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US-APWR Design Centered Working Group Meeting with NRC

April 22, 2008



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Introductions and Opening Remarks

Don Woodlan

**Manager, Nuclear Regulatory Affairs
Luminant**

David Lange

**Senior Licensing Manager, CPNPP Units 3 & 4 Project
MNES**



Agenda

- Introductions and Opening Remarks – Don Woodlan**
- Risk-Informed/Performance Based Tech Specs – Etsuro Saji**
- PRA for Risk Informed Tech Specs– Futoshi Tanaka**
- COL Items and Departures – David Lange**
- Draft COLA Products – David Lange**
- Summary and Conclusion – Don Woodlan**



Meeting Objectives

- Update the NRC on selected US-APWR DCWG topics**
- Obtain NRC comments/feedback**
- Identify emergent issues**



US-APWR DCWG

- Formed in April 2007**
- Current membership – Luminant Power and Mitsubishi Nuclear Energy Systems (MNES)**
- Provided a single response to RIS 2007-08 in May 2007**
- Public meetings with NRC in June and October of 2007 and February of 2008**



Project Goals

- Develop and deliver to the NRC a high quality COLA**
- Submit COLA by September 2008**
- Ensure COLA docketing to qualify for PTCs**
- Execute aggressive project schedule by applying “lean” techniques**
- Maximize integration between DCD and COLA**
- Provide timely and complete responses to NRC RAIs**
- Develop a business case which provides Luminant the best financial alternative to market power in ERCOT**



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COLA Status

Site exploration: 100% complete

FSAR Chapter 2: ~96% complete

FSAR (remainder): ~79% complete

ER sections: ~91% complete

Conceptual engineering: ~73% complete

Total COLA: ~89% complete

6



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COLA Submittal Schedule

- Will notify the NRC in writing at least 90 days before submittal date.**
- Projected submittal date adjusted to September 2008 to allow incorporation of lessons learned from US-APWR DCD submittal and from other facility COLA submittals**

7



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Risk Informed and Performance Based Technical Specifications

Etsuro Saji

**Engineering Manager, Safety and Licensing Integration Group
Mitsubishi Heavy Industries, Ltd.**



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Contents

- Background**
- Guidance documents**
- Plan pertaining to Initiative 4b/5b**



Background

Design Control Document (DCD) for US-APWR

- **“Chapter 16 Technical Specifications” applies Initiative 4b (Risk Managed Tech. Specs.) to 9 LCOs*.**
 - **The program which allows Completion Time to be flexibly determined on site by a licensee using PRA result based on the real time plant configuration.**
- **Other initiatives such as 5b (Surveillance Frequency Control Program), 1b (Modified End States) and 7b (inoperable barriers) may be implemented in the future.**

***LCO: Limiting Condition for Operation**



DCD and COLA Plans

- **DCD rev. 1 and COLA for Comanche Peak Unit 3/4**
 - **Initiative 4b**

Increase the application of initiative 4b in Technical Specifications.
 - **Initiative 5b**

Incorporate initiative 5b into the Technical Specifications to the extent allowed by regulation.

This program relocates Surveillance Frequencies to licensee control.



Guidance documents

Industry Guidance Document for Initiative 4b/5b

Initiative 4b

- NEI 06-09 rev.0 "Risk-Managed Technical Specifications Guidelines" (Approved on 5/17/07)
- TSTF-505 (Under development)

Initiative 5b

- NEI 04-10 rev.1 "Risk-Informed Method for Control of Surveillance Frequencies" (Approved on 9/19/07)
- TSTF-425 rev.2 (Under review by NRC)
 - Notice for availability will be published on August, 2008 by NRC



Plan Pertaining to Initiative 4b

Now investigating each SSC regarding the suitability for applying 4b using a deterministic approach

- Modeled in PRA?
- Any gain to apply?
- Sufficient front-stop completion time?
- Front-stop completion time less than 30 days?
- Other engineering considerations by design sections

TSTF-505, planned to be published 2008 summer, will be compared to US-APWR Generic TS (GTS)



Plan Pertaining to Initiative 5b

- NEI 04-10 shows that PRA and previous performance may be used to investigate an extension of surveillance interval.**
- 5b will be applied to equivalent Surveillance Frequencies (SFs) that TSTF-425 describes for NUREG-1431.**
 - **Time-based, NOT Event based**
 - **Exclude SFs that reference other programs (ex. IST)**
- US-APWR GTS will be developed based on TSTF-425.**



Summary

- Difference between DCD Rev.0 and CP 3/4 COLA**
 - **Extension of Initiative 4b applied SSCs (LCOs)**
 - **Adoption of Initiative 5b**
 - **Both to be incorporated in DCD Rev.1**
- PRA model is the same for the DCD Rev.1 and COLA, except plant-specific part.**

**Probabilistic Risk Assessment
for
Risk-Informed Tech. Specs.**

Futoshi Tanaka
Senior Engineer, Safety and Licensing Integration Group
Mitsubishi Heavy Industries, Ltd.

Contents

- PRA Technical Adequacy for Risk-Informed Tech. Specs.**
- Status of Comanche Peak PRA Model**
- Conformance with PRA adequacy required for initiative 4b**
- PRA Development plan for Risk-Informed Tech. Specs.**
- Summary**



PRA Technical Adequacy for Risk-Informed Tech. Specs.

Initiative 4b (NEI-06-09 Rev.0)

List of 10 items including requirement to meet capability category 2 for the supporting requirements for the ASME internal events at power PRA standard.

Initiative 5b (NEI-04-10 Rev.1)

“The quality of the PRA must be compatible with the safety implications of the proposed TS changes and the role the PRA plays in justifying the change.”



PRA technical adequacy required for initiative 4b (NEI-06-09 Rev.0)

- PRA must meet Capability Category 2 for the supporting requirements of the ASME internal events at power PRA standard**
- PRA must provide a reasonable representation of the plant risks associated with the removal of plant SSCs from service**



PRA technical adequacy required for initiative 4b (cont.)

- PRA model shall include Level 1 (CDF) plus large early release frequency (LERF)**
- Contributions from external events, internal flooding events, and internal fire events shall be included. However, alternate methods (e.g., conservative or bounding analyses) are acceptable.**

Other external events include:

High winds and tornadoes, external floods, seismic, and transportation and nearby facility accidents

- PRA modeling uncertainties shall be considered in application of the PRA base model results to the RMTS program.**



Status of Comanche Peak PRA Model

- PRA model for COLA FSAR rev.0 is equivalent with DCD rev.1 in PRA technical adequacy**
- PRA includes internal events PRA, internal flooding PRA, internal fire PRA and seismic margin analysis**
- Assumptions are used for information currently unavailable (e.g. plant specific emergency response guideline). Use of plant specific information is required for Capability Category 2 of the ASME Std**



Conformance with PRA adequacy requirements for initiative 4b

- Conformance with Capability Category 2 for the supporting requirements of the ASME
 - PRA model has been developed appropriately for DCD.
 - PRA model in chapter 19 of DCD satisfies ASME Category 2 requirements limited to those achievable by standard plant design
 - Remaining items are related to plant specific conditions determined at construction or operation stage.



Capability Category 2 of the ASME PRA Std.

□ Number of Supporting Requirements of the ASME PRA Std. Capability Category 2

■ IE (Initiating Event Analysis)	31	Ref: ASME-RA-Sb-2005
■ AS (Accident Sequence Analysis)	21	
■ SC (Success Criteria)	14	
■ SY (System Analysis)	42	
■ HR (Human Reliability Analysis)	34	
■ DA (Data Analysis)	33	
■ QU (Quantification)	36	
Total:	211	

*Except IF (Internal Flooding) and LE (LERF Analysis)



Capability Category 2 of the ASME PRA Std. (cont.)

Contents of Capability Category 2 for Supporting Requirements of the ASME PRA std.

	Same with Category 1	Higher than Category 1	Total
IE	27	4	31
AS	19	2	21
SC	10	4	14
SY	38	4	42
HR	22	12	34
DA	22	11	33
QU	30	6	36
Total	168	43	211

- Approximately 80% of requirements are same with Category 1.



Applicability of Capability Category 2 requirements to standard design PRA

Not Applicable Requirements:

- Site-specific, as-built, and/or as-operated requirements
 - Example: Review plant specific operating experience for initiating event precursors. (IE-A7)

Limited Applicable Requirements:

- Lack of site-specific, as-built, and/or as-operated information
 - Example: Some requirements for Human Reliability Analysis (HR)

Applicable Requirements:

- Not depend on site-specific, as-built, and/or as-operated information
 - Example: Estimate mean CDF of internal events. (QU-A2b)



Applicability of Capability Category 2 requirements to standard design PRA (cont.)

	Not Applicable	Limited Applicable	Applicable	Total
Same with Category 1	33	54	81	168
Higher than Category 1	13	19	11	43
Total	46	73	92	211



Conformance with other requirements of NEI 06-09

PRA Element	PRA Status
Initiating event analysis	Gap: Initiating events affected by plant configuration such as loss of support systems according to plant specific operation will be revised.
Event tree analysis	Compliant
System dependency analysis	Compliant
Success criteria analysis	Compliant
System analysis	Gap: Model will be revised to accommodate removal of plant SSCs from service according to plant specific operation.
Data analysis	Compliant
Common cause analysis	Compliant
Human reliability analysis (HRA)	Compliant
Quantification	Gap: Uncertainty analysis will be expanded (e.g. HRA based on plant specific operation, impact on risk informed completion time (RICT) calculations



Conformance with other requirements of NEI 06-09 (cont.)

	PRA Technical Adequacy Requirements in the NEI-06-09 (Initiative 4b and 5b)	DCD	COLA	Post COL
1	Modeling of removal of plant SSCs from service	NA	NA	X
2	Compliance with Standard Design	X	X	X
	Capability Category 2 Site-Specific	NA	X	X
3	of ASME PRA std. As-built/As-operated	NA	NA	X
	Evaluation of CDF and LERF	X	X	X
4	Assessment of external events	X	X	X
	Capability to quantify configuration specific impact due to unavailability of equipments in CRM program	NA	NA	X
5	Consideration of current (i.e. Seasonal or time of cycle) configuration	NA	NA	X
6	Common cause treatment in CRM model	NA	NA	X
7	Maintain and update PRA	NA	NA	X
8	Satisfy software station software quality assurance requirements	NA	NA	X
8	Arguments on use of at-power PRA to low operating modes	NA	NA	X
10	Consideration of modeling uncertainty in the RMTS program	NA	NA	X



PRA Development plan for Risk-Informed Tech. Specs.

- PRA for Risk-Informed Tech. Specs. will be controlled and adequately updated by Luminant
- Luminant will respond to NRC requests for PRA model review as needed
- COLA will be revised as appropriate (if necessary)



**PRA Development Plan for Risk-Informed Tech. Specs.
(cont.)**

- Plant specific key items requiring update to meet the NEI guideline requirements:**
 - **Model to fully reflect removal of plant SSCs from service**
 - **Consideration of uncertainties in application of the PRA base model results for initiative 4b**
 - **Utilize additional plant specific detail information such as detail design, procedures, etc.**



PRA Development plan for Risk-Informed Tech. Specs.

- Development of PRA considering plant specific detailed information**
 - Detailed information not fully available at this stage**
 - **Plant specific emergency response guideline**
 - **Plant specific detailed design**
- Uncertainty analysis will be performed for PRA elements pertaining to unavailable information (e.g. Human reliability analysis (HRA))**



PRA Development plan for Risk-Informed Tech. Specs.

Phased approach

Phase-a

COLA phase: develop PRA model for internal level-1 and level-2 PRA based on available plant specific information

Phase-b

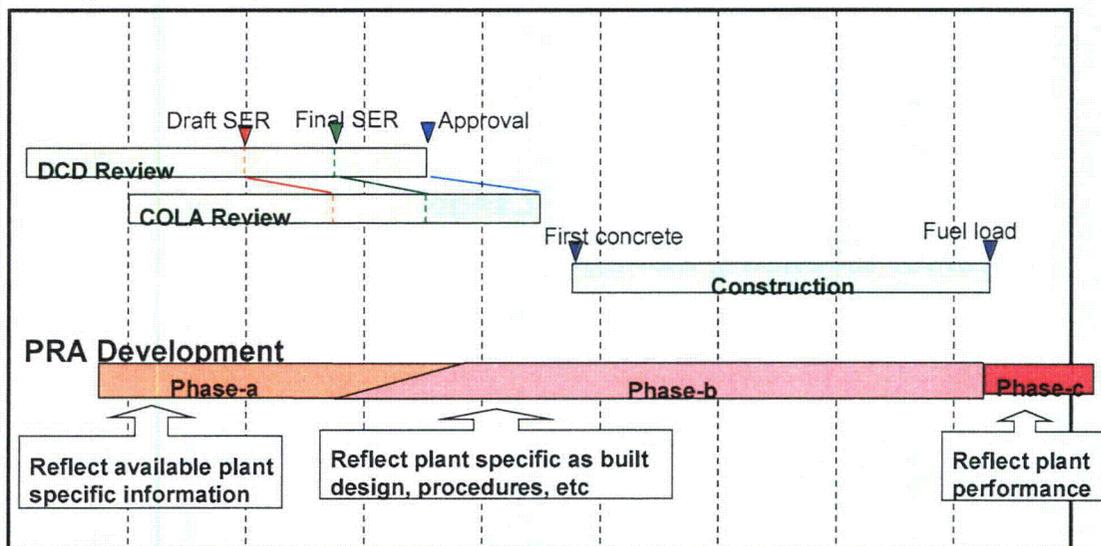
Construction phase: reflect plant specific as built design, procedures, etc., including technical issues for internal flooding and internal fire

Phase-c

Operating phase: reflect plant performance for plant specific performance database --- As operated



PRA Development plan for Risk-Informed Tech. Specs.





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Summary

- MHI has prepared the PRA to support the DCD
- Luminant will provide information for chapter 19 of COLA in accordance with R.G.1.206
- Luminant will continue to enhance PRA to support Risk-Informed Tech. Specs.

34



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COL Items and Departures

David Lange

Senior Licensing Manager, CPNPP Units 3 & 4 Project

MNES

35



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Contents

- Objectives
- Confirmation of COL Items
- Breakdown of COL Items
- Rationale Categories for COL Holder Items
- Example Items from Each Rationale Category
- COL Items and Departures by Chapter
- Summary

36



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Objectives

- Confirmation of COL Items
- Breakdown of COL Holder Items
 - Explanation of Rationale Categories for COL Holder Items with examples
- Identification of Departures

37



Confirmation of COL Items

FSAR Chapter	FSAR Chapter Title	Number of COL Items
1	Introduction and General Description	3
2	Site Characteristics	7
3	Design of Structures, Components, Equipment, Systems	98
4	Reactor	1
5	Reactor Coolant System and Connected Systems	22
6	Engineered Safety Features	33
7	Instrumentation and Controls	4
8	Electrical Systems	21
9	Auxiliary Systems	54
10	Steam and Power Conversion Systems	6



Confirmation of COL Items (cont.)

FSAR Chapter	FSAR Chapter Title	Number of COL Items
11	Radioactive Waste Management	26
12	Radiation Protection	8
13	Conduct of Operations	29
14	Verification Programs	13
15	Transient and Accident Analyses	0
16	Technical Specifications	12
17	Quality Assurance and Reliability Assurance	3
18	Human Factors Engineering	19
19	Probabilistic Risk Assessment and Severe Accident Evaluation	6

Total Number	365
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Breakdown of COL Items

- Definition of "COL Holder Items" and "COL Applicant Items" -

COL Item Category	Definition
COL Holder Item	Information that will be addressed after issuance of the COL. Sufficient information will be provided in the COLA to allow the NRC to issue a final SER
COL Applicant Item	Information needed in the COL application to meet the guidelines of RG 1.206
	Information that will be submitted additionally/supplementary for NRC staff review



Rationale Categories for COL Holder Items

COL Holder Item Resolution Rationales
(1)a: Detailed design information dependent on as-procured/as-built information.
(1)b: Operational programs/procedures
(1)c: Detailed schedule – Impossible to fix during COLA review phase, which is subject to change in accordance with progress of design or construction. Milestones will be listed.



**Example Items from Each Rationale Category
- Rationale (1)a -**

Resolution Rationale
(1)a: Detailed design information dependent on as-procured/as-built information.
Example: COL 6.2(7)
The operating principle and accuracy of the combustible gas analyzers are provided by the COL applicant.



**Example Items from Each Rationale Category
- Rationale (1)b -**

Resolution Rationale
(1)b: Operational programs/procedures
<ul style="list-style-type: none"> ➤ Described in the FSAR to the extent that NRC can conclude reasonable assurance, and which are not required by RG 1.206 to be part of the application, or ➤ Those which should be submitted in accordance with regulations or RG 1.206 but are scheduled to be provided after COLA approval and prior to fuel load.
Example: COL 3.9(6)
The COL Applicant is to provide the Program Plan for IST of dynamic restraints in accordance with ASME OM Code.



Example Items from Each Rationale Category - Rationale (1)c -

Resolution Rationale
(1)c: Detailed schedule – Impossible to fix during COLA review phase, which is subject to change in accordance with progress of design or construction. Milestones will be listed.
<p>Example: COL 14.2(8)</p> <p>The COL applicant provides an event-based schedule, relative to fuel loading, for conducting each major phase of the test program.</p>



COL Information Item Breakdown (by Rational)

Category	Rationale	Counts	Total
COL Holder Item	(1).a Site specific design areas	11	85
	(1).b Programs/procedures	72	
	(1).c Detailed schedule	2	
COL Applicant Items	302		

(Discrepancy between this and previous table because some Items double counted-as-both Applicant and Holder)



COL Items and Departures by Chapter (1/2)

Chapter	COL Item				
	Applicant Item	Holder Item			By Rationale
		Total	(1)a	(1)b	
1	3	0	0	0	0
2	7	0	0	0	0
3	78	22	0	22	0
4	0	1	1	0	0
5	18	6	1	5	0
6	9	25	6	19	0
7	4	0	0	0	0
8	20	1	1	0	0
9	45	9	1	8	0



COL Items and Departures by Chapter (2/2)

Chapter	COL Item				
	Applicant Item	Holder Item			By Rationale
		Total	(1)a	(1)b	
10	5	1	0	1	0
11	19	7	1	6	0
12	7	1	0	1	0
13	26	3	0	3	0
14	11	3	0	1	2
15	0	0	0	0	0
16	12	0	0	0	0
17	2	1	0	1	0
18	31	4	0	4	0
19	5	1	0	1	0
TOTAL	302	85	11	72	2

(Discrepancy between this and previous table because some Items double counted as both Applicant and Holder)



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Departures

- Currently no Departures identified

- Continuing to review COL Application for any potential Departures from DCD through process by which they are resolved through COLA modification or DCD modification

48



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Summary:

- COL Holder Items identified

- No Departures currently identified

49



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COLA FSAR Style Guide and Draft COLA Products

**David Lange
Senior Licensing Manager, CPNPP Units 3 & 4 Project
MNES**



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Contents

- Objective**
- FSAR Style**
- FSAR Examples**
- Summary**



Objective

- Explanation of FSAR Style Guide through examples



FSAR Style: Component Definition and Designation

COL Application Component	Left Margin Notation	Definition
Departure		Information supplied as part of the COL Application that represents a departure from the Tier 2 information contained in the applicable DCD
Standard Departure	STD DEP X.Y (#)	COL Application information that departs from the generic DCD and is common for all parallel applicants
Plant-Specific Departure	(PLANT) DEP X.Y (#)	COL Application information that departs from the generic DCD and is plant-specific
COL Item		COL Application information that addresses a DCD COL Item
Standard COL Item	STD COL X.Y (#)	COL Application information that addresses a DCD COL Item that is common for all parallel applicants
Plant-Specific COL Item	(PLANT) COL X.Y (#)	COL Application information that addresses a DCD COL Item that is plant-specific



FSAR Example (cont'd)

Table

Comanche Peak Nuclear Power Plant 3 & 4
COL Application
Part 2, FSAR

CP COL 10.4(#)

Table 10.4-3R
Circulating Water System

Parameter	Value
Circulating Water Pumps	
Number of pumps	
Pump type	
Unit flow capacity	
Drive Type	
Normal Power Heat Sink	
Normal Heat Removal Duty	
Dry Cooling Tower Array	
Array Length	
Array Width	

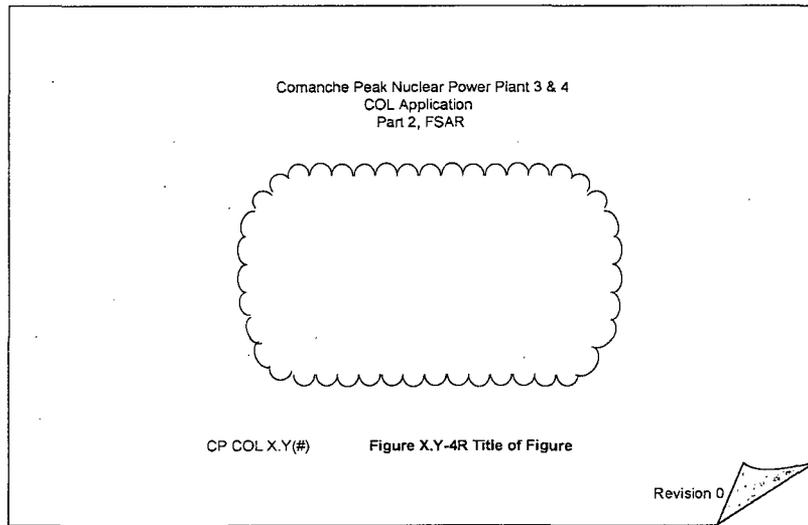
X.Y.#

Revision 0



FSAR Example (cont'd)

Figure





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Summary:

COLA Structure and Style

- COLA basic structure, style and format for the FSAR are based on commonly used conventions.

58



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Summary and Conclusion

Don Woodlan

Manager, Nuclear Regulatory Affairs

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59



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Today's Topics

- RI-PB Tech Specs**
- PRAs**
- COL Items and Departures**
- Draft COLA Products**

60



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Future Interactions

- DCD/COLA schedule**
- Security (at least partially a closed meeting)**
- Plant Specific ITAAC**
- Emergent technical items**
- Ongoing periodic conference calls**
- Site visits (ER records review)**
- Public outreach**
- QA audit**

61



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Emphasis – Facilitate the NRC Review

- Submit a complete, high quality COLA**
- Conform with RGs/SRPs**
- Meetings to keep NRC updated & obtain feedback**
- Keep the DCD and COLA aligned – minimize departures**

62



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Closing Remarks

- Safety focus driven by high quality**
- Environmental stewardship**
- Community involvement**
- Continuous improvement and learning organization**
- ERCOT market growth and ERCOT reserve margin**
- Strong team to meet Luminant business needs**
- NuBuild communication with the NRC**

63



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Questions and Comments