ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9204010087 DOC.DATE: 92/03/25 NOTARIZED: NO DOCKET #
FACIL:50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270

AUTH.NAME	AUTHOR AFFILIATION
BENESOLE,S.G.	Duke Power Co.
HAMPTON,J.W.	Duke Power Co.

RECIP.NAME	RECIPIENT AFFILIATION

SUBJECT: LER 92-002-00:on 920210,TS violation occurred due to pressurizer safety relief valve actuation.Caused by setpoint error.Test procedures changed.W/920325 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 LA	1	1	PD2-3 PD	1	1
	WIENS,L	1	1			
INTERNAL:	ACNW	2	2	ACRS	2	2
	AEOD/DOA	1	1	AEOD/DSP/TPAB	1	1
	AEOD/ROAB/DSP	2	2	NRR/DET/EMEB 7E	1	1
	NRR/DLPQ/LHFB10	1	1	NRR/DLPQ/LPEB10	1	1
	NRR/DOEA/OEAB	1	1	NRR/DREP/PRPB11	2	2
	NRR/DST/SELB 8D	1	1	NRR/DST/SICB8H3	1	1
	NRR/DST/SPLB8D1	1	1	NRR/DST/SRXB 8E	1	1
	REG FILE 02	1	1	RES/DSIR/EIB	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	EG&G BRYCE,J.H	3	3	L ST LOBBY WARD	1	1
	NRC PDR	1	1	NSIC MURPHY,G.A	1	1
	NSIC POORE,W.	1	1	NUDOCS FULL TXT	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
TOTAL NUMBER OF COPIES REQUIRED: LTTR 32 ENCL 32

Duke Power Company
Oconee Nuclear Generation Department
P.O. Box 1439
Seneca, SC 29679

J.W. HAMPTON
Vice President
(803)885-3499 Office
(704)373-5222 FAX

DUKE POWER

March 25, 1992

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 270/92-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 270/92-02, concerning pressurizer relief valve setpoint deviation.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

J W Hampton

J. W. Hampton
Vice President

/ftr

Attachment

xc: Mr. S. D. Ebneter
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, Georgia 30323

Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. P. E. Harmon
NRC Resident Inspector
Oconee Nuclear Station

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, NY 10020

IE22

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	1 OF 0 8

TITLE (4) Pressurizer Safety Relief Valve Actuation Setpoint Error Due To Defective Procedure Results In A Technical Specification Violation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 2	1 0	9 2	9 2	0 0 2	0 0	0 3	2 5	9 2		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): - 0 -

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

[ ] 20.402(b)	[ ] 20.405(c)	[ ] 50.73(a)(2)(iv)	[ ] 73.71(b)
[ ] 20.405(a)(1)(i)	[ ] 50.36(c)(1)	[X] 50.73(a)(2)(v)(D)	[ ] 73.71(c)
[ ] 20.405(a)(1)(ii)	[ ] 50.36(c)(2)	[ ] 50.73(a)(2)(vii)	[ ] OTHER (Specify in Abstract below and in Text, NRC Form 366A)
[ ] 20.405(a)(1)(iii)	[ ] 50.73(a)(2)(i)	[ ] 50.73(a)(2)(viii)(A)	
[ ] 20.405(a)(1)(iv)	[ ] 50.73(a)(2)(ii)	[ ] 50.73(a)(2)(viii)(B)	
[ ] 20.405(a)(1)(v)	[ ] 50.73(a)(2)(iii)	[ ] 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)	
S. G. Benesole, Safety Review	8 0 3	8 8 5 - 3 5 1 8

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
D	A B	V	D 2 4 3	Yes					

SUPPLEMENTAL REPORT EXPECTED (14)

[ ] YES (If yes, complete EXPECTED SUBMISSION DATE) [X] NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ABSTRACT

On February 10, 1992, with Unit 2 at cold shutdown for refueling, notification was received from Wyle Laboratories that, during testing, both Oconee Unit 2 pressurizer code safety relief valves actuated at pressures above the maximum valve lift setpoint band given in the bases of the Technical Specifications. As a result, it could not be assured that the valves would have performed their safety function during the last fuel cycle. Therefore, a Technical Specification requirement was not met from October 26, 1990 to January 9, 1992. Spare pressurizer relief valves, whose actuation setpoints had previously been set within the required band using an improved test procedure, were installed prior to the unit startup. Investigations have concluded that the previous Wyle valve test procedure could introduce setpoint errors. Corrective action was completed to change the test procedure. However, the initial testing of these Unit 2 valves was performed prior to the completion of this corrective action. The root cause of these valves' setpoint errors is defective procedure, technical deficiency.

BACKGROUND

The Reactor Coolant System (RCS) [EIIS:AB] serves as a barrier to prevent radionuclides in the reactor coolant from reaching the atmosphere. System pressure limits have been established to assure the integrity of the RCS. The design pressure of the RCS is 2500 psig. The maximum transient pressure, as specified by the American Society of Mechanical Engineers (ASME) Code, Section III, Summer 1967, is 110 percent of design pressure. Thus, the safety limit for RCS pressure is 2750 psig. The pressurizer code safety relief valves (PCSRV) prevent overpressurization of the RCS during transients and accidents which involve a mismatch between the primary heat source and the secondary heat sink. Technical Specification 3.1.1.c requires that both PCSRVs be operable whenever the reactor is critical. The bases of this Technical Specification states that the PCSRV lift setpoint (the pressure at which the valve begins to lift) shall be set at 2500 psig plus or minus 1 percent allowance for error. One PCSRV must be operable whenever all RCS openings are closed. PCSRVs are required by Technical Specifications to be tested every refueling outage.

The PCSRVs were manufactured by Dresser Industries. Since equipment to test and establish setpoints for these valves is not present on site, the valves are removed during scheduled refueling outages, shipped to a vendor (Wyle Laboratories), tested and adjusted as necessary, and returned to Oconee. Meanwhile, spare PCSRVs are installed to replace those being tested. When the tested valves are returned to Oconee, they become the spares. In this manner, each pair of PCSRVs is rotated between the three Oconee units.

The ability of PCSRVs to repetitively and consistently perform within the plus or minus 1 percent setpoint tolerance is recognized as an industry wide concern. A brief history shows that approximately 42 percent of Industry's as-found tests resulted in a setpoint deviation greater than the 1 percent tolerance. (The Industry's percent value is not all inclusive, but is based on the utilities who responded to a survey.)

EVENT DESCRIPTION

In May 1990, pressurizer code safety relief valves (PCSRV) serial numbers BL8891 and BL8895 were removed from Unit 1 and were sent to Wyle Laboratories for testing and maintenance using the old test procedure. They were subsequently installed in Unit 2 during a refueling outage which ended October 26, 1990.

In February 1991, two PCSRVs were removed from Oconee's Unit 3 and were also sent to Wyle Laboratories for tests and maintenance. They were tested using the old test procedure. They were found to lift at pressures above the design setpoint tolerance, but analysis showed that they would still have controlled Reactor Coolant System (RCS) pressure below the safety limit. This problem and planned corrective action were reported to the NRC

TEXT (If more space is required, use additional NRC Form 366A's) (17)

as a Special Report entitled, "Pressurizer Safety Relief Valve Actuation Setpoint Drift Occurs Due To Unknown Causes, Possible Test Procedure Deficiency", dated July 10, 1991, per Problem Investigation Report number 3-091-0024. A similar problem with PCSRVs occurred at Catawba and it is described in a Special Report submitted from that station under Problem Investigation Report number 1-C90-0075.

On January 14, 1992, during the Unit 2 end of cycle 12 refueling outage, with the unit at less than 200 degrees F and at atmospheric pressure, the PCSRVs were removed from the pressurizer, packaged, and sent to Wyle Laboratories for testing and maintenance. On February 8, 1992, the first of the two was tested and found to be outside the required setpoint pressure band. On February 10, 1992, the second of the two valves was tested and found to be outside the required setpoint band. Nuclear Maintenance Engineer A received notifications by telephone, on the same two days, from Wyle Laboratories personnel that the "as-found " actuation setpoint of these two valves (serial numbers BL8891 and BL8895) had been found to be above the allowed tolerance of one percent for the desired setpoint of 2500 psig. Nuclear Maintenance Engineer A notified Nuclear Maintenance Services Engineer A, by telephone, about the anomalies on the same days. A Notice of Anomaly was sent by Wyle Laboratories to the Nuclear Maintenance Engineer A on February 10 and 11, 1992. It was found that both valves lifted at 2697 psig, which is 7.9 percent above the 2500 psig setpoint.

On February 21, 1992, Duke Engineering performed an operability evaluation for the past Oconee Unit 2 fuel cycle number 12, which included a determination of the maximum acceptable PCRSV setpoint. Their analysis indicated that the maximum acceptable lift setpoint to prevent exceeding the RCS safety limit of 2750 psig was 2670 psig or 6.8 percent above the RCS design pressure of 2500 psig. They concluded that, with the as-found valve setpoints of 7.9 percent above the nominal lift setpoint, the peak RCS pressure could have exceeded the 2750 psig safety limit during a startup rod withdrawal accident. As a result of this conclusion, the PCSRVs were determined to have been technically inoperable from October 26, 1990 to January 9, 1992.

CONCLUSIONS

Investigations, resulting from the two previous Special Reports, into the setpoint deviations of the pressurizer code safety relief valves (PCSRVs) developed nine potential causes. After that time, four potential causes were eliminated from consideration. One of the remaining potential causes is spring performance and it is still under investigation. The last four remaining potential causes involved technical deficiencies within the test procedure. The last four potential causes culminate into the root cause of the valve setpoint deviations which is defective procedure, technical deficiencies. These four procedural deficiencies are:

1. Leaking valve during setpoint test.

   If valves are leaking during the steam setpoint verification test, the valves' huddle chamber (see Figure 1) could become pressurized, effectively increasing the valve seat area. With this larger area, a lower pressure could then produce sufficient force to lift the disc. If the leak was later repaired as was done with the jack and lap process, this would result in a higher actual setpoint if retesting on steam is not performed.

2. The jack and lap process.

   The jack and lap process is a partial disassembly of the valve while maintaining spring pressure. This process is used to polish the valve seats, often in preparation for a final gaseous nitrogen leakage test. This disassembly process obviously can introduce some small error into the as-tested setpoint since it is very difficult to reassemble the valve exactly as it was found.

3. Ring adjustment after a setpoint test.

   If a valve undergoes ring adjustments, particularly on the lower ring (nozzle ring), its transition from simmer (valve disc starts to move off seat) to pop (valve is fully open) is changed and its performance under leaking conditions is also changed.

4. Setpoint trending control.

   While performing setpoint verification testing, particularly after a valve rebuild, performance stabilization is necessary to validate a true setpoint. If setpoints are trending in one direction some stabilization or "turn around" is desired before a test is considered valid. Test controls should be tight enough to ensure that trending will not continue and that the valves' true setpoint has been achieved.

To correct the first problem the Wyle test procedure was changed to stop valve leakage that occurs during setpoint testing. Valves which leak during or after a setpoint test are required to be repaired and retested on steam. Acceptance criteria for leakage allows no leakage at 93 percent of the set pressure.

To improve the jack and lap process, the procedure was changed to require reestablishment of the bonnet-to-body gap (see Figure 1) as well as a subsequent steam setpoint verification test.

If ring adjustments are made, steam setpoint verification tests shall be conducted subsequent to ring adjustments.

To control setpoint trending, the test procedure was changed to require that three consecutive setpoint verification pops be within 10 psi if trending occurs in one direction.

Other potential causes considered were temperature effects, spring performance, seat adhesion effects, transportation/handling effects, and test process effects. All of these potential causes have been eliminated except for the spring performance which is still being evaluated. The station maintenance procedure for the removal and installation of the pressurizer safety valves was also investigated and eliminated as a potential cause.

Although these potential causes were thought to be less significant, some corrective actions were instituted to address them. Temperature measurements of three body and bonnet locations are performed during testing by using two thermocouples on the lower bonnet flange and two thermocouples on the inlet flange. Test process effects were addressed by two procedure changes which instituted a torquing guideline to ensure even loading and alignment when the valve was installed for the test and a standardized pressurization rate to eliminate the possible effects of the pressure ramp on the setpoint determination.

On August 12, 1991, Duke requested that Wyle Laboratories again test PCSRV BSO 2871 from Catawba, about two months after the setpoint had been determined using the improved test procedure. The test resulted in three successful lifts within 10 psig of each other. Each of the lifts were within 1 percent of the as-left setpoint. These results enhance the assurance that the corrective action taken can prevent recurrence of the PCSRV setpoint deviation problems.

The subject valves of this report were previously tested on July 2, 1990, using the old test procedure. When again tested on January 8 and 10, 1992, they were tested using the improved test procedure. It is possible that the differences in the old and new test procedures contributed to the elevated as-found actuation setpoints of the subject valves of this report.

This incident has been determined to be recurring. Since 1982, approximately 70 percent of Oconee's as-found PCSRV setpoints, during testing, were found to be outside the 1 percent tolerance. Specifically, the Oconee Nuclear Station Special Report associated with Problem Investigation Report number 3-091-0024, addresses PCSRV setpoint errors that occurred on Unit 3. That report identified the same potential causes as does this report. All of the corrective actions required by that report have been completed except for the spring performance evaluation. The completed corrective actions did not have an effect on the Unit 2 valves, because their previous tests and adjustments were performed prior to the initiation of the corrective actions.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	9 2	— 0 0 2	— 0 0	0 6 OF 0 8

TEXT (If more space is required, use additional NRC Form 366A's) (17)

Oconee has never experienced an event in which Reactor Coolant System pressure reached the PCSRV design setpoint.

There were no personnel injuries, radiation overexposures, or radioactive releases associated with this event. The valves are Dresser model 31739A and are NPRDS reportable.

CORRECTIVE ACTIONS

Immediate

1. none

Subsequent

1. Spare pressurizer code safety relief valves, whose actuation setpoints were set within one percent of 2500 psig, using the enhanced Wyle Laboratory test procedure, were installed on Unit 2 prior to startup of the unit.

Planned

1. Engineering Maintenance Services will track and trend the results of the improved test procedure on the pressurizer code safety relief valve setpoints over the next fuel cycle for each of the three Oconee units and both Catawba units. If required, further corrective action will be taken based on the results of this program.

SAFETY ANALYSIS

The primary function of the pressurizer code safety relief valves (PCSRV) is to maintain the Reactor Coolant System (RCS) pressure below the transient pressure safety limit of 2750 psig during normal operation or anticipated operational occurrences. During normal operation and most plant transients, the PCSRV setpoint is not challenged because of the normal pressure control mechanisms. The pressurizer spray valve opens at approximately 2205 psig, introducing a cooler RCS water spray which quenches pressurizer steam and reduces RCS pressure. If the pressure reaches approximately 2355 psig, the Reactor Protection System (RPS) [EIIS:JC] receives a trip signal which shuts down the reactor and reduces heat input to the RCS. The PCSRVs alone can not prevent overpressure; they act in conjunction with the RPS to prevent overpressure. If pressure increases to 2450 psig, the pilot operated relief valve will open and relieve RCS pressure. It is only during plant transients in which the normal pressure control functions are insufficient that the PCSRVs become necessary.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	9 2	— 0 0 2	— 0 0	0 7 OF 0 8

TEXT (If more space is required, use additional NRC Form 366A's) (17)

The most limiting RCS overpressure transient in the Oconee Final Safety Analysis Report (FSAR) is the control rod bank withdrawal event from hot zero power. The FSAR Chapter 15 analysis of this event indicates that the peak RCS pressure remains below 2750 psig when both PCSRVs lift at the nominal setpoint of 2500 psig.

Duke Power reanalyzed the rod withdrawal transient from hot zero power with the PCSRVs lifting above the nominal lift setpoint. The control rod withdrawal event from 25 percent full power initial conditions and the bounding loss of a heat sink accident were also analyzed to verify that the control rod withdrawal event from hot zero power is the limiting overpressure transient. The analysis was performed using conservative boundary conditions and physics parameters which bounded the operating history of Unit 2 Cycle 12.

Based on the results of this analysis, with both PCSRVs lifting at 7.9 percent above the nominal setpoint, the valves would only have to achieve a small fraction of their rated capacity in order to relieve RCS pressure. Thus, one PCSRV lifting at 7.9 percent above nominal would have sufficient capacity to relieve RCS pressure. Using only one PCSRV would increase peak RCS pressure by less than 10 psi. This increase in pressure would result in peak pressures exceeding the 2750 psig safety limit by approximately 30 psi in the reactor vessel lower plenum, reactor vessel downcomer, and reactor coolant pump cold leg discharge piping.

Events that could result in the safety limit of 2750 psig being exceeded are very low probability; such events would require one or more of the following simultaneous failures in addition to the failure(s) that initiates the event: 1) Failure to scram. 2) Failure of a PCSRV to open.

Due to design margin in excess of the safety limit, the increase in RCS peak pressure would not significantly increase the probability of failure of the RCS pressure boundary. Also, during Unit's 2 cycle 12, the RCS pressure did not exceed 2355 psig. Therefore, the health and safety of the public were not affected by this event.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 2	0 5 0 0 0 2 7 0	9 2	— 0 0 2	— 0 0	0 8 OF 0 8

TEXT (If more space is required, use additional NRC Form 366A's) (17)

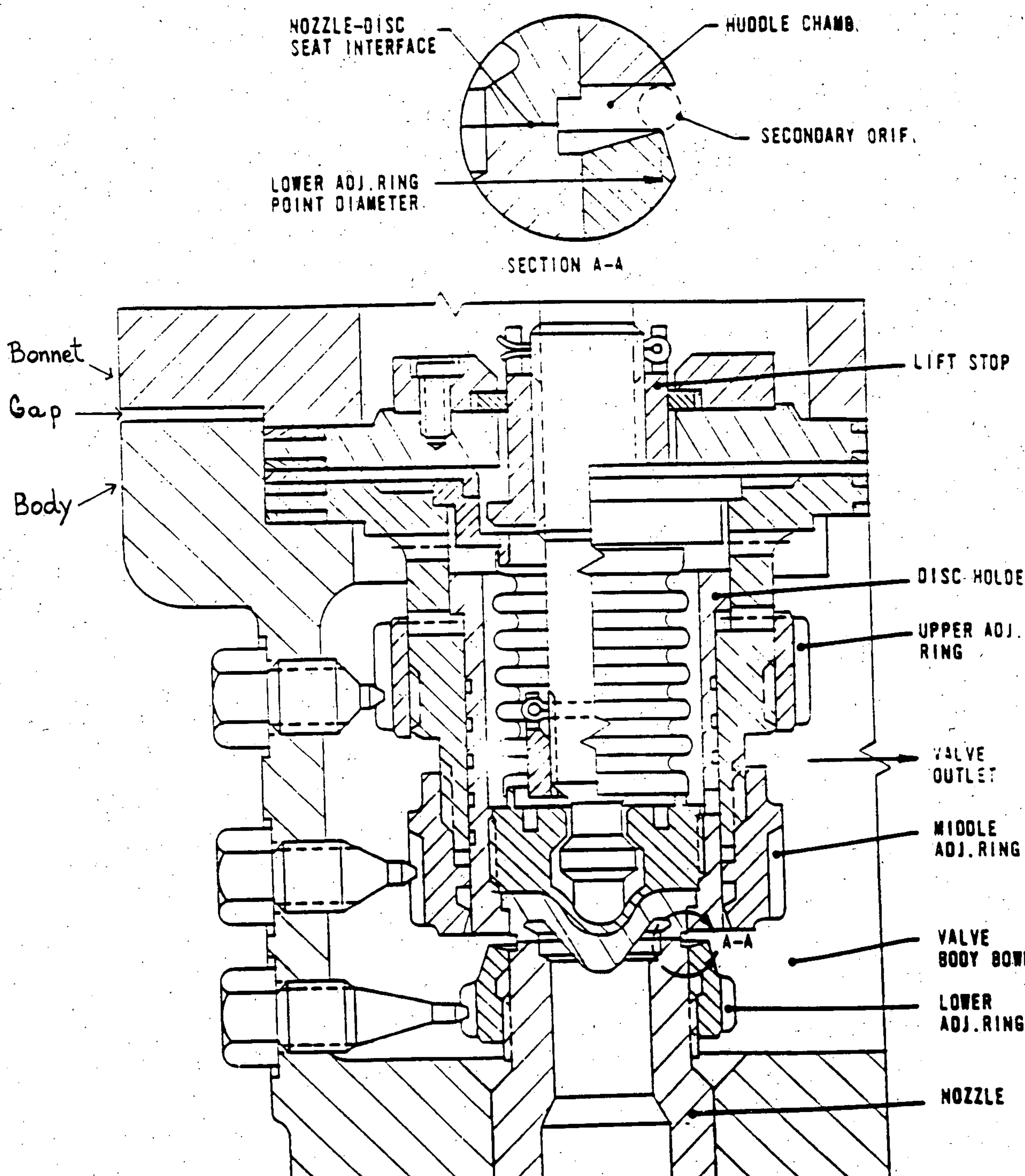

FIGURE 1
VALVE OPENING