Response to Action Item 10-2 Section 10.2.3

MCB Issue List Regarding APR-1400, FSAR Section 10.2.3

Issue #1 (AI 10-2.1)

Delete the incomplete sentence that reads “In-service test, inspection and frequency.” in Tier 1 of the APR1400 FSAR, Table 2.7.1.1-1, ITAAC Number 7 since it is an editorial error.

Response

The incomplete sentence noted in Table 2.7.1.1-1, ITAAC Number 7 will be deleted.

Impact on DCD

DCD Tier 1 Table 2.7.1.1-1 will be revised as suggested like attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Reports.

Table 2.7.1.1-1 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The MSVs, CVs, ISVs, and IVs close reacting to a T/G trip signal.	4. Tests will be conducted on the as-built MSVs, CVs, ISVs, and IVs by an actual or simulated T/G trip signal.	4. A report of testing exists documenting that Each MSV, CV, ISV, and IV closes within about 0.3 second of an actual or simulated trip signal.
5. The non-return check valves on the extraction lines close reacting to a T/G trip signal.	5. Tests will be conducted on the as-built extraction non-return check valves by an actual or simulated T/G trip signal	5. A report of testing exists documenting that The non-return check valve closes within about 1.0 second of an actual or simulated to T/G trip signal.
6. The reactor trip signal from plant control system the initiates a T/G trip.	6. A test of the as-built system will be conducted by a simulated reactor trip signal.	6. A report of testing exists documenting that the as-built control logic generates a T/G trip by a simulated reactor trip signal.
7. The turbine and turbine valve in-service test and inspection program includes scope, frequency, methods, acceptance, disposition of reportable indications, corrective actions, and technical basis for inspection frequency.	7. In-service inspection and testing will be performed at a frequency and in accordance with operating procedures consistent with turbine manufacturer's recommendations and assumptions/input of Probability Analysis of Turbine Missiles Report.	7. The turbine and turbine valve in-service test and inspection program includes scope, frequency, methods, acceptance, disposition of reportable indications, corrective actions, and technical basis for inspection frequency. ~~In-service test, inspection and frequency.~~ In-service test, inspection and operating procedures are in accordance with industry practice and ensure assumptions/input of Probability Analysis of Turbine Missiles Report performed by the COL applicant are valid.

Response to Action Item 10-2 Section 10.2.3

MCB Issue List Regarding APR-1400, FSAR Section 10.2.3

Issue #2 (AI 10-2.2)

APR1400 FSAR, Section 10.2.3.1 states that "turbine designs utilize rotors produced from large integral forgings or from multiple wrought components." This section also states that, "The 50 percent FATT, as obtained from Charpy tests performed in accordance with American Society of Testing Methods (ASTM) A-370 (Reference 4), is no higher than -18°C (0°F) for low-pressure turbine wheel (disc) forgings." Based on the staff's understanding of turbine rotor designs, the statements above are ambiguous and potentially contradictory. The staff understands there to be three principle designs for turbine rotors: (1) integral forgings, (2) rotors made from multiple forgings welded together (welded rotors), and (3) rotors made from discs that are shrunk-on to the turbine shaft. Based on FSAR, Section 10.2.3.1, the staff understands the design to include (1) or (2), but not (3) as options for the APR1400.

Confirm that the staff's understanding of the information in FSAR, Section 10.2.3.1 is correct. If so, revise the statements from FSAR, Section 10.2.3.1 above to read, "turbine designs utilize rotors produced from large integral forgings or from welded rotors using multiple forgings" and "The 50 percent FATT, as obtained from Charpy tests performed in accordance with American Society of Testing Methods (ASTM) A-370 (Reference 4), is no higher than -18°C (0°F) for low-pressure turbine forgings."

Response

The intent is to maintain the COL applicant's flexibility to use any of the three principal designs, provided the turbine vendor's and COL applicant's turbine missile probability analysis meets the regulatory and DCD criteria.

The APR1400 DCD does not specify a turbine design and, therefore, requires that a COL applicant referencing the APR1400 DCD submit the plant specific turbine missile probability analysis including as built material properties to the NRC. DCD section 10.2.3 currently states "Acceptable material properties will be consistent with component size and fabrication method."

Consideration of how to address the pending acceptance criteria changes of SRP 10.2.3 identified two options to revise the APR1400 DCD:

a) Retain the current DCD limits for large integral rotors, which are the same values as accepted by the NRC for another new reactor applicant, or
b) Provide no quantitative limits for large integral rotors since the COL item for submittal of a turbine missile probability analysis based on as-built properties and the associated ITAAC will need to address the revision of SRP 10.2.3.

Since the eventual revision of SRP 10.2.3 could implement acceptance criteria different from current approved values, option b was selected. Accordingly, DCD section 10.2.3.1 will be revised to add a COL item that clearly identifies the requirement for specifying rotor material properties. In addition, to eliminate confusion over which of the three possible rotor designs is

Response to Action Item 10-2 Section 10.2.3

discussed in Section 10.2.3, the information is segregated under subheadings for shrunk on disk, welded, and monoblock designs.

Impact on DCD
DCD Sections 10.2.3.1, 10.2.5, and Table 1.8-2 will be revised as shown in the attached markup.

Impact on PRA
There is no impact on the PRA.

Impact on Technical Specifications
There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports
There is no impact on any Technical, Topical or Environmental Reports.

10.2.3 Turbine Rotor Integrity

Turbine rotor integrity is provided by the integrated combination of material selection, rotor design, fracture toughness requirements, tests, and preservice and inservice inspection. This combination results in a low probability of a condition that would cause a rotor failure.

The COL applicant shall identify the turbine vendor and model. Also, the COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP, Section 10.2.3, Acceptance Criteria, preservice inspections) will be met (COL 10.2(3)).

Insert (A) of next page

The as-built turbine material properties, turbine rotor and blade designs, pre-service inspection and testing results and in-service testing and inspection requirements shall be verified by ITAAC to meet the requirements defined in the turbine missile probability analysis.

10.2.3.1 Material Selection

Turbine rotor forgings are made from vacuum treated or remelted Ni-Cr-Mo-V alloy steel components using processes that minimize flaw occurrence, provide reasonable assurance of uniform strength, and provide adequate fracture toughness. Undesirable elements, such as sulfur and phosphorus, are controlled to the lowest practicable concentrations consistent with good feedstock selection and melting practice, and consistent with obtaining adequate initial and long-life fracture toughness for the environment in which the parts operate. The turbine rotor material conforms with the chemical property limits of ASTM A470 (Reference 3). The chemical composition of manufacturer's material for the rotor steel has lower or equal limitations than indicated in the ASTM standard for phosphorous, sulphur, and antimony as described in Table 10.2.3-1. The rotor forgings are heat treated and tested prior to the final machining process.

10.2.3.1.1 Integral/Monoblock Rotor

~~Turbine~~ designs utilize rotors produced from large integral forgings ~~or from multiple wrought components~~. Acceptable material properties will be consistent with component size and fabrication method. Material testing has shown that fracture appearance transition temperature (FATT) increases (and Charpy V-notch energy decreases) from the

These turbine

Insert (A)

. If the turbine vendor has performed a turbine missile analysis that has been reviewed and approved by the NRC for a rotor design relevant to the COL applicant's selected design, then the COL applicant should reference the analysis. If an approved analysis is not available, then the COL applicant shall prepare and reference an analysis that provides confidence that the final analysis performed with as-built properties, when available, will be sufficient to demonstrate assurance of turbine rotor integrity

Insert (B)

The COL applicant shall specify the turbine rotor material properties for the chosen turbine vendor and applicable for the specific rotor designs. The COL applicant shall specify the turbine rotor material properties (in terms of the 50% FATT and Charpy V-notch energy tests performed in accordance with ASTM A-370 (Reference 4)) for the chosen turbine vendor and applicable for the specific rotor designs. Any deviation from material properties in SRP 10.2.3, revision in effect on date of regulatory applicability for COL application, shall be identified and justified (COL 10.2(4)).

10.2.3.1.2 Welded Rotor

The COL applicant shall specify the turbine rotor material properties for the chosen turbine vendor and applicable for the specific rotor designs. The COL applicant shall specify the turbine rotor material properties (in terms of the 50% FATT and Charpy V-notch energy tests performed in accordance with ASTM A-370) for the chosen turbine vendor and applicable for the specific rotor designs. Any deviation from material properties in SRP 10.2.3, revision in effect on date of regulatory applicability for COL application, shall be identified and justified (COL 10.2(4)).

10.2.3.1.3 Shrunk-on Disk

outer surface to the deep-seated region of a forging as a result of variation (slowing from outside to center) in the cooling rate during the quenching process. The cooling rate variation causes the FATT (and Charpy V-notch energy) to vary rapidly with depth near the surface of the forging and then more gradually at deeper forging locations. Since actual levels of the 50 percent FATT and Charpy V-notch energy vary depending upon the size of the part, and the location within the part, etc., these variations are taken into account in accepting specific forgings for use.

Insert (B) of previous page

The 50 percent FATT, as obtained from Charpy tests performed in accordance with ~~American Society of Testing Methods (~~ASTM~~)~~ A-370 ~~(Reference 4)~~, is no higher than -18ºC (0ºF) for low-pressure turbine wheel (disc) forgings, and the Charpy V-notch energy at the minimum operating temperature is at least 8.3 kg-m (60 ft-lbf) in the tangential direction. ~~If used, the larger size of integral rotors limits the achievable properties at the rotor body center bore.~~ ~~The 50 percent FATT, as obtained from Charpy tests performed in accordance with ASTM A-370, is no higher than -1.1ºC (30ºF) and the Charpy V-notch energy at the minimum operating temperature is at least 6.22 kg-m (45 ft-lbf).~~ ~~A minimum of three Charpy V-notch specimens are tested in accordance with specification ASTM A-370.~~

Any deviation from material properties in SRP 10.2.3, revision in effect on date of regulatory applicability for COL application, shall be identified and justified (COL 10.2(4)).

10.2.3.2 Fracture Toughness

The proper toughness of the turbine rotor is obtained through the use of selected materials as described in Subsection 10.2.3.1. High reliability and availability, efficiency, and safety are satisfied by keeping the balance between the strength and toughness of the turbine rotor.

The fracture toughness K_{IC} for actual rotor product is determined using a value of deep-seated FATT based on the measured FATT values from the center bore or trepan specimens from the rotor forging, and a correlation factor obtained from the past manufactured rotor material test data, and generated statistically lower bound of the data.

As part of the turbine missile probability analysis, the COL applicant is to identify which of the methods for determining fracture toughness properties of those allowed in SRP Section 10.2.3 acceptance criteria is used.

Appropriate radiological controls can be applied to steam systems in the event that such leakage occurs. Discussions of the radiological aspects of primary-to-secondary leakage are presented in Chapter 11.

10.2.5 Combined License Information

COL 10.2(1) The COL applicant is to identify the turbine vendor and model.

COL 10.2(2) The COL applicant is to identify how the functional requirements for the overspeed protection system are met and provide a schematic of the TGCS and protection systems from sensors through valve actuators.

COL 10.2(3) The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP Section 10.2.3 Acceptance Criteria, preservice inspections) will be met. Insert (C) of next page

10.2.6 References

1. ASME Section VIII, Division 1, “Rules for Construction of Pressure Vessels,” the American Society of Mechanical Engineers, the 2013 Edition.

2. IEEE Standard C50.13-2014, “IEEE Standard for Cylindrical - Rotor, 50 Hz and 60 Hz Synchronous Generators Rated 10 MVA and Above,” Institute of Electrical and Electronics Engineers, 2014.

3. ASTM A470, “Standard Specification for Vacuum-Treated Carbon and Alloy Steel Forgings for Turbine Rotors and Shafts,” American Society for Testing and Materials, 2010.

4. ASTM A370, “Standard Test Methods and Definitions for Mechanical Testing of Steel Products,” American Society for Testing and Materials, 2014.

Insert (C)

If the turbine vendor has performed a turbine missile analysis that has been reviewed and approved by the NRC for a rotor design relevant to the COL applicant's selected design, then the COL should reference the analysis. If an approved analysis is not available, then the COL applicant shall prepare and reference an analysis that provides confidence that the final analysis performed with as-built properties, when available, will be sufficient to demonstrate assurance of turbine rotor integrity.

Table 1.8-2 (16 of 29)

Item No.	Description
COL 9.5(7)	The COL applicant is to provide the fire brigade radio systems.
COL 9.5(8)	The COL applicant is to provide the LAN and VPN system.
COL 9.5(9)	The COL applicant is to provide the emergency offsite communication system including dedication hotline, local law enforcement radio equipment, and wireless communication system.
COL 9.5(10)	The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident.
COL 9.5(11)	The COL applicant is to provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface.
COL 9.5(12)	The COL applicant is to provide the security radio system that consists of a base unit, mobile units, and portable units.
COL 9.5(13)	The COL applicant is to provide the local law enforcement communications including dedicated conventional telephone and radio-transmitted two-way communication system.
COL 9.5(14)	The COL applicant is to provide electric power for the security lighting system.
COL 9.5(15)	The COL applicant is to provide the system design information of AAC GTG building HVAC system including flow diagram, if the AAC GTG building requires the HVAC system.
COL 10.2(1)	The COL applicant is to identify the turbine vendor and model.
COL 10.2(2)	The COL applicant is to identify how the functional requirements for the overspeed protection system are met and provide a schematic of the TGCS and protection systems from sensors through valve actuators.
COL 10.2(3)	The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP Section 10.2.3 Acceptance Criteria, preservice inspections) will be met.
COL 10.3(1)	The COL applicant is to provide operating and maintenance procedures including adequate precautions to prevent water (steam) hammer and relief valve discharge loads and water entrainment effects in accordance with NUREG–0927 and a milestone schedule for implementation of the procedure.
COL 10.3(2)	The COL applicant is to establish operational procedures and maintenance programs as related to leak detection and contamination control.
COL 10.3(3)	The COL applicant is to provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description is to address consistency with GL 89-08 and NSAC-202L-R3 and provide a milestone schedule for implementation of the program.

Insert (C) of previous page

Response to Action Item 10-2 Section 10.2.3

MCB Issue List Regarding APR-1400, FSAR Section 10.2.3

Issue #3 (AI 10-2.3)

APR1400 FSAR, Section 10.2.3.5 states, “Non-return check valves are inspected by an inspection program in accordance with vendor recommendations.” Revise this to state, “Non-return check valves are inspected by an inspection program in accordance with vendor recommendations as supported by the turbine missile probability analysis,” since the turbine missile probability analysis should include these valves in determining the probability of generation of a turbine missile.

Response

KHNP will add that the non-return check valve inspection program will be supported by the turbine missile probability analysis.

Impact on DCD

DCD Section 10.2.3.5 will be revised as shown in the attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Reports.

The inspection includes a complete inspection of all normally inaccessible parts, such as couplings, coupling bolts, LP turbine rotors, LP turbine buckets, and HP turbine rotor. The inspection consists of visual, surface, and volumetric examinations.

The inservice inspection of MSVs, CVs, ISVs, and IVs includes the following description. At 3-year intervals, during refueling or maintenance shutdowns coinciding with the inservice inspection schedule required by ASME Section XI for reactor components, at least one MSV, one CV, one ISV, and one IV are dismantled, and visual and surface examinations are conducted of valve seats, disks, and stems. If unacceptable flaws or excessive corrosion are found in a valve, all other valves of that type are dismantled and inspected. Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance. Non-return check valves are inspected by an inspection program in accordance with vendor recommendations.

as supported by the turbine missile probability analysis

10.2.3.6 Turbine Missile Probability Analysis

An analysis containing an evaluation of the probability of turbine missile generation is prepared by the COL applicant. The report provides a calculation of the probability of turbine missile generation using established methods and industry guidance applicable to the fabrication technology employed. The analysis is a comprehensive report containing a description of turbine fabrication methods, material quality and properties, and required maintenance and inspections that addresses:

a. The calculated probability of turbine missile generation from material and overspeed related failures based on as-built rotor and blade designs and as-built material properties (as determined in certified testing and nondestructive examination [NDE])

b. Maximum anticipated speed resulting from a loss of load, assuming normal control system function without trip

c. Overspeed basis and overspeed protection trip setpoints

d. Discussion of the design and structural integrity of turbine rotors

Response to Action Item 10-2 Section 10.2.3

MCB Issue List Regarding APR-1400, FSAR Section 10.2.3

Issue #4 (AI 10-2.4)

APR1400 FSAR, Section 10.2.5 identifies the combined license (COL) information that a COL applicant should submit. COL Item 10.2(3) states that "The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that the requirements for protection against turbine missiles …will be met."

As specified in NUREG-0800, "Standard Review Plan," Section 10.2.3, "Turbine Rotor Integrity," and Regulatory Guide (RG) 1.115, Revision 2, "Protection Against Turbine Missiles," a turbine missile probability analysis is to be submitted to the NRC for review and approval. Therefore, this COL Item 10.2(3) should be revised accordingly as follows: "The COL applicant is to submit a turbine missile probability analysis which conforms with Subsection 10.2.3.6 to demonstrate that the requirements for protection against turbine missiles …will be met."

Response

As previously noted, the APR1400 DCD does not include a specific turbine design or type of rotor (e.g., monoblock). Therefore, performing a turbine missile probability analysis as part of the DCD is not useful and might not address considerations specific to the design selected by the COL applicant. To ensure the COL applicant will have a suitable turbine missile probability analysis, the DCD includes COL items and ITAAC to direct the COL applicant to evaluate turbine as built properties against acceptance criteria, once as built data is available. However, the as built analysis is expected to not be available at the time of the NRC review of the COLA. The absence of an analysis, especially with a pending change to SRP Section 10.2.3, could require considerable NRC staff effort to ascertain how acceptable turbine integrity will be assured.

To address this, the APR1400 DCD will be revised to require the COL applicant to reference an approved turbine design (i.e., previously reviewed and accepted by the NRC) that is applicable to the APR1400 or, for a design not previously approved, perform an analysis to provide confidence prior to COL approval that the design and associated specifications will ensure acceptable turbine integrity once the as built analysis can be performed. This pre-as built analysis shall be incorporated by reference in the COLA, facilitating NRC review in support of COL approval.

The APR1400 DCD will be revised by expansion of COL item 10.2.5(3). Final verification of as built turbine acceptability will still be provided through several ITAAC in Tier 1 Table 2.7.1.1-1.

Impact on DCD

DCD Sections 10.2.3.6, 10.2.5, and Table 1.8-2 will be revised as shown in the attached DCD Tier 2 markup.

Impact on PRA

Response to Action Item 10-2 Section 10.2.3

There is no impact on the PRA.

Impact on Technical Specifications
There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports
There is no impact on any Technical, Topical or Environmental Reports.

The inspection includes a complete inspection of all normally inaccessible parts, such as couplings, coupling bolts, LP turbine rotors, LP turbine buckets, and HP turbine rotor. The inspection consists of visual, surface, and volumetric examinations.

The inservice inspection of MSVs, CVs, ISVs, and IVs includes the following description. At 3-year intervals, during refueling or maintenance shutdowns coinciding with the inservice inspection schedule required by ASME Section XI for reactor components, at least one MSV, one CV, one ISV, and one IV are dismantled, and visual and surface examinations are conducted of valve seats, disks, and stems. If unacceptable flaws or excessive corrosion are found in a valve, all other valves of that type are dismantled and inspected. Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance. Non-return check valves are inspected by an inspection program in accordance with vendor recommendations.

10.2.3.6 Turbine Missile Probability Analysis

Referenced

An analysis containing an evaluation of the probability of turbine missile generation is ~~prepared~~ by the COL applicant. The report provides a calculation of the probability of turbine missile generation using established methods and industry guidance applicable to the fabrication technology employed. The analysis is a comprehensive report containing a description of turbine fabrication methods, material quality and properties, and required maintenance and inspections that addresses:

a. The calculated probability of turbine missile generation from material and overspeed related failures based on as-built rotor and blade designs and as-built material properties (as determined in certified testing and nondestructive examination [NDE])

b. Maximum anticipated speed resulting from a loss of load, assuming normal control system function without trip

c. Overspeed basis and overspeed protection trip setpoints

d. Discussion of the design and structural integrity of turbine rotors

e. An analysis of potential degradation mechanisms (e.g., stress corrosion cracking, pitting, low-cycle fatigue, corrosion fatigue, erosion and erosion-corrosion), and any specific maintenance or operating requirements necessary to mitigate the them

f. Material properties (e.g., yield strength, stress-rupture properties, fracture toughness, minimum operating temperature of the high-pressure turbine rotor) and the method of determining those properties

g. Required preservice test and inspection procedures and acceptance criteria to support calculated turbine missile probability

h. Actual maximum tangential and radial stresses and their locations in the low-pressure turbine rotor

i. Rotor and blade design analyses, including loading combinations, assumptions and warmup time, that demonstrate sufficient safety margin to withstand loadings from postulated overspeed events up to 120 percent of rated speed

j. Description of the required inservice inspection and testing program for valves essential to overspeed protection and any inservice tests, inspections, and maintenance activities for the turbine and valve assemblies that are required to support the calculated missile probability, including inspection and test frequencies with technical bases, type of inspection, techniques, areas to be inspected, acceptance criteria, disposition of reportable indications, and corrective actions

updated based on as-built properties and

The above analysis/report is prepared using criteria in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements (Reference 8, 9). The turbine missile probability analysis report(s) are verified by ITAAC to exist and conclude that the probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing is less than $1x10^{-5}$ per year.

Appropriate radiological controls can be applied to steam systems in the event that such leakage occurs. Discussions of the radiological aspects of primary-to-secondary leakage are presented in Chapter 11.

10.2.5 Combined License Information

COL 10.2(1) The COL applicant is to identify the turbine vendor and model.

COL 10.2(2) The COL applicant is to identify how the functional requirements for the overspeed protection system are met and provide a schematic of the TGCS and protection systems from sensors through valve actuators.

COL 10.2(3) The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP Section 10.2.3 Acceptance Criteria, preservice inspections) will be met.

Insert (D) of next page

10.2.6 References

1. ASME Section VIII, Division 1, “Rules for Construction of Pressure Vessels,” the American Society of Mechanical Engineers, the 2013 Edition.

2. IEEE Standard C50.13-2014, “IEEE Standard for Cylindrical - Rotor, 50 Hz and 60 Hz Synchronous Generators Rated 10 MVA and Above,” Institute of Electrical and Electronics Engineers, 2014.

3. ASTM A470, “Standard Specification for Vacuum-Treated Carbon and Alloy Steel Forgings for Turbine Rotors and Shafts,” American Society for Testing and Materials, 2010.

4. ASTM A370, “Standard Test Methods and Definitions for Mechanical Testing of Steel Products,” American Society for Testing and Materials, 2014.

Insert (D)

COL 10.2(4) The COL applicant shall specify the turbine rotor material properties for chosen turbine vendor and applicable for the specific rotor designs. The COL applicant shall specify the turbine rotor material properties (in terms of the 50% FATT and Charpy V-notch energy) for the chosen turbine vendor and applicable for the specific rotor designs. Any deviation from material properties in SRP 10.2.3, revision in effect on date of regulatory applicability for COL application, shall be identified and justified.

Table 1.8-2 (16 of 29)

Item No.	Description
COL 9.5(7)	The COL applicant is to provide the fire brigade radio systems.
COL 9.5(8)	The COL applicant is to provide the LAN and VPN system.
COL 9.5(9)	The COL applicant is to provide the emergency offsite communication system including dedication hotline, local law enforcement radio equipment, and wireless communication system.
COL 9.5(10)	The COL applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident.
COL 9.5(11)	The COL applicant is to provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface.
COL 9.5(12)	The COL applicant is to provide the security radio system that consists of a base unit, mobile units, and portable units.
COL 9.5(13)	The COL applicant is to provide the local law enforcement communications including dedicated conventional telephone and radio-transmitted two-way communication system.
COL 9.5(14)	The COL applicant is to provide electric power for the security lighting system.
COL 9.5(15)	The COL applicant is to provide the system design information of AAC GTG building HVAC system including flow diagram, if the AAC GTG building requires the HVAC system.
COL 10.2(1)	The COL applicant is to identify the turbine vendor and model.
COL 10.2(2)	The COL applicant is to identify how the functional requirements for the overspeed protection system are met and provide a schematic of the TGCS and protection systems from sensors through valve actuators.
COL 10.2(3)	The COL applicant is to provide a description of how the turbine missile probability analysis conforms with Subsection 10.2.3.6 to ensure that requirements for protection against turbine missiles (e.g., applicable material properties, method of calculating the fracture toughness properties per SRP Section 10.2.3 Acceptance Criteria, preservice inspections) will be met.
COL 10.3(1)	The COL applicant is to provide operating and maintenance procedures including adequate precautions to prevent water (steam) hammer and relief valve discharge loads and water entrainment effects in accordance with NUREG–0927 and a milestone schedule for implementation of the procedure.
COL 10.3(2)	The COL applicant is to establish operational procedures and maintenance programs as related to leak detection and contamination control.
COL 10.3(3)	The COL applicant is to provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description is to address consistency with GL 89-08 and NSAC-202L-R3 and provide a milestone schedule for implementation of the program.

Insert COL 10.2(4)

Insert (E) of next page as COL 10.2(4) description

Insert (E)

The COL applicant shall specify the turbine rotor material properties for chosen turbine vendor and applicable for the specific rotor designs. The COL applicant shall specify the turbine rotor material properties (in terms of the 50% FATT and Charpy V-notch energy) for the chosen turbine vendor and applicable for the specific rotor designs. Any deviation from material properties in SRP 10.2.3, revision in effect on date of regulatory applicability for COL application, shall be identified and justified.