



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-17-141

December 28, 2017

10 CFR 50.4

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1, 2, and 3  
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68  
NRC Docket Nos. 50-259, 50-260, and 50-296

Sequoyah Nuclear Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

Watts Bar Nuclear Plant, Units 1 and 2  
Facility Operating License Nos. NPF-90 and NPF-96  
NRC Docket Nos. 50-390 and 50-391

Subject: **TENNESSEE VALLEY AUTHORITY - ANCHOR DARLING DOUBLE DISC  
GATE VALVE INFORMATION AND STATUS**

- References:
1. Nuclear Energy Institute (NEI) letter to NRC, "Anchor Darling Double Disc Gate Valve Industry Resolution Plan Update (Project 689)," dated August 4, 2017 (ML17220A363)
  2. NEI letter to NRC, "NSIAC Concurrence on Anchor Darling Double Disc Gate Valve Industry Response Actions (Project 689)," dated October 26, 2017 (ML17303A031)
  3. BWROG Topical Report TP16-1-112, Revision 4, "Recommendations to Resolve Flowserve 10 CFR Part 21 Notification Affecting Anchor Darling Double Disc Gate Valve Wedge Pin Failures," dated August 2017

By letter dated August 4, 2017 (Reference 1), the Nuclear Energy Institute (NEI) provided the NRC a resolution plan for the U.S. nuclear industry to address the known Anchor Darling Double Disk Gate Valve (ADDDGV) issues. By letter dated October 26, 2017 (Reference 2), NEI informed NRC that each utility would provide a listing of their Anchor Darling valve population with active safety functions along with relevant valve information, including the results of susceptibility evaluations, repair status, and a repair schedule for each susceptible valve not yet repaired. This letter serves to provide this information for Sequoyah Nuclear Plant (SQN), Units 1 and 2.

For Browns Ferry Nuclear Plant, Units 1, 2, and 3, this letter provides the available information. However, TVA has not completed its review of the Browns Ferry Anchor Darling valve population, so the repair schedule cannot be provided at this time. TVA will provide this information after the necessary repairs have been identified.

This letter is also to confirm that Watts Bar Nuclear Plant (WBN), Units 1 and 2, does not use ADDDGVs to support any active safety function.

Enclosures 1 and 2 to this letter contain the following information for each BFN and SQN ADDDGV motor-operated valve, respectively.

- Plant Name, Unit, and Valve ID.
- System.
- Valve Functional Description.
- Valve Size.
- Active Safety Function (open, close, both).
- Are multiple design basis post-accident strokes required (yes/no)?
- Expert Panel Risk Ranking (high, medium, low).
- Result of susceptibility evaluation (susceptible or not susceptible).
- Is the susceptibility evaluation in general conformance with TP16-1-112R4 (Reference 3)?
- Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10? For cases where thread-friction was relied upon, information is provided whether the coefficient of friction was above or below 0.1.
- Was an initial stem-rotation check performed? If yes, include rotation criteria (i.e.  $\leq 10$  degrees or  $\leq 5$  degrees).
- Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4 (Reference 3)?
- The valve's repair status (i.e. repaired or not repaired).
- A repair schedule for each susceptible valve.

The new regulatory commitments contained in this letter are included in Enclosure 3.

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If you have any questions regarding this submittal, please contact Russell Thompson at (423) 751-2567.

Respectfully,



J. W. Shea  
Vice President, Nuclear Regulatory Affairs and Support Services

- Enclosures:
1. Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Anchor Darling Double Disc Gate Valve Information
  2. Sequoyah Nuclear Plant, Units 1 and 2 - Anchor Darling Double Disc Gate Valve Information
  3. Summary of Commitments

cc (Enclosures):

NRR Director - NRC Headquarters  
NRC Regional Administrator - Region II  
NRC Project Manager - Browns Ferry Nuclear Plant  
NRC Project Manager - Sequoyah Nuclear Plant  
NRC Project Manager - Watts Bar Nuclear Plant  
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant  
NRC Senior Resident Inspector - Watts Bar Nuclear Plant

Enclosure 1  
Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(Susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Browns Ferry	1	1-FCV-001-0055	Main Steam	MAIN STEAM LINE DRAIN INBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	1	1-FCV-001-0056	Main Steam	MAIN STEAM LINE DRAIN OUTBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	1	1-FCV-068-0003	Reactor Recirculation	REACTOR RECIRC PUMP 'A' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3)(4)</sup>
Browns Ferry	1	1-FCV-068-0079	Reactor Recirculation	REACTOR RECIRC PUMP 'B' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3)(4)</sup>
Browns Ferry	1	1-FCV-069-0001	Reactor Water Cleanup	RWCU INBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	No	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	1	1-FCV-069-0002	Reactor Water Clean-Up	RWCU OUTBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	1	1-FCV-071-0002	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY INBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	1	1-FCV-071-0003	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY OUTBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	1	1-FCV-073-0002	High Pressure Coolant Injection	HPCI INBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	1	1-FCV-073-0003	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	1	1-FCV-073-0081	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION BYPASS VALVE	1	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	1	1-FCV-075-0009	Core Spray	CORE SPRAY SYSTEM I MINIMUM FLOW VALVE	3	Both	Yes	Low	Susceptible <sup>(4)</sup>	Yes <sup>(5)</sup>	Yes, >0.10	Yes, ≤5 deg.	Yes	Not Repaired <sup>(4)(5)</sup>

- Notes: (1) Stem/wedge connection is a T-head. Not repaired due to not being susceptible.  
(2) Wedge pin was replaced with an Inconel pin and wedge pin analysis determined new pin is satisfactory.  
(3) Pin shear will not affect valve performance. If the pin sheared the applied torque would tighten the stem to upper wedge and there would be no loose parts since the pin is peened on both ends and broken parts would be captured in the upper wedge (See PDO for PER 692133, Rev 2).  
(4) Determine if valve has a pressed-on stem collar. (CR# 1334283).  
(5) Original pin remains installed and wedge pin analysis determined pin is satisfactory.

Enclosure 1  
Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(Susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Browns Ferry	1	1-FCV-075-0037	Core Spray	CORE SPRAY SYSTEM II MINIMUM FLOW VALVE	3	Both	Yes	Low	Susceptible <sup>(4)</sup>	Yes <sup>(5)</sup>	Yes, >0.10	Yes, ≤5 deg.	Yes	Not Repaired <sup>(4) (5)</sup>
Browns Ferry	2	2-FCV-001-0055	Main Steam	MAIN STEAM LINE DRAIN INBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	2	2-FCV-001-0056	Main Steam	MAIN STEAM LINE DRAIN OUTBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	2	2-FCV-068-0003	Reactor Recirculation	REACTOR RECIRC PUMP 'A' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3) (4)</sup>
Browns Ferry	2	2-FCV-068-0079	Reactor Recirculation	REACTOR RECIRC PUMP 'B' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3) (4)</sup>
Browns Ferry	2	2-FCV-069-0001	Reactor Water Cleanup	RWCU INBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	No	No	Yes	Repaired <sup>(2) (4)</sup>
Browns Ferry	2	2-FCV-069-0002	Reactor Water Cleanup	RWCU OUTBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2) (4)</sup>
Browns Ferry	2	2-FCV-071-0002	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY INBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	2	2-FCV-071-0003	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY OUTBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	2	2-FCV-073-0002	High Pressure Coolant Injection	HPCI INBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2) (4)</sup>
Browns Ferry	2	2-FCV-073-0003	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2) (4)</sup>
Browns Ferry	2	2-FCV-073-0081	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION BYPASS VALVE	1	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>

- Notes: (1) Stem/wedge connection is a T-head. Not repaired due to not being susceptible.  
(2) Wedge pin was replaced with an Inconel pin and wedge pin analysis determined new pin is satisfactory.  
(3) Pin shear will not affect valve performance. If the pin sheared the applied torque would tighten the stem to upper wedge and there would be no loose parts since the pin is peened on both ends and broken parts would be captured in the upper wedge (See PDO for PER 692133, Rev 2).  
(4) Determine if valve has a pressed-on stem collar. (CR# 1334283).  
(5) Original pin remains installed and wedge pin analysis determined pin is satisfactory.

Enclosure 1  
Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(Susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Browns Ferry	3	3-FCV-001-0055	Main Steam	MAIN STEAM LINE DRAIN INBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	3	3-FCV-001-0056	Main Steam	MAIN STEAM LINE DRAIN OUTBOARD ISOLATION VALVE	3	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	3	3-FCV-068-0003	Reactor Recirculation	REACTOR RECIRC PUMP 'A' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3)(4)</sup>
Browns Ferry	3	3-FCV-068-0079	Reactor Recirculation	REACTOR RECIRC PUMP 'B' DISCHARGE VALVE	24	Close	No	Low	Susceptible <sup>(4)</sup>	Yes <sup>(3)</sup>	No <sup>(3)</sup>	Yes, ≤5 deg.	Yes	Not Repaired <sup>(3)(4)</sup>
Browns Ferry	3	3-FCV-069-0001	Reactor Water Cleanup	RWCU INBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	3	3-FCV-069-0002	Reactor Water Cleanup	RWCU OUTBOARD CONTAINMENT ISOLATION VALVE	6	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	3	3-FCV-071-0002	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY INBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	3	3-FCV-071-0003	Reactor Core Isolation Coolant	RCIC STEAM SUPPLY OUTBOARD CONTAINMENT ISOLATION VALVE	3	Close	No	Medium	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>
Browns Ferry	3	3-FCV-073-0002	High Pressure Coolant Injection	HPCI INBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	3	3-FCV-073-0003	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION VALVE	10	Close	No	Medium	Susceptible <sup>(4)</sup>	Yes <sup>(2)</sup>	Yes, >0.10	No	Yes	Repaired <sup>(2)(4)</sup>
Browns Ferry	3	3-FCV-073-0081	High Pressure Coolant Injection	HPCI OUTBOARD CONTAINMENT ISOLATION BYPASS VALVE	1	Close	No	Low	Not Susceptible <sup>(1)</sup>	Yes <sup>(1)</sup>	No	No	No	Not Repaired <sup>(1)</sup>

- Notes:
- (1) Stem/wedge connection is a T-head. Not repaired due to not being susceptible.
  - (2) Wedge pin was replaced with an Inconel pin and wedge pin analysis determined new pin is satisfactory.
  - (3) Pin shear will not affect valve performance. If the pin sheared the applied torque would tighten the stem to upper wedge and there would be no loose parts since the pin is peened on both ends and broken parts would be captured in the upper wedge (See PDO for PER 692133, Rev 2).
  - (4) Determine if valve has a pressed-on stem collar. (CR# 1334283).
  - (5) Original pin remains installed and wedge pin analysis determined pin is satisfactory.

Enclosure 2  
Sequoyah Nuclear Plant, Units 1 and 2 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?(A)	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Sequoyah	1	1-FCV-063-0008-A	Safety Injection	RHR HTX A TO CVCS CHG PUMPS	8	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0011-B	Safety Injection	RHR HTX B TO SIS PUMPS	8	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0022-B	Safety Injection	SIS PUMPS COLD LEG INJ	4	Open/Close	Yes	Low	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(3)</sup>
Sequoyah	1	1-FCV-063-0025-B	Safety Injection	SIS CCP INJ TANK SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0026-A	Safety Injection	SIS CCP INJ TANK SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0039-A	Safety Injection	SIS CCP INJ TANK INLET SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0040-B	Safety Injection	SIS CCP INJ TANK INLET SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0072-A	Safety Injection	CONTAINMENT SUMP FLOW ISOL VLV	18	Open/Close	Yes	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-063-0073-B	Safety Injection	CONTAINMENT SUMP FLOW ISOL VLV	18	Open/Close	Yes	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>

Notes: (A) Applied Wedge Pin Torque must bound anticipated design basis operating torque requirements and current maximum total torque

(1) The repair of this MOV included upgrading the pin material to Inconel 718, and torquing the stem/wedge connection to a value equal to greater than the valve operating torque requirements and the maximum allowable setup valve total torque. A Flowserve analysis has been performed to demonstrate the repaired valve will withstand the maximum Sequoyah valve operating loads. The combination of applied stem/wedge torque and upgraded pin analysis provides additional design margin. Reference Appendix I

(2) The maximum allowed stem assembly force calculation uses a thread factor and the collar to wedge friction. This is just used to determine the maximum allowable torque of the stem to upper wedge. The evaluation does not rely on an additional thread frictional force to counteract the operating torque. The connection torque capability is based on the sum of the installed torque of the upper wedge to stem and the strength of the pin.

(3) Repair scheduled for U1C22 refueling outage.

(4) Repair scheduled for U2C22 refueling outage.

Enclosure 2  
Sequoyah Nuclear Plant, Units 1 and 2 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?(A)	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Sequoyah	1	1-FCV-074-0003-A	Residual Heat Removal	RHR PUMP A-A INLET FLOW CONTROL VLV	14	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-074-0021-B	Residual Heat Removal	RHR PUMP B-B INLET FLOW CONTROL VLV	14	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	1	1-FCV-074-0033-A	Residual Heat Removal	RHR HT EXCH A BYPASS	8	Open/Close	Yes	Medium	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(3)</sup>
Sequoyah	1	1-FCV-074-0035-B	Residual Heat Removal	RHR HT EXCH B BYPASS	8	Open/Close	Yes	Medium	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(3)</sup>
Sequoyah	2	2-FCV-063-0008-A	Safety Injection	RHR HTX A TO CVCS CHG PUMPS	8	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0011-B	Safety Injection	RHR HTX B TO SIS PUMPS	8	Open/Close	No	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0022-B	Safety Injection	SIS PUMPS COLD LEG INJ	4	Open/Close	Yes	Low	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(4)</sup>
Sequoyah	2	2-FCV-063-0025-B	Safety Injection	SIS CCP INJ TANK SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0026-A	Safety Injection	SIS CCP INJ TANK SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>

Notes: (A) Applied Wedge Pin Torque must bound anticipated design basis operating torque requirements and current maximum total torque

(1) The repair of this MOV included upgrading the pin material to Inconel 718, and torquing the stem/wedge connection to a value equal to greater than the valve operating torque requirements and the maximum allowable setup valve total torque. A Flowserve analysis has been performed to demonstrate the repaired valve will withstand the maximum Sequoyah valve operating loads. The combination of applied stem/wedge torque and upgraded pin analysis provides additional design margin. Reference Appendix I

(2) The maximum allowed stem assembly force calculation uses a thread factor and the collar to wedge friction. This is just used to determine the maximum allowable torque of the stem to upper wedge. The evaluation does not rely on an additional thread frictional force to counteract the operating torque. The connection torque capability is based on the sum of the installed torque of the upper wedge to stem and the strength of the pin.

(3) Repair scheduled for U1C22 refueling outage.

(4) Repair scheduled for U2C22 refueling outage.



Enclosure 2  
Sequoyah Nuclear Plant, Units 1 and 2 - Anchor Darling Double Disc Gate Valve Information

Plant Name	Unit	Valve ID	System	Valve Functional Description	Valve Size (inches)	Active Safety Function	Are multiple design basis post-accident strokes required?	Expert Panel Risk Ranking	Result of susceptibility evaluation	Is the susceptibility evaluation in general conformance with TP16-1-112R4?(A)	Does the susceptibility evaluation rely on thread friction? If yes, was the COF greater than 0.10?	Was an initial stem-rotation check performed? If yes, include rotation criteria	Was the diagnostic test data reviewed for failure precursors described in TP16-1-112R4?	Valve repair status
						(Open, Close, Both)	(Yes/No)	(High, Medium, Low)	(susceptible or not susceptible)	(Yes/No)	(No), (Yes, >0.10), (Yes, ≤0.10)	(No), (Yes, ≤10 deg.), (Yes, ≤5 deg.)	(Yes/ No)	(repaired or not repaired)
Sequoyah	2	2-FCV-063-0039-A	Safety Injection	SIS CCP INJ TANK INLET SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0040-B	Safety Injection	SIS CCP INJ TANK INLET SHUTOFF VLV	4	Open/Close	Yes	Low	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0072-A	Safety Injection	CONTAINMENT SUMP FLOW ISOL VLV	18	Open/Close	Yes	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-063-0073-B	Safety Injection	CONTAINMENT SUMP FLOW ISOL VLV	18	Open/Close	Yes	High	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-074-0003-A	Residual Heat Removal	RHR PUMP A-A INLET FLOW CONTROL VLV	14	Open/Close	No	High	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(4)</sup>
Sequoyah	2	2-FCV-074-0021-B	Residual Heat Removal	RHR PUMP B-B INLET FROM CONTROL VLV	14	Open/Close	No	High	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(4)</sup>
Sequoyah	2	2-FCV-074-0033-A	Residual Heat Removal	RHR HT EXCH A BYPASS	8	Open/Close	Yes	Medium	Not Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Repaired <sup>(1)</sup>
Sequoyah	2	2-FCV-074-0035-B	Residual Heat Removal	RHR HT EXCH B BYPASS	8	Open/Close	Yes	Medium	Susceptible	Yes	No <sup>(2)</sup>	No	Yes	Not repaired <sup>(4)</sup>

Notes: (A) Applied Wedge Pin Torque must bound anticipated design basis operating torque requirements and current maximum total torque

(1) The repair of this MOV included upgrading the pin material to Inconel 718, and torquing the stem/wedge connection to a value equal to greater than the valve operating torque requirements and the maximum allowable setup valve total torque. A Flowserve analysis has been performed to demonstrate the repaired valve will withstand the maximum Sequoyah valve operating loads. The combination of applied stem/wedge torque and upgraded pin analysis provides additional design margin. Reference Appendix I

(2) The maximum allowed stem assembly force calculation uses a thread factor and the collar to wedge friction. This is just used to determine the maximum allowable torque of the stem to upper wedge. The evaluation does not rely on an additional thread frictional force to counteract the operating torque. The connection torque capability is based on the sum of the installed torque of the upper wedge to stem and the strength of the pin.

(3) Repair scheduled for U1C22 refueling outage.

(4) Repair scheduled for U2C22 refueling outage.

## Enclosure 3

### Summary of Commitments

1. TVA will repair the following SQN Unit 1 Anchor Darling double disc gate valve MOVs during the Spring 2018 refueling outage: 1-FCV-063-0022-B, 1-FCV-074-0033-A, and 1-FCV-074-0035-B.
2. TVA will repair the following SQN Unit 2 Anchor Darling double disc gate valve MOVs during the Fall 2018 refueling outage: 2-FCV-063-0022-B, 2-FCV-074-0003-A, 2-FCV-074-0021-B, and 2-FCV-074-0035-B.
3. By April 30, 2018 TVA will complete its review based on TP16-1-112 R4 of BFN Anchor Darling double disc gate valve MOVs with active safety functions that are susceptible to the condition described in the Flowserve 10CFR21 Update dated July 11, 2017 to determine which valves require repair.
4. Upon completion of this review, by May 31, 2018, TVA will provide an updated listing of the BFN Anchor Darling valve information with a repair schedule for each susceptible valve not yet repaired.