

I. OVERVIEW / SIGNATURES

Facility: Waterford 3 SES

Document Reviewed: ER-W3-2003-0053-000

Change/Rev.: 2/0

System Designator(s)/Description: Turbine

Description of Proposed Change:

Engineering Request ER-W3-2003-0053-000 will upgrade the high pressure (HP) turbine steam path to maximize the plant electrical output due to the extended power uprate (EPU) that will be implemented in Refuel 13. The upgrade of the HP turbine steam path includes a complete replacement of the older technology blading with a flow path design featuring advanced blade profiles, an increased number of stages, and eliminates the partial arc admission for improved performance. The four nozzle segments and the two stationary blade carriers are replaced by a full-arc admission inner casing and two stationary blade carriers. The proposed upgrade also included margins in the HP steam path design to accommodate future plant changes with minimal modification.

CR-WF3-2004-3216 documented that the original 50.59 Exemption performed for Engineering Request ER-W3-2003-0053-000 should have identified this change as an 'adverse' impact (rotor weight) to the design function. CR-WF3-2004-3216 also documented that "FSAR only" changes to FSAR sections 3.5.1.3.2.1 and 10.2.3.3 change should have been discussed in a 50.59 Safety Evaluation. This 50.59 review will supersede the previous 50.59 reviews (ER-W3-2003-0053-000 Rev. 0 and ER-W3-2003-0053-000 ERCN #1) performed with the exception of the editorial changes discussed in the previous 50.59 reviews.

The following 50.59 Reviews were performed for ER-W3-2003-0053-000:

- 50.59 Screening – Changes to FSAR Sections 10.2.2.1 and 10.2.3.3 and FSAR Figures 10.2-2 and 10.2-3 which describe the new operating conditions for the extended power uprate (EPU). Operation at the new EPU conditions is not being authorized by this change.
- 50.59 Safety Evaluation – All other LBD changes as a result of the proposed HP steam path replacement.

Check the applicable review(s): (Only the sections indicated must be included in the Review.)

<input type="checkbox"/>	EDITORIAL CHANGE of a Licensing Basis Document	Section I
<input checked="" type="checkbox"/>	SCREENING	Sections I and II required
<input type="checkbox"/>	50.59 EVALUATION EXEMPTION	Sections I, II, and III required
<input checked="" type="checkbox"/>	50.59 EVALUATION (#: <u>05-013</u>)	Sections I, II, and IV required

Preparer: David Viener / *[Signature]* / FOI / DESIGN ENG / 4/14/05
Name (print) / Signature / Company / Department / Date

Reviewer: Joseph Reese / *[Signature]* / FOI / ENGINEERING / 4/14/05
Name (print) / Signature / Company / Department / Date

OSRC: R.A. Dodds / *[Signature]* / 4/15/2005
Chairman's Name (print) / Signature / Date
[Required only for Programmatic Exclusion Screenings and 50.59 Evaluations.]

II. SCREENINGS

A. Licensing Basis Document Review

1. Does the proposed activity impact the facility or a procedure as described in any of the following Licensing Basis Documents?

Operating License	YES	NO	CHANGE # and/or SECTIONS IMPACTED
Operating License	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
TS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
NRC Orders	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

If "YES", obtain NRC approval prior to implementing the change by initiating an LBD change in accordance with NMM ENS-LI-113. (See Section 5.2[13] for exceptions.)

LBDs controlled under 50.59	YES	NO	CHANGE # (if applicable) and/or SECTIONS IMPACTED
FSAR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FSAR Chapter 10 (DRNs 04-719 and 05-49), FSAR Chapter 3 (DRN 04-874), G-151 Sheets 2 and 3 (DRNs 04-876 and 04-877), G-165 Sheet 4 (DRN 04-871)
TS Bases	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Technical Requirements Manual	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Core Operating Limits Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
NRC Safety Evaluation Report and supplements for the initial FSAR ¹	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
NRC Safety Evaluations for amendments to the Operating License ¹	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

If "YES", perform an Exemption Review per Section III OR perform a 50.59 Evaluation per Section IV OR obtain NRC approval prior to implementing the change. If obtaining NRC approval, document the LBD change in Section II.A.5; no further 50.59 review is required. However, the change cannot be implemented until approved by the NRC. AND initiate an LBD change in accordance with NMM ENS-LI-113.

LBDs controlled under other regulations	YES	NO	CHANGE # (if applicable) and/or SECTIONS IMPACTED
Quality Assurance Program Manual ²	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Emergency Plan ^{2,3}	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fire Protection Program ^{3,4} (includes the Fire Hazards Analysis)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Offsite Dose Calculations Manual ^{3,4}	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

If "YES", evaluate any changes in accordance with the appropriate regulation AND initiate an LBD change in accordance with NMM ENS-LI-113. No further 50.59 review is required.

¹ If "YES," see Section 5.2[5]. No LBD change is required.

² If "YES," notify the responsible department and ensure a 50.54 Evaluation is performed. Attach the 50.54 Review.

³ Changes to the Emergency Plan, Fire Protection Program, and Offsite Dose Calculation Manual must be approved by the OSRC in accordance with NMM OM-119.

⁴ If "YES," evaluate the change in accordance with the requirements of the facility's Operating License Condition or under 50.59, as appropriate.

2. Does the proposed activity involve a test or experiment not described in the FSAR? Yes
 No

If "yes," perform a 50.59 Evaluation per Section IV OR obtain NRC approval prior to implementing the change AND initiate an LBD change in accordance with NMM LI-113. If obtaining NRC approval, document the change in Section II.A.5; no further 50.59 review is required. However, the change cannot be implemented until approved by the NRC.

3. **Basis**

Explain why the proposed activity does or does not impact the Operating License/Technical Specifications and/or the FSAR and why the proposed activity does or does not involve a new test or experiment not previously described in the FSAR. Discuss other LBDs if impacted. Adequate basis must be provided within the Screening such that a third-party reviewer can reach the same conclusions. Simply stating that the change does not affect TS or the FSAR is not an acceptable basis.

This ER implements upgrades to the HP Turbine in support of EPU. Operating License and Technical Specification changes associated with increasing the reactor rated thermal power from 3441 megawatts thermal (MWt) to 3716 MWt are included in License Amendment Request NPF-38-249 (and supplements) and will be implemented by ER-W3-2001-1149-000. All instrumentation and control changes associated with this change (such as setpoint changes and sensor input to the Digital Electro-Hydraulic Control System) will be addressed by ER-W3-2003-0053-001.

Operating License:

The Waterford Unit 3 operating license is impacted by the Extended Power Uprate (EPU). EPU will be implemented by ER-W3-2001-1149-000 and the License Amendment Request NPF-38-249 (and supplements) for EPU will address those applicable changes. The operating license does not have any restrictions on the activities such as those within the scope of this proposed HP Turbine steam path replacement. None of the license conditions contained in the operating license are impacted by the activity within the scope of this ER. Therefore, the proposed activity does not impact the Waterford Unit 3 operating license.

Technical Specifications:

The Technical Specifications do not address the HP Turbine and therefore do not require revision. The new heat balance associated with EPU, and subsequent impact on the Technical Specifications (such as increased reactor power) are addressed by the EPU License Amendment Request NPF-38-249 (and supplements) and will be implemented by ER-W3-2001-1149-000. Turbine first stage pressure signals that input to the Technical Specification systems are addressed separately in the 50.59 Review for ER-W3-2003-0053-001. The activities within the scope of this ER will not adversely affect the mode of operation of any important to safety equipment or Technical Specification associated equipment. In addition, the activities will not create a system configuration or operating condition such that a Technical Specifications LCO or surveillance requirement is no longer adequate. Likewise, the activities will not result in a condition that would bypass or invalidate automatic actuation features required to be operable by the Technical Specifications or exceed any limits specified in the Technical Specifications. Therefore, the proposed activity does not impact the Technical Specifications.

License Basis Documents

An electronic search of Licensing Basis Documents (LBDs) was conducted using the LRS Retrieval function of Autonomy (WF3) with the 50.59 Search filter applied and using the search terms listed in Section II.A.4. A summary of the LBD review is provided below. Document Change Notices (DRNs) against those LBDs that are impacted have been initiated and are given in Section II.A.1. This review identified no impacts to the Core Operating Limits Report, Quality Assurance Program Manual, Environmental Protection Plan, Emergency Plan, Fire Protection Plan or Offsite Dose Calculations Manual.

FSAR Section 10.2

This FSAR section describes the function and design basis of the turbine generator. This section also includes Flow diagrams G-151 and G-165 which are incorporated in the FSAR by reference. This section will be updated to add, modify or delete the information given to include the changes as a result of the new high pressure turbine steam path. These changes will be evaluated in Section IV of this 50.59 review with the exception of the changes to FSAR Sections 10.2.2.1 and 10.2.3.3 and FSAR Figures 10.2-2 and 10.2-3. These FSAR Sections and Figures are being revised to reflect the new generator power and operating conditions at EPU levels which are not being authorized with this proposed change. This change requires NRC approval of License Amendment Request NPF-38-249 (and supplements) for the Extended Power Uprate which will be implemented by ER-W3-2001-1149-000. These FSAR changes are consistent with and bounded by the information submitted in License Amendment Request NPF-38-249 (and supplements). Therefore, the validity of the 50.59 evaluation will be also dependent on the 50.59 review for ER-W3-2001-1149-000. This requirement will be added to Section II.A.5.

FSAR Section 3.5.1.3

This FSAR section describes the design features employed to mitigate against potential turbine generated missiles. This section will be updated to add, modify or delete the information given to include the changes as a result of the new high pressure turbine steam path. These changes will be evaluated in Section IV of this 50.59 review.

FSAR Section 7.7.1.1, 7.7.1.4.2, 7.7.1.5 and FSAR Table 7.7-1

This FSAR sections describes the relationship with turbine first stage pressure and the Reactor Regulating System (RRS), Digital Electro Hydraulic (DEH) and Core Operating Limits Supervisory System (COLSS) control systems. The pressure tap location for turbine first stage pressure is being relocated upstream of the turbine admission valves because the upgrade steam path does not include a control stage. Any FSAR changes regarding signal conditioning for these systems will be evaluated by ER-W3-2003-0053-001. Therefore, the validity of the 50.59 evaluation will be also dependent on the 50.59 review for ER-W3-2003-0053-001. This requirement will be added to Section II.A.5.

Technical Specification Bases:

The Technical Specification Bases do not address the High Pressure Turbine or any power generating activities. Turbine first stage pressure signals are inputs to protective systems which can trip the turbine. The change in pressure signal location from the turbine first stage pressure to the turbine admission pressure is addressed separately in the 50.59 Review for ER-W3-2003-0053-001. All required Technical Specification and Technical Specification Bases changes for EPU are included in LAR NPF38-249 (and supplements). Therefore, no Technical Specifications Bases are impacted by this activity associated with the HP Turbine upgrade.

Technical Requirements Manual:

Turbine Overspeed Protection is unaffected by the proposed changes. Therefore, no change to the TRM is required as a result of implementation of this ER.

Test or experiment not described in the FSAR:

This activity does not require the turbine to be operated in a way that deviates from the operation previously evaluated in the FSAR and it does not require any special testing. Testing will verify installation requirements as delineated in Procurement Specification DES-M-016 and will include required dimensional tolerances for installed components, material compatibility, assembly and fit-ups, casing alteration, and bolting to ensure the upgrade conforms to existing design configuration. These are standard post-modification tests that will be performed under approved procedures. Therefore, the proposed activity does not include a test or experiment not described in the FSAR.

4. References

Discuss the methodology for performing LBD searches. State the location of relevant licensing document information and explain the scope of the review such as electronic search criteria used (e.g., key words) or the general extent of manual searches per Section 5.5.1[5](d) of LI-101. **NOTE: Ensure that manual searches are performed using controlled copies of the documents. If you have any questions, contact your site Licensing department.**

LBDs/Documents reviewed via keyword search: Keywords:

FSAR Sections 3.5.1.3, 4.4.3.5, 7.7.1.1, 7.7.1.5, 7.7.1.4.2, 7.7.1.4.3, 10.1, 10.2 (including Tables and Figures), 10.3.1, 10.3.2, 10.4.3, 15.1.1.3, 15.1.2.3, 15.1.3, 15.2.1.1, 15.2.1.2, 15.2.1.3, 15.2.2.1, 15.2.2.2, 15.2.2.3; FSAR Tables 3.2-1 and 7.7-1; SER Sections 10.2 and 10.3, SER Supp #4 Section 3.5; and TRM 3/4.3.4 were identified by the search as requiring review for impact.

high pressure (HP) turbine, impulse and reaction blading, Digital Electro-Hydraulic (DEH), sequential and partial arc admission, turbine missiles, heat balance, first stage pressure, turbine trip, turbine overspeed

LBDs/Documents reviewed manually:

FSAR Sections identified by electronic keyword search were reviewed manually.

5. Is the validity of this Review dependent on any other change?
 Yes
 No

If "YES", list the required changes/submittals. The changes covered by this 50.59 Review cannot be implemented without approval of the other identified changes (e.g., license amendment request). Establish an appropriate notification mechanism to ensure this action is completed.

Validity of this review is dependent on the 50.59 review for ER-W3-2003-0053-001 and ER-W3-2001-1149-000. The 50.59 review for these listed ERs may be dependent on the approval of the Extended Power Uprate License Amendment Request NPF-38-249 (and supplements), which is currently awaiting NRC approval. An action in ERD has been created to track the final 50.59 approval of these ERs.

B. ENVIRONMENTAL SCREENING

If any of the following questions is answered "yes," an Environmental Review must be performed in accordance with NMM Procedure ENS-EV-115, "Environmental Evaluations," and attached to this 50.59 Review. Consider both routine and non-routine (emergency) discharges when answering these questions.

Will the proposed Change being evaluated:

- | | <u>Yes</u> | No | |
|-----|--------------------------|-------------------------------------|--|
| 1. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve a land disturbance of previously disturbed land areas in excess of one acre (i.e., grading activities, construction of buildings, excavations, reforestation, creation or removal of ponds)? |
| 2. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve a land disturbance of undisturbed land areas (i.e., grading activities, construction, excavations, reforestation, creating, or removing ponds)? |
| 3. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve dredging activities in a lake, river, pond, or stream? |
| 4. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Increase the amount of thermal heat being discharged to the river or lake? |
| 5. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Increase the concentration or quantity of chemicals being discharged to the river, lake, or air? |
| 6. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Discharge any chemicals new or different from that previously discharged? |
| 7. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Change the design or operation of the intake or discharge structures? |
| 8. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify the design or operation of the cooling tower that will change water or air flow characteristics? |
| 9. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify the design or operation of the plant that will change the path of an existing water discharge or that will result in a new water discharge? |
| 10. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify existing stationary fuel burning equipment (i.e., diesel fuel oil, butane, gasoline, propane, and kerosene)? ¹ |
| 11. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve the installation of stationary fuel burning equipment or use of portable fuel burning equipment (i.e., diesel fuel oil, butane, gasoline, propane, and kerosene)? ¹ |
| 12. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve the installation or use of equipment that will result in a new or additional air emission discharge? |
| 13. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve the installation or modification of a stationary or mobile tank? |
| 14. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve the use or storage of oils or chemicals that could be directly released into the environment? |
| 15. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Involve burial or placement of any solid wastes in the site area that may affect runoff, surface water, or groundwater? |

¹ See NMM Procedure ENS-EV-117, "Air Emissions Management Program," for guidance in answering this question.

C. SECURITY PLAN SCREENING

If any of the following questions is answered "yes," a Security Plan Review must be performed by the Security Department to determine actual impact to the Plan and the need for a change to the Plan.

Could the proposed activity being evaluated:

- | | <u>Yes</u> | <u>No</u> | |
|-----|--------------------------|-------------------------------------|--|
| 1. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Add, delete, modify, or otherwise affect Security department responsibilities (e.g., including fire brigade, fire watch, and confined space rescue operations)? |
| 2. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Result in a breach to any security barrier(s) (e.g., HVAC ductwork, fences, doors, walls, ceilings, floors, penetrations, and ballistic barriers)? |
| 3. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Cause materials or equipment to be placed or installed within the Security Isolation Zone? |
| 4. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Affect (block, move, or alter) security lighting by adding or deleting lights, structures, buildings, or temporary facilities? |
| 5. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect the intrusion detection systems (e.g., E-fields, microwave, fiber optics)? |
| 6. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect the operation or field of view of the security cameras? |
| 7. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect (block, move, or alter) installed access control equipment, intrusion detection equipment, or other security equipment? |
| 8. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect primary or secondary power supplies to access control equipment, intrusion detection equipment, other security equipment, or to the Central Alarm Station or the Secondary Alarm Station? |
| 9. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect the facility's security-related signage or land vehicle barriers, including access roadways? |
| 10. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Modify or otherwise affect the facility's telephone or security radio systems? |

Documentation for accepting any "yes" statement for these reviews will be attached to this 50.59 Review or referenced below.

III. 50.59 EVALUATION EXEMPTION

Enter this section only if a "yes" box was checked in Section II.A.1.

A. Check the applicable boxes below. If any of the boxes are checked, clearly document the basis in Section III.B, below. If none of the boxes are appropriate, perform a 50.59 Evaluation in accordance with Section IV. Provide supporting documentation or references as appropriate.

- The proposed activity meets all of the following criteria regarding design function per Section 5.5[1](a):

The proposed activity does not adversely affect the design function of an SSC as described in the FSAR; **AND**

The proposed activity does not adversely affect a method of performing or controlling a design function of an SSC as described in the FSAR; **AND**

The proposed activity does not adversely affect a method of evaluation that demonstrates intended design function(s) of an SSC described in the FSAR will be accomplished.

- An approved, valid 50.59 Review(s) covering associated aspects of the proposed activity already exists per Section 5.5[1](b). Reference 50.59 Evaluation # _____ (if applicable) or attach documentation. Verify the previous 50.59 Review remains valid.
- The NRC has approved the proposed activity or portions thereof per Section 5.5[1](c).
Reference: _____

B. Basis

Provide a clear, concise basis for determining the proposed activity may be exempted such that a third-party reviewer can reach the same conclusions.

(Insert basis discussion.)

IV. 50.59 EVALUATION

License Amendment Determination

Does the proposed Change being evaluated represent a change to a method of evaluation Yes
ONLY? If "Yes," Questions 1 – 7 are not applicable; answer only Question 8. If "No," answer No
 all questions below.

Does the proposed Change:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously Yes
 evaluated in the FSAR? No

BASIS:

The proposed change will upgrade the high pressure (HP) turbine steam path to maximize the plant electrical output for the new extended power uprate (EPU) operating conditions. The upgrade of the HP turbine steam path includes a complete replacement of the older technology blading with a flow path design featuring advanced blade profiles, an increased number of stages, and eliminates the partial arc admission for improved performance. The four nozzle segments and the two stationary blade carriers are replaced by a full-arc admission inner casing and two stationary blade carriers. Two new drain lines from the lower inlet pipe nozzles on the outer casing to the #1 Heater extraction header will be installed to drain any water that may accumulate after the normal drain valve to the condenser closes above 20% load. The pressure tap location for turbine first stage pressure is being relocated upstream of the turbine admission valves due to the upgrade steam path does not include a control stage.

The accidents potentially impacted by this proposed change include increased heat removal events caused by steam line breaks or an increased opening of turbine admission valves and decreased heat removal events caused by inadvertent closure of the turbine stop valves, a turbine trip, or a loss of condenser vacuum due to excessive turbine gland leakage. However, this proposed change will not result in more than a minimal increase in the frequency of occurrence of an these accident based on the following:

- The installation of the HP Turbine casing drain lines will performed in accordance with current design requirements, ANSI B31.1, and installation standards. Piping material requirements will also be equivalent to the current requirements. Post installation testing will ensure line integrity will be maintained. The valves and transmitters relocated to the main steam systems have design ratings equal to or exceed the design ratings of the main steam system. Therefore, this change will not increase the initiation of main steam pipe breaks.
- The proposed change does not modify any turbine valve, therefore this change will not will not increase the initiation of turbine valve malfunctions or failures.
- A retained component evaluation has been performed by the original equipment manufacturer (Ref.: GO NOE21614) to evaluate the support systems to identify any changes that may be required to accommodate the new steam conditions for EPU (Note: ER-W3-2001-1149-000 will authorize the operation at the new steam conditions. See Section II.A.5). This review evaluated potential initiators to turbine trips which include, in part, turbine rotor vibration, turbine rotor differential expansion, thrust bearing wear, and turbine overspeed. The review concluded that the existing limits and alarms for turbine vibration and differential expansion are acceptable for the turbine upgrade. Post installation testing will also ensure operation of the turbine will not exceed any the specified limits. The proposed upgrade maintains the double flow design, therefore this change will not result in increased thrust loads. The turbine overspeed protection system is an independent system which is not modified as part of this change. Therefore, this change will not increase the initiation of turbine trips.
- The retained component evaluation discussed above concluded that the HP gland supply is adequately sized for the proposed change, therefore this change will not will not increase the potential for air in-leakage at the turbine glands causing a possible loss of condenser vacuum.

Based on the above, the upgrade of the high pressure (HP) turbine steam path will not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the FSAR.

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR? Yes No

BASIS:

Equipment important to safety being modified by this proposed upgrade to the HP turbine steam path is located in the main steam system. The proposed change will be adding a new drain lines in the main steam system to drain any water from the HP turbine that may accumulate after the normal drain valve to the condenser closes. Instruments, valves and tubing will be relocated from the reheat steam system to the main steam system to support the new pressure tap location for turbine first stage pressure. The design and installation of the HP Turbine casing drain lines will in accordance with all applicable codes and standards. Piping material requirements will also be equivalent to the current requirements. The instruments, valves and tubing being relocated to the main steam system have design ratings equal to or exceed the design ratings of the main steam system. Therefore, the upgrade of the high pressure (HP) turbine steam path will not result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR.

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR? Yes No

BASIS:

Equipment important to safety being modified by this proposed upgrade to the HP turbine steam path is located in the main steam system. This affected equipment is not or will not be credited for accident mitigation. In addition, proposed upgrade to the HP turbine steam path does not change any system response as a result of an accident. Therefore, the upgrade of the high pressure (HP) turbine steam will not result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR.

4. Result in more than a minimal increase in the consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR? Yes No

BASIS:

Steam turbines have the potential for producing high-energy missiles which may cause damage to equipment important to safety. The probability for the HP turbine to generate missiles currently is practically zero since the postulated steam flow with the admission valve wide open can not drive the HP turbine above its destructive overspeed limit. The design for the HP rotor retrofit will maintain the current probability of missile generation from the HP turbine. There are three potential failure mechanisms considered when determining the potential for missile generation; ductile burst from overspeed, a fracture due to high cycle fatigue cracking, and a fracture resulting from low cycle fatigue cracking. A review has been performed by the original equipment manufacturer (Ref.: EC-02262) which concluded the following:

- A ductile burst from overspeed would not occur since the required speed is beyond the terminal speed of the turbine unit.
- Retrofits include improved design safety factors to reduce potential failures from high cycle fatigue cracking. No industry failures due to high cycle fatigue cracking have been reported to date.
- A failure from low cycle fatigue cracking is unlikely since the amount of start cycles is much less than the design (10,000).

Based on the above, the upgrade of the high pressure (HP) turbine steam path will not result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR.

5. Create a possibility for an accident of a different type than any previously evaluated in the FSAR?
BASIS: Yes
 No

The upgrade of the high pressure (HP) turbine steam path does not recommend new system interactions or connections or require the turbine to be operated in an abnormal manner. The proposed casing drain line is not a new system interaction since the turbine currently interfaces with the extraction steam system. Additional protective equipment is not necessary to prevent the turbine from exceeding its design overspeed limit of 120%. The additional rotor weight will increase the WR^2 which will decrease the expected overspeed should a turbine overspeed trip occur. The additional rotor weight is within the capacity of the current HP turbine bearings; therefore modification to the HP bearings and supports are not required. The total weight of the HP steam path is less than the current steam path; therefore the turbine building floor and pedestal do not require changes to accept the new steam path. Therefore, the proposed change does not create the possibility of an accident of a different type previously described in the SAR.

6. Create a possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the FSAR? Yes
 No

BASIS:

The only restriction imposed by the Nuclear Steam Supply System (NSSS) on turbine operation is that the turbine trips when the reactor is tripped. The upgrade of the high pressure (HP) turbine steam path does not alter the operation or function of this turbine trip circuit or physically change any component, system or structure associated with the turbine trip circuit. Since the failure modes associated with the turbine trip circuit will remain unchanged as a result of the upgrade of the high pressure (HP) turbine steam path, this change does not create a possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the FSAR.

7. Result in a design basis limit for a fission product barrier as described in the FSAR being exceeded or altered? Yes
 No

BASIS:

TRM 3/4.3.4 requires at least one turbine overspeed system be operable during Modes 1, 2, and 3. Turbine overspeed protection is required to protect the turbine from excessive overspeed that could cause missiles that could impact and damage equipment important to safety. This change does not modify the turbine overspeed protection system. As discussed in question 4, the design for the HP rotor retrofit will maintain the current probability of missile generation from the HP turbine. The additional rotor weight will increase the WR^2 which will decrease the expected overspeed should a turbine overspeed trip occur. There are no Technical Specifications associated with the HP turbine and there are no accident analyses that credit the HP turbine for accident mitigation. Therefore, the upgrade of the high pressure (HP) turbine steam path does not result in a design basis limit for a fission product barrier as described in the FSAR being exceeded or altered.

8. Result in a departure from a method of evaluation described in the FSAR used in establishing the design bases or in the safety analyses? Yes
 No

BASIS:

Methods to evaluate maximum expected turbine overspeed at turbine trip or to determine the destructive overspeed that could cause missile generation are not described in the FSAR; therefore the upgrade of the high pressure (HP) turbine steam path does not result in a departure from a method of evaluation described in the FSAR used in establishing the design bases or in the safety analyses.

If any of the above questions is checked "YES", obtain NRC approval prior to implementing the change by initiating a change to the Operating License in accordance with NMM Procedure ENS-LI-113.