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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Operating License No. DPR-16
Docket No. 50-219
Generic Letter 89-10, Supplement 3 Reassessment

This letter transmits the results of a detailed reassessment of the OCNGS motor operated valves which are within the scope of NRC Generic Letter 89-10, Supplement 3, as committed during NRC Inspection 50-219/91-81 conducted October 21-25, 1991, and documented in Inspection Report 50-219/91-81 unresolved item 91-81-03.

Attachment I provides a description of the general assumptions and methodology utilized for this assessment. Attachment II discusses the four (4) motor operated containment isolation valves in each of the Isolation Condenser Systems at OCNGS. Attachment III discusses the two (2) motor operated containment isolation valves in the Reactor Water Cleanup System supply line at OCNGS. These ten (10) motor operated containment isolation valves were determined to comprise the scope of Generic Letter 89-10, Supplement 3, as applicable to OCNGS. The motor operated valve in the RWCU return line is not included within the scope of Generic Letter 89-10, Supplement 3, as recognized in the Generic Letter. The RWCU return line contains an additional isolation check valve inside containment which would ensure isolation in the event of failure of the motor operated valve. The enclosed Table 2 provides a description of each Supplement 3 valve.

The results of this reassessment, as described in Attachments I, II, and III utilizing available industry information regarding postulated valve behavior under blowdown flow conditions, have confirmed that all Supplement 3 valves are capable of developing sufficient thrust at the present torque switch settings to perform their intended safety function under postulated worst case design basis conditions, including nominal and degraded voltage conditions. Therefore, it is determined that these valves are not deficient within the scope of Generic Letter 89-10, Supplement 3 concerns, and no further immediate actions are necessary.

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As previously noted, OCNGS does not have a High Pressure Coolant Injection System or a Reactor Core Isolation Cooling System. Therefore, these portions of Supplement 3 are not applicable to Oyster Creek.

The need for additional valve actuator torque and/or thrust margin to account for industry program developments and future testing will be considered within the scope of the ongoing Generic Letter 89-10 motor operated valve program.

Very truly yours,

G. L. Bond

for J. C. DeVine
Vice President and Director,
Technical Fur.tions

JCD/DJD/amk

Attachments

cc: Administrator, Region I
NRC Resident Inspector
Oyster Creek NRC Project Manager

Sworn and subscribed to before me this 15th day of February, 1992

Michele E. Shaffer
NOTARY PUBLIC OF NEW JERSEY

MICHELE E. SHAFFER
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES 11-25-94

ASSESSMENT METHODOLOGY

A design basis review was conducted to determine the worst case differential pressure and voltage conditions for each valve. Attachments II and III provide this basis for each specific valve.

Available voltage at the valve motor terminals was determined based on existing motor control center voltage calculations, actual cable lengths and cable temperature effects. Cable temperature effects were determined by calculating the accident environment thermal lag effect on the subject cables. This cable temperature rise was then utilized to calculate additional cable impedance. A minimum temperature of 75°C was utilized for all cables not subjected to a greater rise due to an accident environment, in order to conservatively account for higher ambient temperatures in cable trays due to adjacent energized cables.

The motor terminal voltage was then compared with the nominal motor ratings. For AC motor operators, the torque varies with the square of the voltage for the full range of applied voltage. For DC motor operators, the torque versus voltage curves are based on recent industry test data which demonstrates that the voltage versus torque is a linear relationship at voltages greater than 10% of rated value. The power demand (KVA) of the motor is assumed constant for a given torque demand.

The Electrical Distribution System will provide sufficient voltage to initiate motor gear turning through the point of hammer blow and start stem nut movement. Therefore, the motor can be assumed to be at full speed when the stem starts to move and the valve operator motor running efficiency is then used for calculating torque values. The greatest required thrust occurs when seating the valve. Since this is the intended safety function, it is not necessary to determine needed thrust values throughout the valve stroke. The maximum thrust the operator must produce is determined by utilizing the "standard industry equation". Valve performance is assessed at the "flow isolation" position. This is the position where the stem force is expected to be highest prior to wedging into the seats. The safety function of our Supplement 3 valves is met by achieving the flow isolation position prior to torque switch trip. Valve disc factors used in our analysis were obtained by study of References 1, 2, and 3 identified below. GPUN employed the mean seat area in the standard industry equation, rather than the valve orifice area. The above approach to required thrust determination is consistent with INEL and EPRI in References 2 and 3. This is converted to a maximum torque the motor operator is required to produce by multiplying thrust value by the stem factor, unit ratio, application factor, and running efficiency.

The current needed by the motor to deliver the necessary torque is then determined using the torque versus current curve (motor rated curve at rated voltage). This current is then used to calculate the voltage drop that will occur with this current flowing through the cable to the motor, accounting for length of cable from the MCC and resistance due to the temperature of the cable, as stated above. The voltage drop produces an available voltage at the motor terminals. For AC, the voltage at the MCC is calculated for worst case degraded grid conditions (i.e., just above the undervoltage protection setpoint). For DC, the voltage is calculated for worst case conditions assuming: (1) decreased voltage due to battery loading and draindown at the time of required valve operation, and (2) loss of battery charger, if appropriate.

The current versus torque curve assumes rated voltage at the valve motor terminals. Due to the voltage drops under the defined conditions the terminal voltage is less than rated, and an actual terminal voltage value is determined through a series of reiterative current/voltage drop calculations. This final terminal voltage value produces the torque delivered by the motor operator. If this torque delivered by the motor operator is greater than the torque needed by the valve, then the valve operator has the capability to close the valve. The acceptability of current torque switch settings on the valves is determined by comparing, the most recent as-left thrust measurements (from MOVATS static testing performed in the 13R outage - Spring of 1991) to the calculated required thrust values excluding packing load. The as-left thrust is the thrust above preload/running load on the MOVATS trace. If both conditions are met the valve is shown to have capability to close to the "flow isolation" position even under degraded voltage and postulated maximum ambient temperature conditions.

REFERENCES

(1) NUREG CR 5406, Vol. 2, BWR Reactor Water Cleanup System Flexible Wedge Gate Isolation Valve Qualification and High Energy Flow Interruption Test.

(2) EPRI Report NP-7065, Review of NRC/INEL Gate Valve Test Program January, 1991

(3) INEL Report EGG-SSRE-9926, November 12, 1991, Evaluation of EPRI Draft Report HP-7065.

ISOLATION CONDENSER SYSTEM

The Isolation Condenser System (ICS) is a standby, high pressure system for removal of fission product decay heat when the reactor vessel is isolated from the main condenser, and provides alternate shutdown capability in the event of damage from a fire or natural phenomenon, as stated in FSAR Section 6.3.1.1.1.

A. Steam Supply Isolation Valves

V-14-31, 33 (DC outside containment)
V-14-30, 32 (AC outside containment)

The Isolation Condenser System (ICS) is assumed to be in the standby mode (i.e., the ICS condensate return line is isolated by normally closed DC powered valves V-14-34, 35), which is the condition of the ICS during normal plant operating conditions. The worst case operating conditions for the normally open ICS steam line isolation valves in this mode is the postulated high energy line break (HELB) of the ICS piping outside containment during normal plant operation at 100% power. An additional single failure of the redundant containment isolation valve in the open position is assumed, which produces a ΔP across the remaining isolation valve of 1020 psi due to full reactor pressure conditions.

V-14-31, 33 (DC outside containment)

The worst case operating condition for V-14-31, 33 is the postulated HELB of the ICS steam line piping outside containment during normal plant operations at 100% power. An additional single failure of the corresponding AC powered isolation valves (V-14-30, 32) in the open position is assumed due to failure of AC bus USS 1B2, or due to failure of the valve itself, coincident with a loss of offsite power (LOOP). This single failure of V-14-30, 32 produces a continuous ΔP across V-14-31, 33 of 1020 psi. This is conservative as reactor trip or feedwater pump trip was not included to accelerate RCS pressure decay during the 35 second delay from time of the HELB to the high flow isolation signal. Piping friction loss, which reduces the effective pressure differential at the valve during blowdown was also not considered.

Normal DC voltage of 132V is available to V-14-31, 33, with or without a loss of offsite power since the battery chargers for these valves are powered from an alternate AC bus. This produces an actual bus voltage of 132 volts and a motor terminal voltage of 118.2 volts for V-14-31, and 100.6 volts for V-14-33.

During the 13R refueling outage, these valves were replaced with 10 inch, 900 lb. parallel disc stainless steel gate valves. A valve factor of 0.40 is utilized (consistent with NRC Information Notice 90-72) based on manufacturer test results for a similar valve. A conservative stem factor (u) of 0.20 is assumed based on best available industry data and experience.

As shown in Table 1, the available motor torque is 56.4 ft.-lbs. for V-14-31 and 48.0 ft.-lbs. for V-14-33, and the required motor torque to close each valve is 37.2 ft.-lbs. The actual available valve thrust based on 13R testing exceeds the required thrust. Therefore, the motor actuators are adequately sized and the current torque switch settings will allow V-14-31, 33 to perform their intended safety function.

V-14-30, 32 (AC outside containment)

The worst case operating condition for V-14-30, 32 is the postulated HELB of the ICS steam line piping outside containment during normal plant operation at 100% power. An additional single failure of the corresponding DC powered isolation valves (V-14-31, 33) in the open position is assumed, which produces a continuous ΔP across V-14-30, 32 of 1020 psi. A containment isolation signal is initiated 35 seconds after the HELB in the ICS piping due to high flow through the line. A reactor trip is conservatively not assumed and no credit for RCS pressure decay over the 35 second delay period is taken.

Degraded AC power conditions from the offsite power distribution system (i.e., just above the undervoltage protection setpoint) is assumed to be available to V-14-30, 32, as this produces a lower voltage available to the valve actuator motor than if a LOOP was assumed and V-14-30, 32 were to be powered from the emergency diesel generators. This results in a bus voltage of 402.2 volts and a motor terminal voltage of 377.9 volts for V-14-30, and 380.9 volts for V-14-32.

During the 13R refueling outage,these valves were replaced with 10 inch, 900 lb. parallel disc stainless steel gate valves. A valve factor of 0.40 is utilized (consistent with NRC Information Notice 90-72) based on manufacturer test results for a similar valve. A conservative u factor of 0.20 is assumed based on best available industry data and experience.

As shown in Table 1, the available motor torque is 26.9 ft.-lbs. for V-14-30 and 26.9 ft. lbs. for V-14-32, and the required motor torque to close each valve is 24.5 ft.-lbs. The actual available valve thrust based on 13R testing exceeds the required thrust. Therefore, the motor actuators are adequately sized and the current torque switch settings will allow V-14-30, 32 to perform their intended safety function.

B. Condensate Return Line Isolation Valves

V-14-34, 35 (DC outside containment)
V-14-36, 37 (AC inside containment)

During normal plant operation, the ICS outboard, DC powered condensate return line isolation valves are normally closed. The ICS is automatically initiated by a persistent signal of either high reactor vessel pressure or low-low reactor water level, causing the normally closed condensate return outboard isolation valves to open. The reactor will also have scrammed due to these signal inputs. Coincident with the signal for ICS initiation, is a signal to trip all five reactor recirculation pumps.

The ICS is automatically isolated from the reactor vessel in the event of high flow lasting over 35 seconds in either the steam or condensate line which results from a line break. This analysis conservatively assumes the HELB occurs at the approximate time of ICS initiation which produces the highest initial reactor coolant pressure for the transient. The licensing basis for the ICS high flow trip isolation setpoints (FSAR 6.3.2.5) assumes the HELB occurs after the ICS has been fully initiated which results in a lower reactor coolant pressure. Reactor coolant system depressurization over the 35 second isolation signal delay is accounted for. Therefore, the worst case system operating condition for closure of the condensate return line isolation valves is the following: (1) the plant is at normal operating conditions, (2) a postulated transient occurs which initiates the ICS due to loss of the main condenser (i.e. MSIV closure), and (3) a high energy line break (HELB) of an ICS loop requiring reactor vessel isolation of the ICS system resulting from high flow in the steam or condensate return lines. The ability to withstand two independent events has been considered for proper Isolation Condenser System operation, in accordance with FSAR Section 6.2.4.5, while satisfying GDC-2 and 54. This scenario results in a maximum differential pressure condition for either condensate return line isolation valve of 730 psi, and less than 730 psi for the adjacent series valve. However, we require that both ICS condensate return line isolation valves close against the 730 psi differential pressure.

V-14-34,35 (DC outside containment)

DC voltage to V-14-34, 35 is based on assuming the corresponding DC powered valve in the steam line (V-14-33 and V-14-31) is closing simultaneously, with nominal battery voltage from the battery chargers powered by the D/G in the event of a LOOP. This produces an actual bus voltage of 132 volts and a motor terminal voltage of 119.4 volts for V-14-34 and 79.6 volts for V-14-35.

Valves V-14-34, 35 were replaced during the 13R refueling outage with 10 inch, 900 lb. parallel disc stainless steel gate valves. A valve factor of 0.40 is utilized (consistent with NRC Information Notice 90-72) based on manufacturer test results for a similar valve. A conservative u factor of 0.20 is assumed based on best available industry data and experience.

As shown in Table 1, the available motor torque is 57.0 ft.-lbs. for V-14-34 and 37.8 ft.-lbs. for V-14-35, and the required motor torque to close each valve is 27.4 ft.-lbs. The actual available valve thrust based on 13R testing exceeds the required thrust. Therefore, the motor actuators are adequately sized and the current torque switch settings will allow V-14-34, 35 to perform their intended safety function.

As stated above, the assessment for V-14-35 assumes a single failure occurs (such as loss of heat sink) which places the ICS in operation with all ICS valves open, followed by a HELB in the ICS "B" loop piping. This initiates a signal to close the ICS steam side valves V-14-32, 33 and the condensate side valves V-14-35, 37. These two sets of valves will start to close, sharing the differential pressure closure forces between them. The faster valve will tend to close first which will relieve the slower valve of any differential pressure. The two DC powered valves in this

scenario, V-14-33, 35, will be closing at the same time. Their simultaneous operation results in reduced voltage at their respective motor terminals. This reduced voltage slows the valve movement. However, as the differential pressure decreases due to continued closure of the AC powered valve, the DC powered valves will complete isolation with the available motor terminal voltage since the valve disc resistance decreases significantly.

V-14-36, 37 (AC inside containment)

Offsite power is considered to be in a degraded condition (i.e., just above the undervoltage protection setpoint) for the AC powered valves. This produces a bus voltage of 402.2 volts and a motor terminal voltage of 383.1 volts for V-14-36 and 359.7 volts for V-14-37.

In determining a valve disc factor to use in the evaluation available industry data was reviewed. Valve V-14-36 and 37 are Anchor/Darling 10" 600 lb stainless steel flexible wedge gate valves with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valves were manufactured in the mid to late 60's at the Hayward, California plant of Anchor Valve.

The most similar of the INEL test valves is an Anchor/Darling 10" 900 lb carbon steel flexible wedge gate valve with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc seat faces. The valve was manufactured in 1982 at the Williamsport plant of Anchor/Darling. This valve is labeled as Valve 4 in EPRI Report NP-7065.

The EPRI report identifies an apparent valve factor of 0.49 based on evaluation of the INEL data for the first blowdown test of Valve 4. The report further suggests that this data is potentially applicable to similar valves intended to close under blowdown conditions under the range of conditions tested.

V-14-36/37 are in condensate return lines at the Isolation Condenser inside the drywell. Their flow medium for blowdown isolation is 730 psig water.

INEL in report EGG-SSRE-9926, Evaluation of EPRI Draft Report NP-7065 - review of NRC/INEL Gate Valve Test Program, dated November 12, 1991 has recalculated the apparent disc factor for flow isolation of test Valve 4 in Table 2, Reassessment of the Design Basis Tests, page 49. The recalculated apparent disc factor corresponding to the EPRI 0.49 value is 0.30. The difference is attributed to the EPRI report incorrectly identifying the point of true flow isolation in the test.

GPUN uses a 0.40 valve factor for these valves. The OCNGS valves and test conditions are similar to the INEL test results and allow for data extrapolation although the test valve and flow conditions are not identical. Based upon a similarity analysis the INEL apparent disc factor of 0.30 can be used as a basis for the V-14-36/37 valve factor. The valve factor has been adjusted upward to account for the somewhat larger disc tilt angle in V-14-36/37 compared to Valve 4, per an Anchor/Darling evaluation comparing Valve 4 dimensions and the V-14-36/37 drawing. A conservative approach is to add an additional 33% to account for the greater tilt. This results in a valve factor at 0.40 for use in the evaluation.

The diameter to be used with the 0.40 valve factor is the seat contact surface diameter which is 9.3" as provided by Anchor/Darling. This is larger than the nominal bore diameter of 8.75" and is just larger than the nominal I.D. of 9.250" of the stellite hard facing on the valve body seat.

As shown in Table 1, the available motor torque is 27.6 ft-lbs for V-14-36 and 26.2 ft-lbs. for V-14-37, and the required motor torque to close each valve is 20.7 ft-lbs. The actual available valve thrust based on 13R testing exceeds the required valve thrust. Therefore, the motor actuators are adequately sized and the current torque switch settings will allow V-14-36, 37 to perform their intended safety function.

REACTOR WATER CLEANUP SYSTEM SUPPLY LINE

The Reactor Water Cleanup System (RWCU) is a filtration and demineralization system for maintaining the purity of the water in the Reactor Coolant System (RCS). The RWCU System is in operation during normal plant conditions and thus the system containment isolation valves are normally open. Reactor coolant flows under reactor pressure from the suction of the reactor Recirculation Pump B, is cooled, depressurized, filtered and demineralized, and then pumped to the discharge of Recirculation Pump B. The system supply line has an AC powered motor operated isolation valve (V-16-1) inside the drywell and two parallel DC powered motor operated isolation valves (V-16-14 and V-16-2) outside the drywell. The one parallel valve V-16-2, is normally closed and is utilized at RCS system pressures less than 125 psig. Therefore, V-16-2 is not evaluated as a Supplement 3 valve. The isolation valves will close, and the cleanup pumps will stop automatically under conditions of high drywell pressure or low-low reactor water level, as well as certain fault conditions within the RWCU system specified in FSAR Section 5.4.8.2.

In determining the valve disc factor to employ in the evaluation, available industry data was reviewed. Valves V-16-1 and 14 are <u>Anchor/Darling 6" 600 lb stainless steel</u> flexible wedge gate valves with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valves were manufactured in the mid to late 60's at the Hayward, California plant of Anchor Valve.

The most similar of the INEL test valves is an <u>Anchor/Darling 6" 900 lb carbon steel</u> flexible wedge gate valve with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valve was manufactured in 1988 at the Williamsport plant of Anchor/Darling. This is labeled as Valve A in EPRI Report NP-7065.

The EPRI Report derived an apparent valve factor for blowdown flow in test Valve 4 of 0.63 and states that this value is potentially applicable to similar valves under the range of conditions tested. This factor was derived from EPRI review of the INEL test data for test number A-3-5.

V-16-1/14 are in the Reactor Water Cleanup system supply lines. Their flow medium for blowdown isolation is 1030 psig water.

INEL in report EGG-SSRE-9926, Evaluation of EPRI Draft Report NP-7065 - Review of NRC/INEL Gate Valve Test Program, dated November 12, 1991, has recalculated the apparent disc factor for test Valve A in Table 2, Reassessment of the Design Basis Tests, page 49. The recalculated disc factor corresponding to the EPRI 0.63 value is 0.36. The difference is attributed to the EPRI report incorrectly identifying the point of true flow isolation in the test.

GPUN reviewed the data for test Valve A from a different perspective. NUREG/CR-5406 figures on Pages 135, 139 and 140 show data from test A-3-5, the first blowdown closure test for Valve A. NUREG/CR-5406, page 135 indicates DELTA-P1 (pressure drop across the flow element) reaching zero at about 25 seconds into the test. This is indicative of blowdown flow reaching zero at about 25 seconds. NUREG/CR-5406, page 139, plotting torque switch volts versus time, indicates an anomalous impulse at 25 seconds, with torque switch trip at 27 seconds. We believe this indicates the valve disc aggressively engaging and damaging the valve seats at this point in the stroke. Also, valve position indication after 25 seconds indicates no additional movement, although the valve did not go to the 100% closed position. Thus, beyond 25 seconds the valve motor was driving the valve disc into the seat ring. During the test nitrogen was being expanded through the valve in its near closed position. The expanding nitrogen would tend to cool and dry the interfacing metal surfaces which could account for the failure of the disc to completely seat. Subsequent liquid blowdown tests indicated lower disc factors which could be attributed to the lubricating effect of the liquid as well as wear-in of the valve disc.

NUREG/CR-5406, page 140, also suggests this anomalous behavior starting at about 25 seconds and stem force increasing at a greater rate after 25 seconds. This data suggests that the most severe valve anomalous behavior (seat damage, gouging) occurred after blowdown flow was reduced essentially to zero. GPUN derived a mean apparent disc factor of 0.28 considering all the test data for Valve A with a standard deviation of 0.034. A mean plus 2-sigma value would then be 0.35.

A valve factor of 0.38 was used for these valves. This value bounds the result of the GPUN analysis and the suggested factor in INEL EGG-SSRE-9926. The diameter to be used with the 0.38 valve factor is the seat contact surface diameter which is 5.9" as provided by Anchor/Darling.

V-16-1 (AC inside containment)

The worst case operating condition for V-16-1 is the postulated high energy line break (HELB) of the RWCU piping outside containment during normal plant operation at 100% power. An additional single failure of valve V-16-14 in the open position is assumed, which produces a ΔP across V-16-1 of 1030 psi. A postulated HELB of the RWCU piping inside containment would result in an insignificant ΔP across V-16-1. A containment isolation signal on reactor low-low water level would require V-16-1 to close. A small RCS pressure decay may occur due to the time required to generate the containment isolation signal on reactor low-low water level.

Degraded AC power conditions from the offsite power distribution system (i.e, just above the undervoltage protection setpoint) is assumed to be available to V-16-1, as this produces a lower voltage to the valve actuator motor than if a LOOP was assumed and V-16-1 were to be powered from the emergency diesel generators. This produces a bus voltage of 402.2 volts and a motor terminal voltage of 382.6 volts.

A conservative u factor of 0.20 is assumed based on best available industry data and experience.

As shown in Table 1, the available motor torque is 11.3 ft-lbs and the required motor torque to close the valve is 10.1 ft-lbs. The actual available valve thrust based on 13R testing exceeds the required valve thrust. Therefore, the motor actuator is adequately sized and the current torque switch setting will allow V-16-1 to perform its intended safety function.

V-16-14 (DC outside containment)

The worst case operating condition for V-16-14 is the postulated high energy line break (HELB) of the RWCU piping outside containment during normal plant operation at 100% power. An additional single failure of V-16-1 in the open position is assumed which produces a ΔP across V-16-14 of 1030 psi. A postulated HELB of the RWCU piping inside containment would result in an insignificant ΔP across V-16-14. A containment isolation signal on reactor low-low water level would require V-16-14 to close. A small RCS pressure decay may occur due to the time required to generate the containment isolation signal on reactor low-low water level.

A nominal DC battery float voltage of 132V is available to power V-16-14 since the redundant emergency diesel generator will continue to power the battery chargers for V-16-14. This produces a motor terminal voltage of 118.0 volts.

A conservative u factor of 0.20 is assumed based on best available industry data and experience.

As shown in Table 1, the available motor torque is 23.5 ft-lbs and the required motor torque to close the valve is 17.1 ft-lbs. The actual available valve thrust based on 13R testing exceeds the required thrust. Therefore, the motor actuator is adequately sized and the current torque switch setting will allow V-16-14 to perform its intended safety function.

TABLE 1

GENERIC LETTER 89-10, SUPPLEMENT 3 ASSESSMENT DATA

VALVE	ΔP (PSI)	VALVE FACTOR	REQ'D THRUST (lbs) (a)	u	STEM TORQUE REQ'D (ft-lbs)	RUNNING EFFICIENCY	MOTOR TORQUE REQ'D (ft-lbs)	UNDER VOLTAGE (Volts)	UV FACTOR	MOTOR TORQUE AVAIL. (ft-lbs)	AS-IS TORQUE SWITCH SETTING	SPRING PACK TORQUE (ft-lbs)	STEM TORQUE @ UV (ft-lbs)	13R AS-LEFT THRUST (lbs) (b)
V-14-31	1020	.40	30768 32737	.2	935	.5	37.2	118.2	.94	56.4	1.0	874	1575	40,558
V-14-33	1020	.40	30768 32737	.2	935	.5	37.2	100.6	.80	48.0	1.75	1213	1340	47,635
V-14-30	1020	.40	30768 32737	.2	768	.55	24.5	377.9	.82	26.9	2.5	525	913	34,706
V-14-32	1020	.40	30768 32737	.2	768	.55	24.5	380.9	.82	26.9	2.0	413	936	31,860
V-14-34	730	.40	22020 23429	.2	689	.5	27.4	119.4	.95	57.0	1.0	874	1591	44,691
V-14-35	730	.40	22020 23429	.2	689	.5	27.4	79.6	.63	37.8	1.0	874	1055	37,572
V-14-36	730	.40	21851 23249	.2	538	.55	20.7	383.1	.83	27.6	2.75	580	759	23,677
V-14-37	730	.40	21851 23249	.2	538	.55	20.7	359.7	.81	26.2	2.75	580	722	27,429
V-16-1	1030	.38	12521 13360	.2	265	.5	10.1	382.6	.87	11.3	2.0	300	330	14,893
V-16-14	1030	.38	12521 13360	.2	265	.55	17.1	118.0	.94	23.5	2.25	350	396	13,270

a) The upper number is the calculated required thrust and is used in the operator sizing calculations. The lower number is the calculated thrust minus packing load and then adjusted upward by the MOVATS inaccuracies in Table 3 of ER-5.0. The lower number is the target thrust above pre-load/running load for MOVATS testing.

b) 13R as-left thrust is the thrust above pre-load/running load on the MOVATS trace. This is to be compared to the lower number in the Required Thrust column.

TABLE 2
OCNGS GENERIC LETTER 89-10, SUPPLEMENT 3 MOTOR
OPERATED VALVES

	V-14-30	V-14-31	V-14-32	V-14-33 -	V-14-34	V-14-35	V-14-36	V-14-37	V-16-1	V-16-14
SYSTEM	ICS "A" Steam Line	ICS "A" Steam Line	ICS "B" Steam Line	ICS "B" Steam Line	ICS "A" Condensate Return Line	ICS "B" Condensate Return Line	ICS "A" Condensate Return Line	ICS "B" Condensate Return Line	RWCU Supply Line	RWCU Supply Line
FUNCTION	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Containment Isolation	Contain-ment Isolation
LOCATION	Outside Containment	Outside Containment	Outside Containment	Outside Containment	Outside Containment	Outside Containment	Inside Containment	Inside Containment	Inside Containment	Outside Contain-ment
POWER SUPPLY	A.C.	D.C.	A.C.	D.C.	D.C.	D.C.	A.C.	A.C.	A.C.	D.C.
NORMAL POSITION	Open	Open	Open	Open	Closed	Closed	Open	Open	Open	Open
ACTUATION	Close	Close	Close	Close	Close	Close	Close	Close	Close	Close
SIZE/TYPE	10" Gate	10" Gate	10" Gate	10" Gate	10" Gate	10" Gate	10" Gate	10" Gate	6" Gate	6" Gate