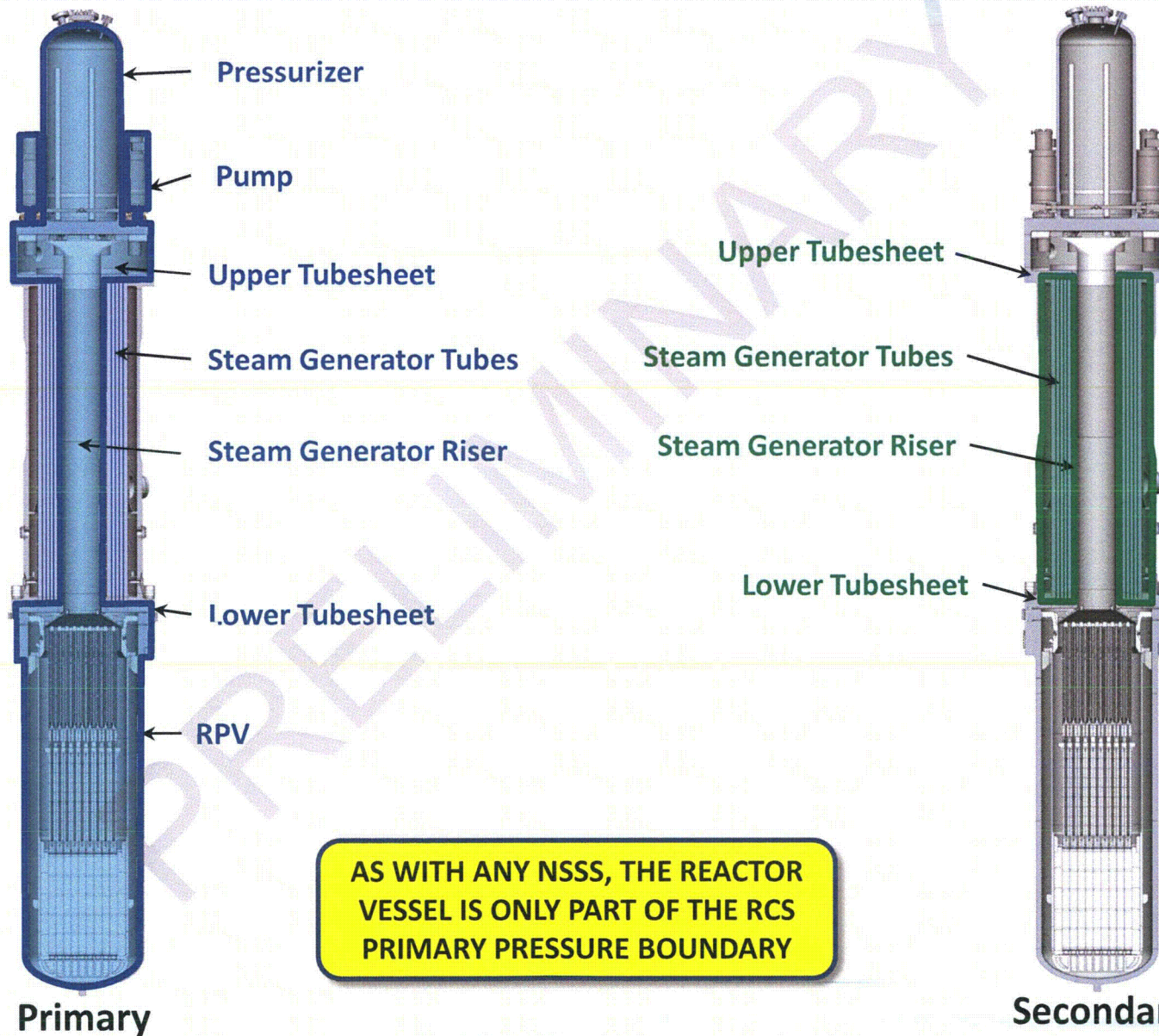
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PRELIMINARY

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# Pressure Boundary



- Consistent with SRP 3.9.5, the term "reactor internals" includes core support and other internal structures and refers to all structural and mechanical elements inside the RPV.
  - For the mPower reactor, the RPV is the lower vessel
  - Does not include:
    - The upper vessel (including the steam generator, riser, pressurizer, and RCPs), which are addressed in DCD Section 5.4
    - Reactor fuel elements which are addressed in DCD Chapter 4
    - Control rod drive elements which are addressed in DCD Section 3.9.4

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PRELIMINARY

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Notes:

1. CS – Core Support Structure  
IS – Internal Structure  
NB – Class 1 Pressure Boundary

- The mPower reactor is the term used for the integral arrangement of the reactor core, steam generator, pressurizer, control rod drive mechanisms and reactor coolant pumps.
- For the mPower reactor, the RPV is the lower vessel
- Comments provided on DSRS 3.9.5 consistent with the mPower design.