UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 19, 1994

Docket No. 52-004

Mr. Patrick W. Marriott, Manager
Advanced Plant Technologies
GE Nuclear Energy
175 Curtner Avenue
San Jose, California 95125

Dear Mr. Marriott:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING THE SIMPLIFIED BOILING WATER REACTOR (SBWR) DESIGN

To supplement information previously provided by GE Nuclear Energy (GE), the staff and its Purdue University contractor have determined that they need additional information for the design of an integral SBWR test facility for confirmatory testing. In order to maintain progress on these efforts, we would appreciate a conference call during the week of April 18, 1994, to discuss your proposed responses to the enclosed questions. Please provide a written response to the questions within 30 days of the date of this letter.

You have previously requested that portions of the information submitted in the August 1992, application for design certification of the SBWR plant, as supplemented in February 1993, be exempt from mandatory public disclosure. The staff has not completed its review of your request in accordance with the requirements of 10 CFR 2.790; therefore, that portion of the submitted information is being withheld from public disclosure pending the staff's final determination. The staff concludes that this RAI does not contain those portions of the information for which you are seeking exemption. However, the staff will withhold this letter from public disclosure for 30 calendar days from the date of this letter to allow GE the opportunity to verify the staff's conclusions. If, after that time, you do not request that all or portions of the information in the enclosure be withheld from public disclosure in accordance with 10 CFR 2.790, this letter will be placed in the NRC's Public Document Room.

This RAI affects nine or fewer respondents, and therefore, is not subject to review by the Office of Management and Budget under P.L. 96-511.

If you have any questions regarding this matter, please call me at (301) 504-1178 or Mr. Rick Hasselberg at (301) 504-1141. We will contact you in the near future to arrange a mutually convenient time for the conference call to discuss your proposed responses to the questions.

Sincerely,

Original Signed By:

Melinda Malloy, Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

Enclosure:
Purdue Questions,
Set 4

cc w/enclosure:
See next page

Distribution (w/ enclosure):

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***To be held for 30 days**

OFC	LA:PDST	PM:PDST	PM:PDST	SRXB	SC:PDST
NAME	PShea	MMalloy:sg	RHasselberg	RBarrett	JNWilson
DATE	04/12/94	04/12/94	04/12/94	04/19/94	04/19/94

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Mr. Patrick W. Marriott
GE Nuclear Energy

Docket No. 52-004

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REQUEST FOR ADDITIONAL INFORMATION (RAI) ON THE SIMPLIFIED BOILING WATER REACTOR (SBWR) DESIGN

Purdue University Questions - Set 4

1. Provide the dimensions for the inside diameter and the outside diameter of a steam separator and stand pipe (below the separator) in vessel.

2. Provide the elevation and opening area of the pick-off rings in the steam separator where water from the pool surrounding the separators can drain back into the chimney region, as shown in attached Figures 2-2 and 2.1-16. Indicate which of the two designs shown in these figures represents the SBWR design. How many stages of separation are in a steam separator for the SBWR? If neither of these designs is applicable to the SBWR, provide a drawing of the SBWR design and list the elevation and opening area of the pick-off rings.

3. Provide the dimensions for the inside diameter and the outside diameter of the dryer skirt and the corresponding elevations of the dryer. Provide a clear picture of the flow paths for water collected in the dryer troughs to return to the downcomer annulus through the pool surrounding the steam separators. What are the flow area and clearance in the annulus between the dryer skirt and vessel inner wall (at the elevation of a main steam line)?

4. There are several different values in the standard safety analysis report (SSAR) for the inside height of the reactor pressure vessel. Confirm whether the value is 24.447 m or 24.612 m, or provide the correct inside height dimension.

5. Provide the weight and material of the following reactor vessel internals (for estimating stored energy):

   a. Lower core plate (with dimensions)
   b. Core top guide plate (with dimensions)
   c. Separators and stand pipes
   d. Dryers
   e. Control blades (with dimensions)
   f. Control rod guide tubes (with dimensions)
   g. Other lower plenum metal structure (with dimensions)

6. Provide hydraulic diameter for the following:

   a. Core (namely, fuel assembly section and core bypass section, with and without control blades inserted)

   b. Lower core plate

   c. Core top guide plate

   d. Stand pipe section

Enclosure

e. Separator section

f. Downcomer in each of the separator/stand pipe section, chimney section, and core section

g. Lower plenum

7. Provide the elevation and material for the following fuel assembly components:

   a. Fuel support casting

   b. Lower tie plate coolant slots (with dimensions)

   c. Upper tie plate (with dimensions and its position within the core top guide plate)

   d. Five fuel rod spacers

8. Provide a drawing showing the 8x8 fuel rods in a channel box and the location and dimension of water rods.

9. Provide the free volume in the core region between the top of the lower core plate to the top of the core top guide plate.

10. Referring to attached Figure 5.3-3, provide the following:

    a. Diameter of core top guide plate (between the top of the active fuel and the chimney)

    b. Diameter of the steam separator support plate (between the steam separator assembly and top of the chimney)

    c. Diameter of the steam dryer support plate.

11. Provide a drawing showing how a 3-inch bypass line connects to the 8-inch vessel suction line of the Reactor Water Cleanup/Shutdown Cooling (RWCU/SDC) System. Also, show how these two lines connect to the bottom drain line. Provide the total break flow area in a double-ended bottom drain line break accident (namely, 2-inch break flow at the vessel bottom "plus" another break flow leaving the vessel downcomer through a RWCU/SDC System line.)

12. Is there a flow resistor on the 8-inch vessel suction line of the Reactor Water Cleanup/Shutdown Cooling System or at the reactor pressure vessel penetration of the Isolation Condenser System steam line?

13. On page 6.3-20 of the SSAR, the feedwater line break size was listed as 8.9 in (inside diameter equivalent nozzle size). However, the pipe at the reactor pressure vessel penetration is a 10-inch Schedule 80 pipe with an inside diameter of 9.5 in. What is the correct break size for the feedwater line break?

14. Describe the control logic for controlling the control rod drive (CRD) flow during a loss-of-coolant accident (LOCA). What is the CRD flow rate as a function of time and its injection location during a LOCA?

15. Provide free volume as a function of elevation in the lower drywell. The attached Figure 3 (taken from "Design Specification, FMF SBWR, MPL Item No. All-5299, Preliminary Issue DMH-4126 February 12, 1991") suggests that there is a brick layer of about 1 m in thickness at the bottom of the lower drywell which precludes water from filling that location. Does this 1-meter-thick brick layer exist?

16. Provide a description of the steam dryer (not the dryer in the reactor pressure vessel) in the gas space of the Isolation Condenser System pool. (The steam will pass through this dryer before it exits to the atmosphere.) Provide the design pressure drop across this dryer, design pressure (i.e., expected pressure of operation), and K value for the dryer.

17. Explain whether the water level predictions in SSAR Sections 6.2 and 6.3 are for collapsed level or for two-phase mixture level.

18. The SSAR does not clearly define the LOCA scenarios (i.e., timing of the event). Provide the scenarios and control logic to initiate the main steam line break, bottom drain line break, stub line break, and feedwater line break.

19. Provide the firing sequence of six depressurization valves.

20. Provide the feedwater pump coastdown curve after the pump is tripped. Provide the control logic that initiates a feedwater pump trip. Explain how the feedwater controller behaves as the vessel water level decreases during a LOCA.

21. Provide current information on the operation of three vacuum breakers (between the drywell and suppression pool gas space).

22. Provide the response of the turbine during a LOCA such as main steam line break, bottom drain line break, Gravity-Driven Cooling System line break, and feedwater line break. Provide the description and set point for the components that regulate the turbine response.

Purdue Questions - Set 4 **Question 2** — Is this design for SBWR?

...he core spray ring
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...ot to interfere with

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...d head and steam
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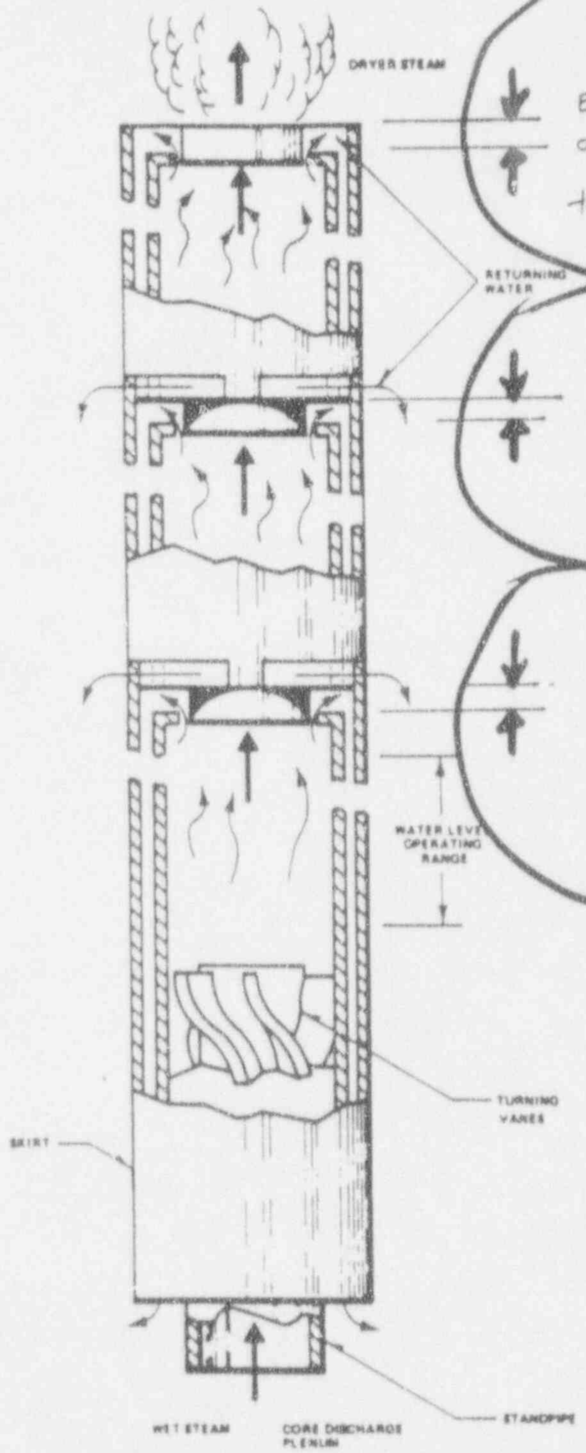

Elevation and opening area of third pickoff ring

Elevation and opening area of second pickoff ring

Elevation and opening area of 1st pickoff ring

Fig. 2-2. Internal steam separator.

(Lahey & Moody, The Thermal-Hydraulics of a BWR)

Purdue Questions - Set 4

Question 2 - Is this design for SBWR?

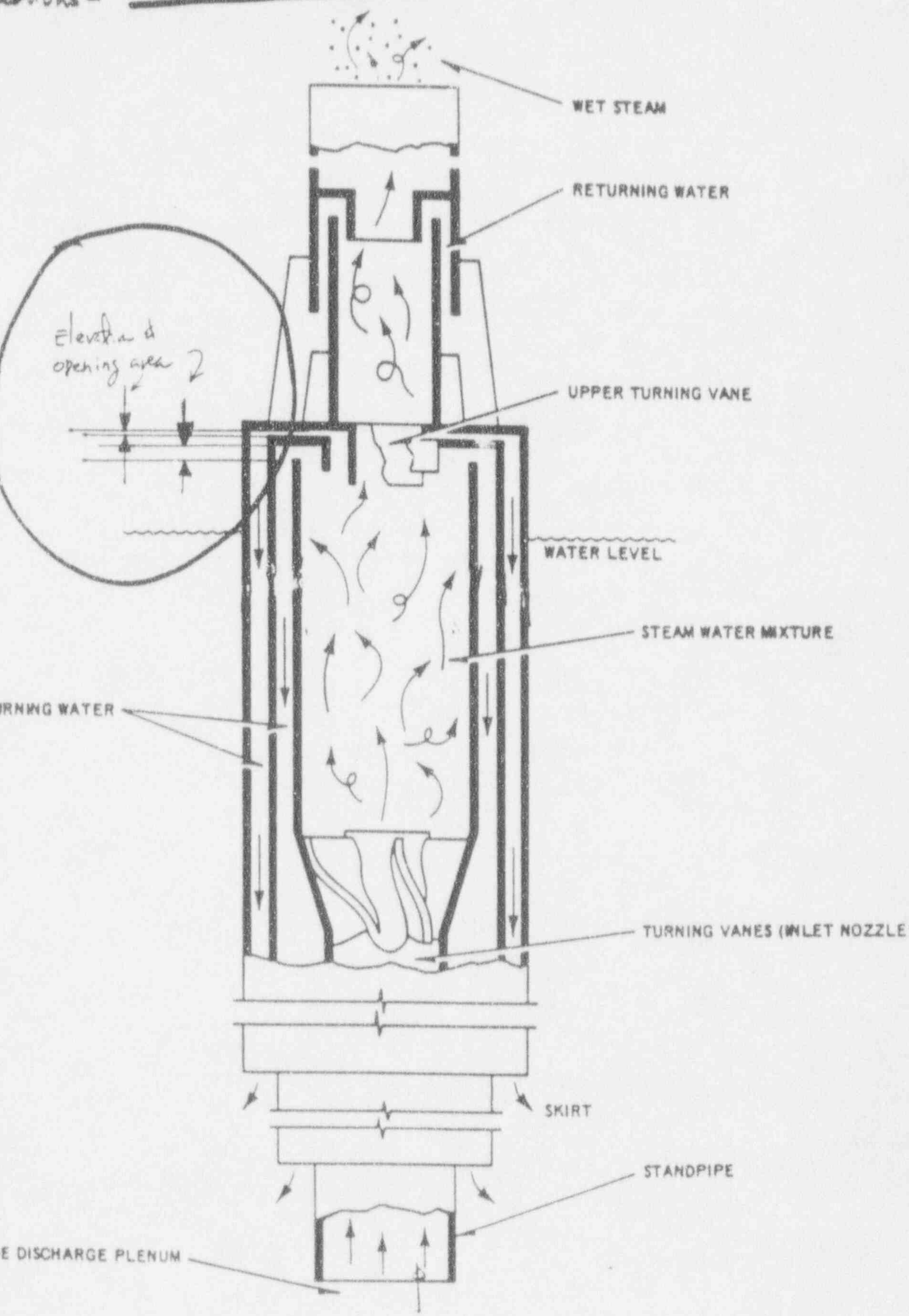

FIGURE 2.1-16 Steam Separator

Purdue Questions - Set 4

Question 10

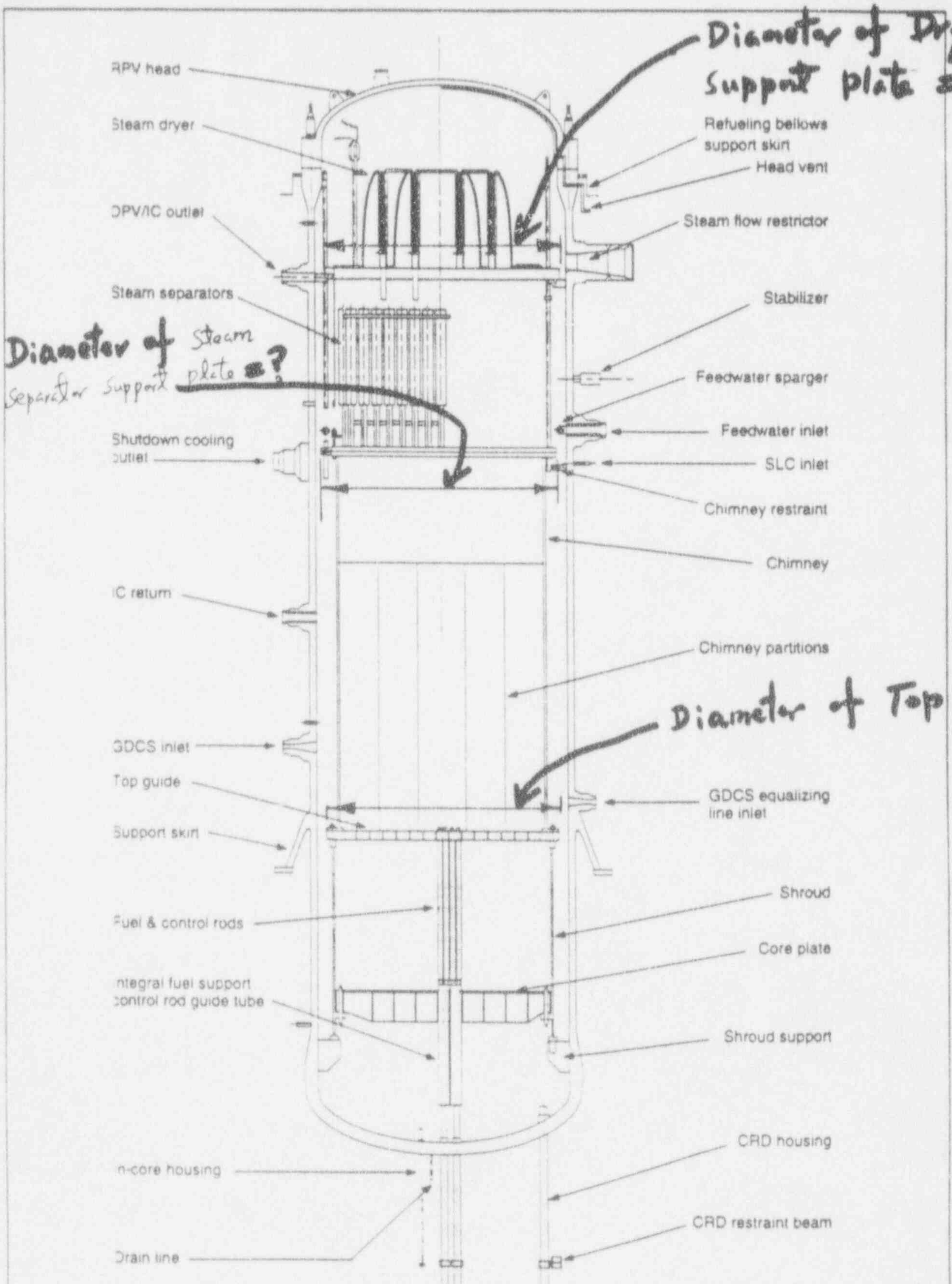

Figure 5.3-3 Reactor Pressure Vessel System Key Features

Purdue Questions - Set 4

Question 15

~~GE Nuclear Energy~~

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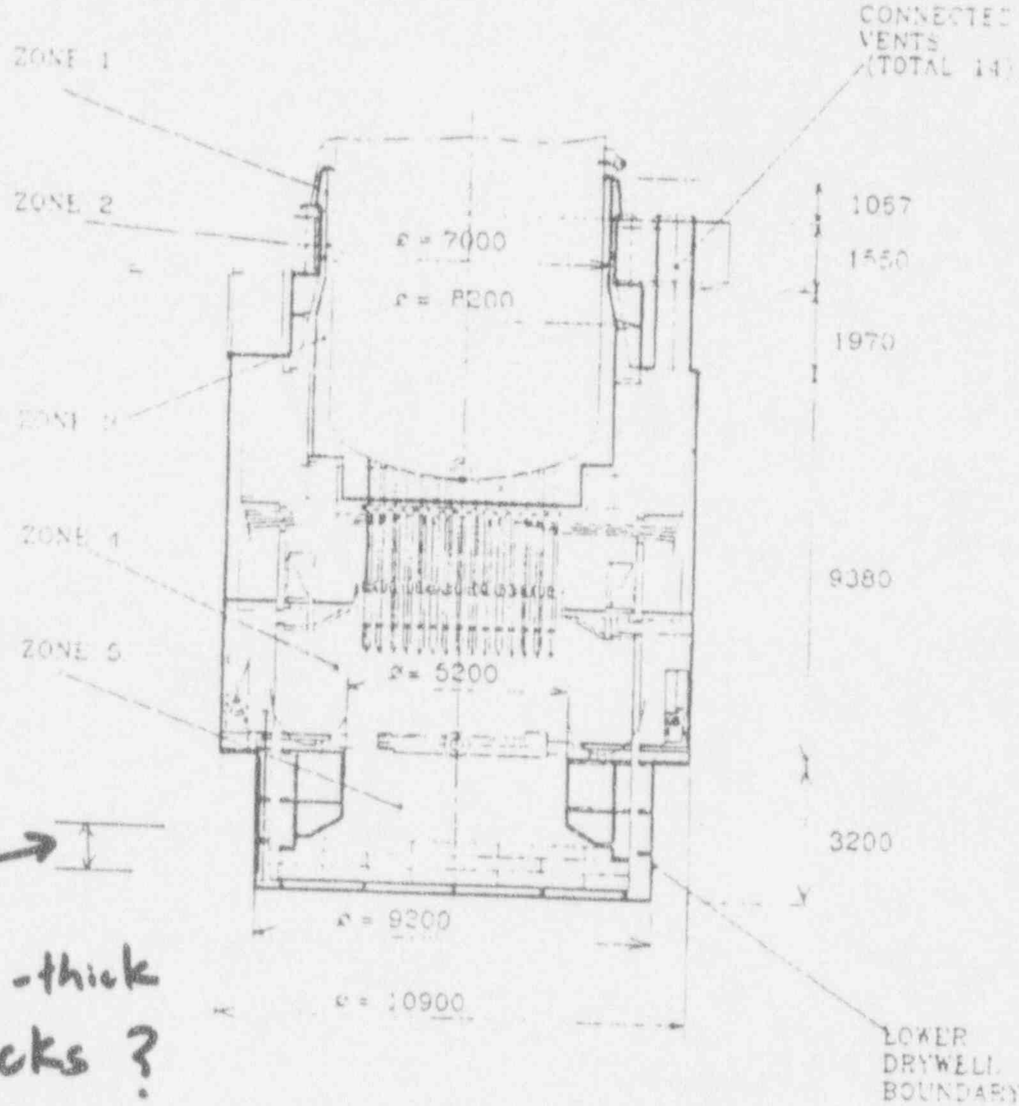

1 m-thick bricks ?

FIGURE 8. LOWER DRYWELL CONFIGURATION