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Georgia Power
the southern electric system

J. T. Beckham, Jr.
Vice President and General Manager
Nuclear Generation

NED-83-325

May 31, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC DOCKETS 50-321, 50-366
OPERATING LICENSES DPR-57, NPF-5
EDWIN I. HATCH NUCLEAR PLANT UNITS 1, 2
PURGE AND VENT VALVE OPERABILITY
SCHEDULE OF RESOLUTION

Gentlemen:

In order to clarify our schedule for resolution of the outstanding issues associated with the purge and vent valves, Georgia Power Company submits the following:

1. The information requested by your July 7, 1982, letter to complete your physical operability evaluation for the purge and vent valves is submitted as Attachment 1 to this letter, with the exception of a summary of seismic test data on one of the purge and vent valves (from Wyle Labs) which will be submitted by June 15, 1983.

2. In accordance with the provisions of 10 CFR 50.90 as required by 10 CFR 50.59(c)(1), a proposed change to the Unit 1 Technical Specifications for Dose Equivalent Iodine is submitted as Attachments 2 thru 4. This change, when approved, will bring the Unit 1 Technical Specifications in line with the current requirements as specified in the BWR Standard Technical Specifications. Specifically, the proposed amendment will reduce the existing limit from 10 microcuries per gram of coolant to 0.2 microcuries per gram.

3. Preliminary details of a proposed design modification to protect downstream equipment is included in Attachment 1. The current schedule calls for installation of the modification during the first outages of sufficient duration on both units, pending NRC staff approval. The design package is scheduled for submittal to NRC with the June 15 transmittal of the Wyle Labs valve test data.

A03A
1/1 w/check
$4,000

Georgia Power

4. As Attachment 5, we are submitting, for information only, proposed Technical Specifications to be formally submitted at a later date. These Technical Specifications for the Drywell and Suppression Chamber Purge System are adapted from the BWR/4 Standard Technical Specifications. We would expect these specifications to be implemented upon completion of the design modification mentioned in item three. Although only one reactor unit is shown, the specifications are expected to be similar for both units. Tentative, formal submittal of proposed Technical Specifications will be with the design package, which will be submitted in mid-June.

It is Georgia Power Company's position that the attached information is sufficient to resolve the outstanding Purge and Vent operability questions. The June 15, 1983, submittal will provide assurance of the integrity of downstream equipment upon installation of the modifications, as well as a data summary of the seismic test of the purge valve. The entire package of analysis, documentation, and design modifications description provides the basis for our proposed change in the requirement for the purge and vent valves which will be formalized in our June 15, 1983, submittal.

If you have any further questions, please contact this office.

J. T. Beckham, Jr. states that he is Vice President of Georgia Power Company and is authorized to execute this oath on behalf of Georgia Power Company, and that to the best of his knowledge and belief the facts set forth in this letter are true.

GEORGIA POWER COMPANY

By: J. T. Beckham, Jr.

Sworn to and subscribed before me this 31st day of May, 1983.

Notary Public, Georgia, State at Large
My Commission Expires Sept. 20, 1983

Notary Public

MJB/mb
Enclosures
xc: H. C. Nix, Jr.
Senior Resident Inspector
J. P. O'Reilly, (NRC-Region II)
J. L. Ledbetter-DNR

Attachment 1

PURGE AND VENT SYSTEM

OPERABILITY

May 31, 1983

I. INTRODUCTION

The intent of this report is to provide full and complete information pertinent to the containment purge and vent system operability issues. It is our understanding that the information provided below will allow the staff to close all open items dealing with the E. I. Hatch Units 1 and 2 containment purge and vent system operability issues. One possible exception is the need to provide test results from a May, 1983, valve test conducted to demonstrate operability of the 18" containment isolation valves.

Each open issue raised in the July 7, 1982, letter from Mr. J. F. Stolz to Mr. J. T. Beckham, Jr. is addressed.

II. CONFORMANCE TO STANDARD REVIEW PLAN SECTION 6.2.4 REVISION 1 AND BRANCH TECHNICAL POSITION CSB6-4 REVISION 1.

(A) Adequate justification for unlimited use of the 18-inch purge/vent systems or an estimate of the expected annual usage of the 18-inch purge/vent system.

G.P.C. Response:

The operating history at Hatch Unit 1 and 2 has shown that the requirement that the 18" purge and vent valves can only be open for 1% of the operating time has imposed severe restrictions on the operation of the plant. There are clearly extensive benefits which can be realized both in the safety and operational aspects of plant operation if unlimited purge times are granted. The operations department personnel at Plant Hatch make drywell inspections soon after startup, prior to power escalation, to inspect for leaks and just prior to shutdown in order to assure that any leakage or other abnormalities are detected prior to depressurization. If the drywell is inerted the operations department personnel are not permitted to enter the drywell by corporate policy due to the fact that an inerted atmosphere will not sustain life. Therefore, drywell inspections can not be made. It is Georgia Power Company's position that this is not in the best interest of safety. For this reason Georgia Power Company will request that the Plant Technical Specifications be changed to allow increased purge times for the purposes of safety inspections of the drywell.

(B) Sufficient information concerning provisions made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.

G.P.C. Response:

Debris screens which conform to the guidance provided by the NRC are being installed during the current outage on the 18-inch purge and vent lines which communicate with the drywell on Unit 2.

Debris screens will not be installed on the Unit 1 piping since structural members inside the drywell make it very unlikely that debris could enter the piping. Pictures of the obstructions were provided to the NRC Staff on March 31, 1983. GPC has been verbally informed by the staff that no debris screens will be required on Unit 1.

(C) An analysis of airborne radioactivity releases as a result of a LOCA; i.e., the amount of air/steam which will be released to the environment prior to purge system isolation following a LOCA.

G.P.C. Response:

An acceptable dose consequence analysis has been performed per the NRC position presented in SRP Section 6.2.4 and Section B, Item B.5.a, of BTP CSB 6-4. A summary of the analysis is presented below as justification for increased use of the purge system during operational conditions 1,2, and 3.

To determine the most severe consequences of an accident occurring during purging of the drywell, two scenarios ar analyzed. These are loss of coolant accidents (LOCA) with both pre-existing and concurrent iodine spikes. Each scenario is summarized below. Resulting offsite doses are listed in Table 1.

<u>Case A: LOCA with pre-existing iodine spike</u>
Prior to the LOCA, the reactor coolant concentration is assumed to be the maximum limit allowed by the technical specifications for the 48 hours following a power transient. For Hatch Unit 1, the limit is 100.0 μCi/g dose equivalent I-131. For Unit 2, the limit is 4.0 μCi/g dose equivalent I-131. The specific accident analyzed is the instantaneous guillotine rupture of a reactor recirculation line. Mass blowdown data and primary containment pressure and temperature profiles are taken from Figures 6.2-23 through 6.2-26 of Hatch Unit 2 FSAR for an accident in either unit.

A flashing fraction of 40% is assumed for the reactor coolant which spills from the ruptured recirculation line. All of the activity in the flashed liquid remains airborne in the primary containment and is available for release through the open purge valves. The 18" purge and vent valves are assumed to close in five seconds. No credit is taken for the reduction in cross sectional area of the duct opening during isolation. Because the drywell purge system exhausts via the standby gas treatment system, the activity is filtered and released from the plant stack at a height of 120 meters.

Case B: LOCA with concurrent iodine spike

The pre-accident iodine concentration of the reactor coolant is assumed to be 10.0 μCi/g dose equivalent I-131 for Unit 1 and 0.2 μCi/g dose equivalent I-131 for Unit 2. These are the maximum limits allowed by the technical specifications during steady state full power operation. A LOCA in either unit is assumed to increase the release rate of iodine from the fuel by a factor of 500. The release of radioactivity to the environment is the same as that described in Case A.

The doses calculated for Cases A and B are only the increments received from a LOCA during purge system operation prior to closure of the purge isolation valves. The other release pathways of primary containment leakage and MSIV leakage contribute much larger dose increments, making the purge portion insignificant in comparison (See FSAR, Table 14.5-1 in HNP Unit 1 and Table 15.1-36 in HNP Unit 2 for radiological consequences due to LOCA).

(D) An analysis of the provisions to protect structures and safety related equipment located downstream of the purge isolation valves against a loss of function from the environment created by the escaping air and steam.

G.P.C. Response:

The subject of steam flood and jet impingement from a ruptured purge or vent line has been investigated. On both units the majority of the lines are fabricated from 150 lb. class pipe and thus do not present a rupture potential. On Unit 2 there is a pipe to duct interface which is located on the 130-foot elevation of the reactor building which could rupture if a LOCA were to occur while purge operations are in progress. A review of the existing HELB analysis has demonstrated that the environment created by a main steam line break in the pipe chase bounds that of a rupture in the ducting and is therefore acceptable. On Unit 1 there are two pipe to duct interfaces. One is located in the SGTS equipment room and the other is located in the torus room. The duct at these interfaces could rupture in the unlikely event of a LOCA while purge and/or vent operations are in progress. It has likewise been shown in both these areas that existing HELB analysis yields more severe environments than the SGTS duct rupture. In no case has it been determined that jet forces due to a ruptured duct present a danger to any essential equipment.

Acceptable over pressure protection of the standby gas treatment filter housings in the the unlikely event of a LOCA concurrent with vent operation has not been demonstrated with the existing design. For this reason, numerous design modifications have been evaluated. We plan on installing redundant safety grade fast acting, excess flow, isolation dampers which will automatically isolate the common 18" vent line from the drywell and torus before it ties into the SGTS filter train suction. Our calculations have determined that under the worst case conditions the dampers must have a closing time of less than 0.475 seconds in order to protect the SGTS filters from overpressure. To assure that post LOCA venting capabilities are maintained with the worst single failure a 2-inch bypass line will be installed around the isolation dampers. We propose that this plant modification be completed during the first outage of sufficient duration for installation on both units after NRC approval of the modification , the completion of the engineering design, and the receipt of materials on site.

With the completion of the design modification discussed above no safety equipment will be subjected to conditions in excess of their design condition.

III Valve Operability

The following information is provided to document the qualification of the purge and vent valves. This information was requested in the September 27, 1979, letter to all light water reactors from Mr. Darrell G. Eisenhut.

(A) Valve closure rate vs time - i.e., constant rate or other.

G.P.C. Response:

The valves are designed with a constant rate of closure. As noted below the data has demonstrated that under the maximum expected loading conditions the valves will close in approximately two seconds. The plant technical specifications require closure in less than 5 seconds.

(B) Flow direction through valves; ΔP across valve.

G.P.C. Response:

The valves have symmetric disc design therefore are bi-directional. The analysis was completed assuming a ΔP of 62 psi across the valves

(C) Single valve closure (inside containment or outside containment valve) or simultaneous closure. Establish worst case.

G.P.C. Response:

Both valves on each line are located outside the drywell and receive simultaneous isolation signals. Since both valves are located outside the drywell for each penetration, there is no worst case.

(D) Adequacy of accumulator (when used) sizing and initial charge for valve closure requirements.

G.P.C. Response:

The valves are spring loaded to close with no air assist; therefore, the size of the air accumulator has no bearing on the closure time of the valves.

(E) For valve operations using torque limiting devices - are the settings of the devices compatible with the torques required to operate the valve during the design basis condition.

G.P.C. Response:

The valve operators do not use torque limiting devices.

(F) Valve closure capabilities:

G.P.C. Response:

In addition the containment purge and vent valve must be capable of closing under a postulated accident condition which results in fluid dynamic related loads combined with seismic related loads.

(F.1) Description of Purge and Vent Valves

The valves identified as the containment isolation valves in the Purge and Vent System are listed on Table 2.

The valves are butterfly type Model 9200 (Series 9220) manufactured by Fisher Controls. These valves are equipped with Bettis Model 733C-SR-60(Unit 2 Valves) or 733B-X-SR60 (Unit 1 Valves) air open-spring to close operators. The capabilities of the two actuators are identical. Valves are limited to a 50° opening angle (90°= full open) by means of mechanical sleeve type stop.

(F.2) Demonstration of Operability

Operability is based on the following assumptions:

1. Redundant valves on each purge and vent line.
2. Peak design containment pressure (62 psig) is the ΔP across the valve at all disc angles from 50° to seating.
3. The valves are symmetrical.
4. Pressure losses in the pipeline are neglected.

The torque values are based on a series of laboratory tests performed at Fisher, using a selected group of models. Analytical technique are used to determine the dynamic torque for the actual valve size.

The approach taken to evaluate critical valve parts is to determine maximum allowable ΔP's across the valve vs disc angles. The maximum allowable ΔP is based on the valves weakest part. The maximum allowable ΔP for each disc angle, in 10° increments, is compared to the 62 psig operating condition, and the maximum disc-opening angle is selected.

A description of the Fisher Computer Program used to determine the maximum opening angle is as follows:

The program begins by calculating the loadings at a particular opening angle. The hydrostatic load on disc, and seating, bushing, packing and dynamic torques are included.

After loading is determined, the program calculate stresses in the shaft, key, pin and bushing for a specific ΔP and compares the calculated stresses to the material strength.

The program calculates stress and change in ΔP iteratively until the allowable strength matches the stress. This determines the maximum allowable pressure drop for that angle. Refer to the attached Tables 3 and 4 which establish the disc angle versus allowable ΔP.

The weak point of the valve assembly is the shaft. The maximum allowable ΔP based on the shaft stress is 75 psi, which establishes the limiting angle of 50° open. Using the 50° open angle and the actual 62 psi ΔP the program calculates the required actuator torque of 5164 in-lbs.

The valves are equipped with Bettis model 733C-SR-60 or 733B-X-SR-60 actuators. The actuator is a spring to close type with a torque output of approximately 8200 in-lbs at the end of stroke. In midstroke, the torque output will drop to approximately 79% of the end stroke values because of the scotch-yoke actuator linkage (approximately 6478 in-lbs). This torque value output is adequate to provide the required closing torque at 50° (5164 in-lbs). Since butterfly valves of this type have a flow-closed characteristic when starting at 50° opening, the only resistances to be overcome for closing are friction and seating torques, which are approximately 2500 in-lbs combined. This torque is well within the capabilities of the actuator. Therefore closure from the 50° open position can be assured under flowing conditions at 62 psig.

The 733B-X-SR60 or 733C-SR-60 basic actuator mechanism is capable of withstanding an external input of 51,000 in-lbs end of stroke position and 30,600 in-lbs mid stroke position. Therefore, a wide margin exists between actuator capabilities and the required performance.

To ensure operability of the valve assembly under to a combined fluid dynamic and seismic loading conditions, Wyle Laboratories was contracted to test a valve. The preliminary test results have been reviewed. The test program consisted of mounting a valve assembly on a triaxial shaker table at Wyle Laboratories, at Huntsville, Alabama. A resistance equal to 5164 in-lbs of torque was applied to the valve, and triaxial accelerations equal to plant SSE accelerations were input into the assembly. The valve was stroked twice while being subjected to the combined loads. The valve assembly operated smoothly during the test, and went from the open to close position in aproximately 2 seconds. A summary of the valve assembly test report will be transmitted for your information upon completion.

All valve assemblies except 2T48-F318, are being reoriented to an elbow-shaft inplane installation configuration (Unit 2 valves by completion of current outage, Unit 1 by completion of next scheduled refueling outage). In this configuration use of the 1.5 safety factor is acceptable. Based on the use of the 1.5 safety factor there is a requirement for the disc to start motion at an actual ΔP of 41 psi. Test results demonstrate full valve closure in about 2 seconds under full load. Based on the DBA analysis, it takes about 2.5 seconds (Unit 2) and 4 seconds (Unit 1) to reach this pressure. The isolation initiation signal is received at essentially time zero. The Plant Technical Specifications require full valve closure within 5 seconds. Therefore, the valves will be subjected to less than the design ΔP prior to motion.

Valve assembly 2T48-F318 cannot be rotated into a shaft-elbow inplane configuration. Therefore, in the out of plane configuration a safety factor of 3 is used. With this safety factor the disc must start to move at a ΔP of 20 psi. Using figure 6.2-25 curve 2 for the torus from the Unit 2 FSAR, attached, it can be seen that a ΔP of 20 psi occurs at 7 seconds.

The plant Technical Specifications require valve closure within 5 seconds. The valve will be fully closed prior to reaching a ΔP of 20 psi. Therefore, it is concluded that valve motion will be initiated far before it is required.

(F.3) Summary

The combination of analysis and test has established that the 18-inch containment purge and vent butterfly valves will go to a safe position and maintain that position when subjected to combined LOCA and seismic loadings. A copy of the December 28, 1979, letter to Mr. M. S. Desai of Bechtel from Mr. J. C. Dresser of Fisher Controls Company is attached for information and use in the evaluation.

IV Safety Actuation Signal Override

As indicated in the July 7, 1982, letter the review of this issue is being handled separately outside the framework of the purge and vent review.

V Containment Leakage Due to Seal Deterioration

Georgia Power Company has a comprehensive maintenance and surveillance program which assures operability and the leak tight integrity of the 18" purge valves. The valves are leak tested each refueling outage as part of the LLRT (Appendix J) program which assures their leak tight integrity. In order to further assure the seats are at their optimum effectiveness at all times, Georgia Power Company will commit to replace the seats on all the 18" purge and vent valves each refueling outage. Based on the above, we do not believe revised surveillance requirement such as has been suggested is needed at Plant Hatch.

VI Conclusion

It is believed that information provided above will allow the NRC Staff to successfully resolve all open issues dealing with the purge and vent system. The summary report dealing with the valve test program will be forwarded when complete and isolation damper procurement activities will commence pursuant to NRC approval of the proposed design modification.

TABLE 1

Offsite Thyroid Dose from LOCA During Purging of the Drywell (REM)

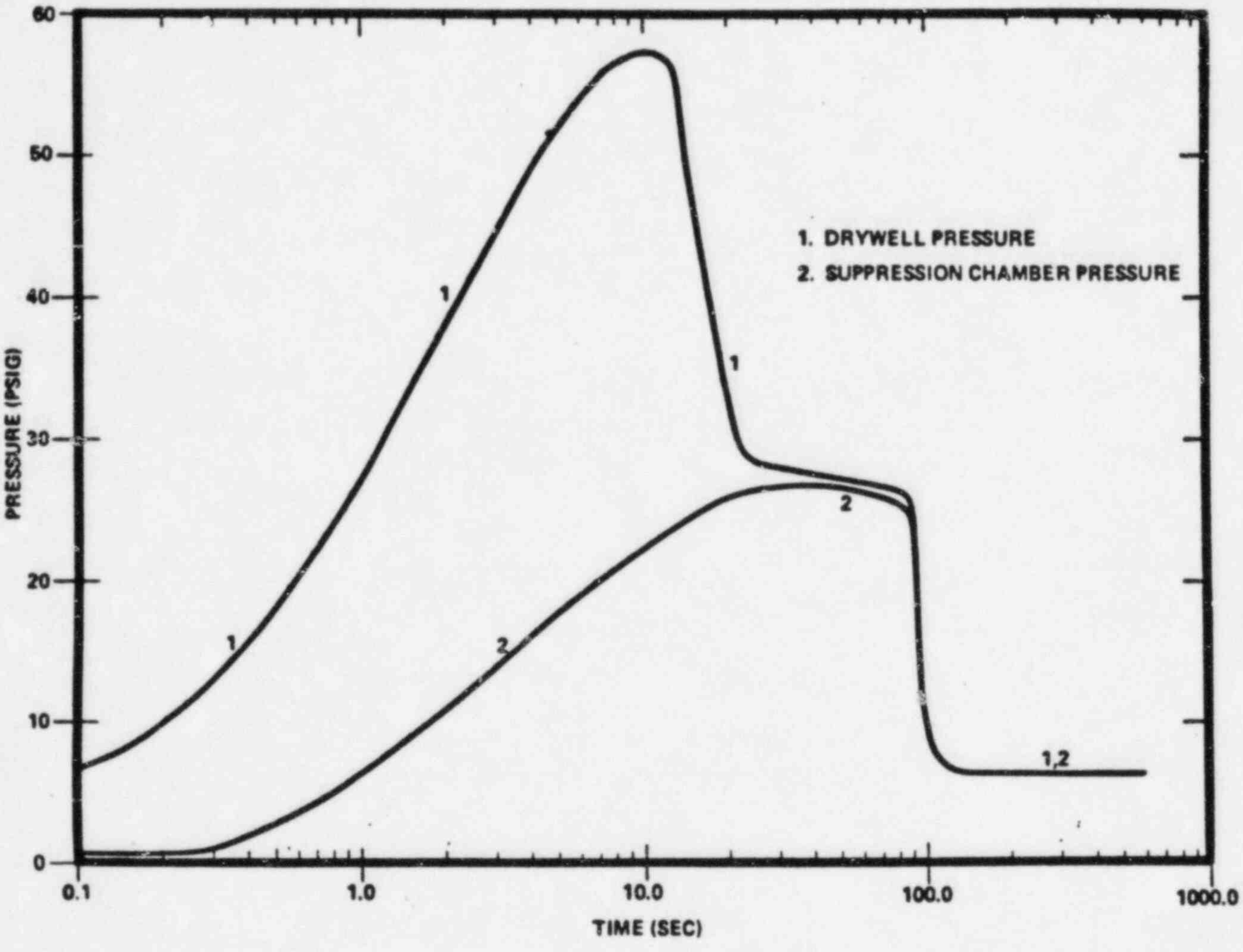
Case	Description of Release	Unit 1	Unit 2
A	Release through open purge valves with pre-existing I spike (5 seconds)	5.5E-3	2.2E-4
B	Release through open purge valves with concurrent I spike (5 seconds)	6.5E-4	1.3E-5

TABLE 2

PURGE AND VENT SYSTEM

CONTAINMENT ISOLATION VALVES

Valve Tag		Valve Size	Location
T48-F307	2T48-F307	18"	Drywell Purge Inboard Inlet Isolation
T48-F308	2T48-F308	18"	Drywell Purge Outboard Inlet Isolation
T48-F309	2T48-F309	18"	Torus Purge Inboard Inlet Isolation
T48-F318	2T48-F318	18"	Torus Purge/Vent Outboard Outlet Isolation
T48-F319	2T48-F319	18"	Drywell Purge/Vent Inboard Outlet Isolation
T48-F320	2T48-F320	18"	Drywell Purge/Vent Outboard Outlet Isolation
T48-F324	2T48-F324	18"	Torus Purge Outboard Inlet Isolation
T48-F326	2T48-F326	18"	Torus Purge/Vent Inboard Outlet Isolation



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EDWIN I. HATCH
NUCLEAR PLANT – UNIT 2

RECIRCULATION BREAK, CALCULATED CONTAINMENT PRESSURE RESPONSE

FIGURE 6.2-25

3604-0

TABLE 2

PURGE AND VENT SYSTEM

CONTAINMENT ISOLATION VALVES

Valve Tag		Valve Size	Location
T48-F307	2T48-F307	18"	Drywell Purge Inboard Inlet Isolation
T48-F308	2T48-F308	18"	Drywell Purge Outboard Inlet Isolation
T48-F309	2T48-F309	18"	Torus Purge Inboard Inlet Isolation
T48-F318	2T48-F318	18"	Torus Purge/Vent Outboard Outlet Isolation
T48-F319	2T48-F319	18"	Drywell Purge/Vent Inboard Outlet Isolation
T48-F320	2T48-F320	18"	Drywell Purge/Vent Outboard Outlet Isolation
T48-F324	2T48-F324	18"	Torus Purge Outboard Inlet Isolation
T48-F326	2T48-F326	18"	Torus Purge/Vent Inboard Outlet Isolation

HATCH

Table 3

DATE 12-14-79 BY A.L.G REF. NOS P87139-02 & P99769-03/10

VALVE TYPE 9200 SIZE 18" TEMP 340° SHAFT MATL 316 S/S BUSH. MATL BRONZE/GRAPHITE

DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

SHAFT STRENGTH FCTR %	51.000	51.000	51.000	51.000	51.000	51.000
BUSH. STRENGTH FCTR %	85.000	85.000	85.000	85.000	85.000	85.000
DISC TO SHAFT CONC FCTR	.500	.500	.500	.500	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750	.750	.750	.750	.750
INPUT						
D	17.000	17.000	17.000	17.000	17.000	17.000
DP ALLOWABLE	103.800	89.300	[75.200]	47.600	33.000	32.500
Lo	.600	.600	.600	.600	.600	.600
Ts	.000	.000	.000	.000	.000	.000
Tl	.000	.000	.000	.000	.000	.000
m	.000	.000	.000	.000	.000	.000
DTF	14.300	58.300	136.000	315.000	720.000	892.000
PI	103.800	89.300	75.200	47.600	33.000	32.500
DPe fact	.260	.350	.250	.180	.110	.090
GENERATED VARIABLES						
St	26775.000	26775.000	26775.000	26775.000	26775.000	26775.000
Ss	13387.500	13387.500	13387.500	13387.500	13387.500	13387.500
Sb	8500.000	8500.000	8500.000	8500.000	8500.000	8500.000
OUTPUT						
ds TORK & BEND (St)	1.408	1.357	1.309	1.177	1.103	1.101
ds TORK & BEND (Ss)	1.426	1.391	1.365	1.269	1.227	1.226
ds TORK & SHEAR (Ss)	1.500	1.500	1.492	1.378	1.320	1.316
ds DISC CONNECT (Ss)	1.256	1.404	1.500	1.500	1.500	1.500
ds DRIVE CONNECT (Ss)	1.293	1.371	1.421	1.381	1.360	1.360
ds BUSH LOAD (Sb)	1.177	1.092	1.002	.797	.664	.658
ds SPECIFIED	1.500	1.500	1.500	1.500	1.500	1.500
TOT ACTUATOR TORK RQ	4777.222	5348.559	5802.608	5338.001	5085.964	5080.303
ACTUAL BUSH LOAD	5239.685	4507.744	3795.995	2402.784	1665.796	1640.556
	10°	20,30 & 40°	[50°]	60°	70°	80 & 90°

Table 4

DATE 12-14-79 BY A.L.G. REF. NOS

VALVE TYPE 9200 SIZE 18" TEMP 340° SHAFT MATL 316 S/S BUSH. MATL BRONZE/GRAPHITE

DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

	0°	50°
SHAFT STRENGTH FCTR %	51.000	51.000
BUSH. STRENGTH FCTR %	85.000	85.000
DISC TO SHAFT CONC FCTR	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750
INPUT		
D	17.000	17.000
DP	65.000	[62.000]
Lo	.600	.600
Ts	2316.600	260.000
Ti	.000	.000
m	.000	.000
DTF	.000	136.000
P1		62.000
DPe fact		.250
GENERATED VARIABLES		
St	26775.000	26775.000
Ss	13387.500	13387.500
Sb	8500.000	8500.000
OUTPUT		
ds TORK & BEND (St)	1.237	1.235
ds TORK & BEND (Ss)	1.283	1.296
ds TORK & SHEAR (Ss)	1.375	1.402
ds DISC CONNECT (Ss)	1.375	1.446
ds DRIVE CONNECT (Ss)	1.308	1.359
ds BUSH LOAD (Sb)	.931	.910
ds SPECIFIED	1.500	1.500
TOT ACTUATOR TORK RQ	4715.063	[5164.043]
ACTUAL BUSH LOAD	3281.113	3129.677

0° 50°

FISHER CONTROLS COMPANY

MARSHALLTOWN, IOWA 50158

AUTOMATIC CONTROL EQUIPMENT SINCE 1880

Reply to: FISHER CONTROLS COMPANY, R. A. Engel Technical Center, P.O. Box 11, Marshalltown, Iowa 50158

BECHTEL POWER CORP.

JOB 6511

BECHTEL JOB 6511			
ROUTE	INF	ACT	INT.
E. MGR.			
P.E.			
FJK			
NBW			
PQE			
MECH			
PLT. DES			
CS			
ELEC			
CIVIL			
ARCH			
HC'G			
PC			
STUP			
ADMIN			
FILE:	A-9.3		

December 28, 1979

Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20760

Attn: Mr. Manu S. Desai

Subject: E. I. Hatch Nuclear Plant, Units 1 & 2
Bechtel Job 6511-001/020
Purge Butterfly Valves
File: A-19.3/SS-2102-107/SS-6902-107
Fisher CCN: P87139 & P99769 (25-24142 & 25-30222)
18" Type 9220 BFV w/Bettis 733B-SR58 or SR60
Tag: T48 & 2T48-F307, 8, 9, 18, 19, 20, 24, 26

Reference:

a. Conference Agreements with Bechtel/Georgia Power representatives per 12-4-79 meeting in Marshalltown.

b. Letter: Fisher Controls (Dresser) to Bechtel Power Corp. (Desai) dated 12-17-79; Same subject.

c. Letter: Bechtel Power Corp. (Glasby) to Fisher Controls (Fleetwood) dated 12-10-79; Operational, Maintenance, and Surveillance History for Subject Valves.

d. NRC letter to "All Light Water Reactors" dated 9-27-79; Subject: Containment Purging and Venting During Normal Operation - Guidelines for Valve Operability.

Gentlemen:

1. Attached is the analysis printout data substantiating the limiting open angle of 50° which was provided per reference (b) above. A brief explanation of this analysis follows:

   a. The horizontal column labeled "DP" shows the allowable differential pressure ac oss the valve, for various opening angles (listed at the bottom of the page) for the 1.5-inch shaft used. Note that only the opening angles up to and including 50° indicate an allowable differential pressure higher than 62 psid (accident condition ΔP). Therefore 50° is the maximum allowable opening angle.

   b. Refer to the second sheet of the printout for the "Total Actuator Torque Required" at 0° and 50° for maximum differential pressure conditions (65 psid shutoff, 62 psid flowing). (The actuator

torque listings on sheet 1 do not apply because these torque values are for the maximum allowable ΔP values at each angle.) The torque values given are for plate discs, so the flow direction has no effect on the torque requirements.

c. The analysis was done using material strength values for 340°F (service condition temperature).

2. These valves are provided with Bettis Type 733B-SR58 or SR60 actuators, which are to be operated with 60-100 psig air. Comparison of the performance characteristics of these actuators with the torque requirements reveals that these actuators are adequate to operate the valve under normal and accident conditions.

   a. The 733B-SR58 is a spring-close type actuator with a torque output of approximately 10,000 in-lb at the end of the stroke. In mid-stroke, the torque output will drop to approximately 79% of the end-stroke values because of the scotch-yoke actuator linkage (approximately 7900 in-lb at 25° open angle). This torque output is adequate to provide the required opening torque at 0° (4715 in-lb at 65 psid) and the hold-open torque at 50° (5164 in-lb at 62 psid).

   b. The 733B-SR60 is a similar spring-close type actuator with a torque output of approximately 8200 in-lb at the end of the stroke. In mid-stroke, the torque output will also drop to approximately 79% of the end of stroke values (6478 in-lb); thus this actuator is also adequate to meet the required opening torque at 0° and the hold-open torque at 50°.

   c. Since butterfly valves of this type have a flow-closed (flow aids closure) characteristic when starting at 50° opening, the only resistances to be overcome for closing are the friction and seating torques, which are fairly low (approximately 2500 in-lb combined). This torque is well within the capabilities of the return spring provided; therefore, closure from the 50° open position can be assured under flowing conditions (at 62 psid).

   d. A Bettis Chart is enclosed showing typical output torques for actuators of the type used (Heavy-duty Series). The curves shown reflect the mid-stroke loss of output due to the scotch-yoke mechanism. If higher pressure air is used (without changing the spring), the air stroke torque output will be increased, while the spring stroke output will remain unchanged.

   e. A marked diagram of a Bettis Type 733B-SR actuator is enclosed, showing the suggested location of the travel stop. The air breather and body plug should be removed from the spring barrel end, and the end of the spring barrel should be re-bored and re-threaded to take a travel stop (machined from bar stock).

The travel stop should be bored for an air breather also. The length of the travel stop may be determined by noting the position of the spring piston rod extension at the desired rotary shaft angle.

3. There will be substantial capacity reductions at the limited opening angles.

   a. If the valves are limited to a 30° maximum opening, the Cg will be approximately 20,700. This will permit a flow of 1500 SCFM of 150°F air at a minimum ΔP of 0.5 psid.

   b. If the valves are limited to a 50° maximum opening, the Cg will be approximately 57,000. This will permit a flow of 1500 SCFM of 150°F air at a minimum ΔP of 0.2 psid.

4. The capacity and torque values used in sizing are based on a series of laboratory tests done at Fisher, using a selected group of models. Capacity and Torque Curves obtained from a typical test are enclosed to illustrate the method and the general shape of the curves for Type 9200 butterfly valves. "Reverse flow" means flow into the hub side of the disc, and positive torque values are assigned if flow tends to close (the usual condition for partial opening). Note that the curves provided are for a 6" model, not for an 18" 9200 butterfly valve with a plate disc.

5. Consideration is given to the eight topics under "Operability - Guidelines for Demonstration of Operability of Purge and Vent Valves" listed in the NRC letter of 9-27-79, as follows:

   (1) Valve Closure Rate/Time: The as-installed closure time for all these valves was determined to be 3-5 seconds under no-flow conditions per the Bechtel letter of 12-10-79 (Ref. C). Because flow aids (or does not impede) closure, the closure time under flow conditions will be at least this fast (even at a ΔP of 62 psid). Only friction and seating loads must be overcome; these are relatively low, in the order of 2500 in-lb, which are well within the capabilities of the spring return torque from the actuator, disregarding the assistance from the flow-closed effect. The closure rate will not be perfectly linear because of the scotch-yoke mechanism, but the departure from linearity will not be drastic, and closure should be achieved in 3-5 seconds.

   (2) Flow Direction Through Valve: The preferred orientation for Type 9200 butterfly valves is to have the T-ring retaining ring on the outlet side of the valve. However, closure can be achieved regardless of flow direction. Since these valves are equipped with symmetrical plate discs, flow direction will have no significant effect on valve capacity or torque requirements. These 18" valves will pass 1500 SCFM of 150°F air each, at a minimum ΔP of 0.5

psid if pinned at 30° maximum opening; if pinned at 50° maximum opening, each valve would pass the above air flow at a ΔP of 0.2 psid.

(3) Single Valve Closure or Simultaneous Closure: In the Hatch Installation, it is understood that the subject valves are installed in pairs (in series) outside the drywell. Thus these valves are not exposed to ambient external pressure/temperature buildup in the event of a LOCA condition. The solenoids and Bettis actuator would be free to vent without backpressure buildup effects, and the spring-action would drive the solenoids and the butterfly valve actuators to the safety-mode position (valve disc closed). With the valves pinned at 50° maximum opening, either valve of the series pair would be able to shut off at the maximum ΔP of 62 psid, and this would be the worst condition (one valve closing against the maximum ΔP). If both close simultaneously, the total pressure drop would be shared.

(7) The Effect of the Piping System (turns, braches, etc.): Fisher considers that essentially uniform flow is achieved within 4-5 pipe diameters downstream from an obstruction. Therefore if no obstructions (turns, bends, valves) are present closer than about 72" on the upstream side, there will be little effect on the flow pattern at the valve (assuming 18" line sizes). On the downstream side, there should be ample clearance for the disc motion. If obstructions are closer than 4-5 pipe diameters on the upstream side, the effect on capacity and torque will be related to the disc shaft orientation with respect to the non-uniform flow pattern. (See following paragraph.)

(8) The Effect of Valve Disc and Shaft Orientation: The preferred orientation for the valve disc and shaft is such that any non-uniform flow in the pipe would be split by the valve shaft, and such that one-sided impingement on the "wings" of the disc are avoided. This is related, therefore, to the nature and orientation of any close obstructions or discontinuities upstream (within 4-5 pipe diameters or less). If there are no close obstructions, the orientation of the disc and shaft would be immaterial, since the flow would be essentially symmetrical, distributed evenly across the pipe cross section.

6. This communication completes our review of the subject valves at the E. I. Hatch Nuclear Plant. We trust that the questions discussed

during our December 4, 1979, meeting have been satisfactorily resolved. If additional evaluation and analyses are needed, appropriate commercial arrangements should be made.

Sincerely,

FISHER CONTROLS COMPANY

John C. Dresser
John C. Dresser
Nuclear Engineering Specialist

JCD:md

Enclosures:

1. Analysis Printout for P87139-02 & P99769-03/10, dated 12-14-79; 2 pages.

2. Diagram of Bettis Model 733B-SR Actuator Marked for Travel Stop, 1 page.

3. Typical Torque Output Chart for Bettis Spring Return Actuators Page 1.27, dated 7-9-74.

4. Flow vs. Travel Characteristic Curves Fisher Report 13, Problem 983, Figure 1.

5. Dynamic Torque Curve Fisher Report 13, Problem 983, Figure 2.

cc: Richard Hoober - Continental Div.
John Weekley - Continental Div.
Al Gentile - Continental Div.
Dick Baumann
Floyd Jury
Larry Fleetwood
Floyd Harthun

DATE 12-14-79 BY A.L.G REF. NOS P87139-02 + P99769-03/10

VALVE TYPE 9200 SIZE 18" TEMP 340° SHAFT MATL 316 S/S BUSH. MATL BRONZE/GRAPHITE

DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

SHAFT STRENGTH FCTR Z	51.000	51.000	51.000	51.000	51.000	51.000
BUSH STRENGTH FCTR Z	85.000	85.000	85.000	85.000	85.000	85.000
DISC TO SHAFT CONC FCTR	.500	.500	.500	.500	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750	.750	.750	.750	.750
INPUT						
D	17.000	17.000	17.000	17.000	17.000	17.000
DF ALLOWABLE	103.800	89.300	[75.200]	47.600	33.000	32.500
Lo	.600	.600	.600	.600	.600	.600
Ts	.000	.000	.000	.000	.000	.000
Tl	.000	.000	.000	.000	.000	.000
m	.000	.000	.000	.000	.000	.000
DTF	14.303	58.300	136.000	315.000	720.000	883.000
P1	103.800	89.300	75.200	47.600	33.000	32.500
DPs FACT	.260	.350	.250	.180	.110	.090
GENERATED VARIABLES						
St	26775.000	26775.000	26775.000	26775.000	26775.000	26775.000
Ss	13387.500	13387.500	13387.500	13387.500	13387.500	13387.500
Sb	8500.000	8500.000	8500.000	8500.000	8500.000	8500.000
OUTPUT						
ds TORK & BEND (St)	1.408	1.357	1.309	1.177	1.103	1.101
ds TORK & BEND (Ss)	1.426	1.391	1.365	1.269	1.227	1.226
ds TORK & SHEAR (Ss)	1.500	1.500	1.492	1.378	1.320	1.316
ds DISC CONNECT (Ss)	1.256	1.404	1.500	1.500	1.500	1.500
ds DRIVE CONNECT (Ss)	1.293	1.371	1.421	1.381	1.360	1.360
ds BUSH LOAD (Sb)	1.177	1.092	1.002	.797	.664	.658
ds SPECIFIED	1.500	1.500	1.500	1.500	1.500	1.500
TOT ACTUATOR TORK RQ	4777.282	5348.559	5802.608	5338.001	5085.964	5080.303
ACTUAL BUSH LOAD	5239.685	4507.744	3795.995	2402.784	1665.796	1640.556
	10°	20,30 & 40°	[50°]	60°	70°	80 & 90°

DATE 12-14-79 BY A.L.G. REF. NOS

VALVE TYPE 9200 SIZE 18" TEMP 340° SHAFT MATL 316 SS BUSH. MATL BRONZE/GRAPHITE

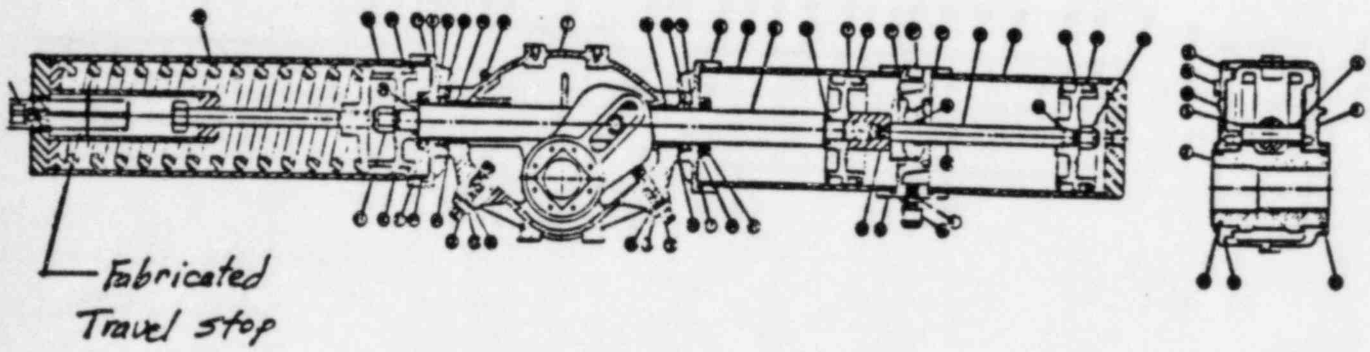
DISC TO SHAFT CONNECTION PINNED DRIVE TO SHAFT CONNECTION KEYED

SHAFT STRENGTH FCTR %	51.000	51.000
BUSH. STRENGTH FCTR %	85.000	85.000
DISC TO SHAFT CONC FCTR	.500	.500
DRIVE TO SHAFT CONC FCTR	.750	.750
INPUT		
D	17.000	17.000
DP	65.000	[62.000]
Lo	.600	.600
Ts	2316.600	260.000
Tl	.000	.000
m	.000	.000
DTF	.000	136.000
P1		62.000
DPe fact		.250
GENERATED VARIABLES		
St	26775.000	26775.000
Ss	13387.500	13387.500
Sb	8500.000	8500.000
OUTPUT		
ds TORK & BEND (St)	1.237	1.235
ds TORK & BEND (Ss)	1.283	1.296
ds TORK & SHEAR (Ss)	1.375	1.402
ds DISC CONNECT (Ss)	1.375	1.446
ds DRIVE CONNECT (Ss)	1.308	1.159
ds BUSH LOAD (Sb)	.931	.910
ds SPECIFIED	1.500	1.500
TOT ACTUATOR TORK RQ	4715.063	[5164.043]
ACTUAL BUSH LOAD	3281.113	3129.677
	0°	50°

BETTIS®

ALWAYS FURNISH SERIAL NUMBER OF ACTUATOR WHEN ORDERING PARTS

MODEL 733 B-SR



MODEL 733 B-SR

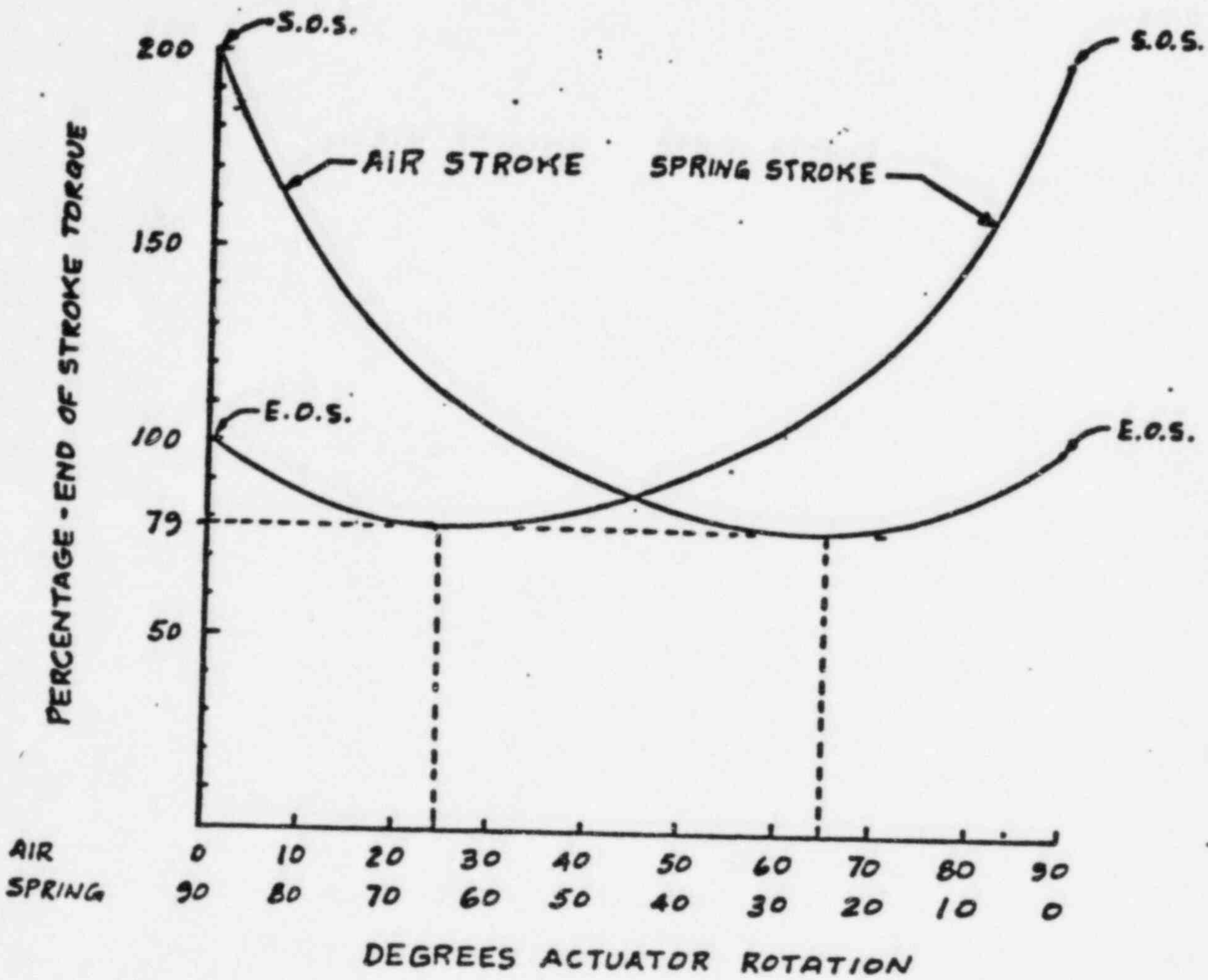
ITEM NO	PART NO	DESCRIPTION	MATERIAL	MATERIAL SPEC	QUAN	SPARE PARTS
1	211328	HOUSING	DUCTILE IRON	ASTM-A445-63T GRADE 60-45-15		
2	211329	YOKE	DUCTILE IRON	ASTM-A536-65T GRADE 65-45-12	1	
3	211330	HOUSING COVER	DUCTILE IRON	ASTM-A536-65T GRADE 65-45-12	1	
4	211331	YOKE PIN	STEEL	STRESSPROOF	1	
5	211415	YOKE PIN ROLLER	STEEL	STRESSPROOF	1	
6	211332	PISTON ROD	STEEL	STRESSPROOF	2	
7	203[illegible]60	PISTON	GRAY IRON	ASTM-A126-61T CLASS B	1	
8	202062	CYLINDER ADAPTER	DUCTILE IRON	ASTM-A536-65T GRADE 60-45-15	1	
9	211333	CYLINDER	STEEL	TUBING AISI 1010 B. PLATE ASTM-A7	2	
10	209096	PISTON ROD GUIDE BUSHING	BRONZE	ASTM-B 43-52 GRADE 86-10-2	1	
11	208388	PISTON RETAINER NUT	STEEL & NYLON	ASTM-A194-65 GRADE 2	2	
12	21634[illegible]	STOP ADJUSTING SCREW	STEEL	45/53 Rc	1	
13	211335	ADJUSTING SCREW JAM NUT	STEEL	ASTM-A194-65 GRADE 1	2	
14	208357	PISTON SEAL	BUNA-N	DURO 70A	2	
15	205244	YOKE SEAL	BUNA-N	DURO 70A	3	3
16	210825	PISTON ROD SEAL	BUNA-N	DURO 65A	2	2
17	208383	CYLINDER SEAL	BUNA-N	DURO 70A	2	2
18	211334	HOUSING COVER GASKET	COMPRESSED ASBESTOS	ASTM-D1170	4	4
19	204684	HOUSING COVER SCREW	STEEL	ASTM-A307-65 GRADE A	1	1
20	209094	CYLINDER ADAPTER GASKET	COMPRESSED ASBESTOS	ASTM-D1170	4	
21	2046[illegible]	CYLINDER ADAPTER SCREW	STEEL	36-42 Rc	2	2
22	20[illegible]27	OIL FILL & DRAIN PLUG	STEEL	COMMERCIAL	8	
23	203727	CYLINDER ADAPTER PLUG	STEEL	COMMERCIAL	1	
24	209017	ADAPTER SCREW LOCK WASHER	STEEL	COMMERCIAL	4	
25	211337	ADJUSTING SCREW SEAL	NYLON	ZYTEL® 101	8	
26	205216	PISTON HEAD SEAL	BUNA-N	DURO 70A	2	2
27	209294	SERIAL NUMBER TAG	ALUMINUM		2	2
28	210921	PISTON ROD ANTI-EXTRUSION SEAL	POLYTHANE®	CUP DURO 90A, O RING DURO 70A	1	
29	209200	INNER CYLINDER	STEEL	AISI-1018	2 SETS	2 SETS
30	211759	OUTER BODY	DUCTILE IRON	ASTM-A536-65T GRADE 60-45-10	1	
31	212[illegible]1	OUTER PISTON ROD	STEEL	STRESSPROOF	1	
32	212935	PISTON ROD ADAPTER	STEEL	GRADE B-1112	1	
33	202[illegible]55	OUTER PISTON	GRAY IRON	ASTM-A126 CLASS-B	1	
34	209[illegible]5	OUTER PISTON RETAINER NUT	STEEL & NYLON	ASTM-A194 GRADE 2	1	
35	[illegible]	[illegible]	[illegible]	[illegible]	1	
36	[illegible]	[illegible] SEAL	[illegible]	[illegible]	1	1
37	[illegible]	[illegible]	[illegible]	[illegible]	1	1
38	21[illegible]	[illegible] SEAL [illegible]	[illegible]	[illegible]	2	
39	[illegible]	[illegible]	ALUMINUM & BUNA-N	[illegible] NYLON	2	2
40	209[illegible]	SPRING PISTON	GRAY IRON	ASTM-B [illegible] 85-5-5-5	4	
41	2119[illegible]0	OUTER BODY BREATHER BUSHING	STEEL	ASTM-A126 CLASS-B	1	
42		SPRING CYLINDER	STEEL	COMMERCIAL	1	
43		SPRING ASSEMBLY	STEEL & DUCTILE IRON	TUBING AISI [illegible] END CAP ASTM-A7	1	

SEAL KIT P/N 920240

BY. B. REED _ DATE 7-9-74
CHKD BY_____ DATE_____

SUBJECT TORQUE CURVE FOR SPRING RETURN TYPE ACTUATORS ~ I POSITION vs % OF E.O.S. RATED TORQUE

SHEET NO 1 OF 1
JOB NO 3-1848-1
(521-SR-60)



VALUES SHOWN ARE THOSE FROM ONE ACTUATOR & SHOULD BE CONSIDERED APPROXIMATE ONLY.

E.O.S. = END OF STROKE.
S.O.S. = START OF STROKE.

DATE 7-1-76 (WCS) FISHER CONTROLS COMPANY PROBLEM 983

REPORT 13

FIGURE 1

FLOW VS TRAVEL CHARACTERISTIC

BODY SIZE 6" DESIGN/TYPE 9200 B/F BODY DWG. F41629-B

SEAL CONSTRUCTION ______ SEAL DWG. ______

MEASURED PROTECTOR RING DIA. ______ PROTECTOR RING DWG. ______

BALL/DISC TYPE 5 TO 1 ASPECT RATIO BALL/DISC DWG. 75-115DXX2002-A

VALVE FLOW DIRECTION: ☒ NORMAL ☒ REVERSE

⊙ WATER TEST

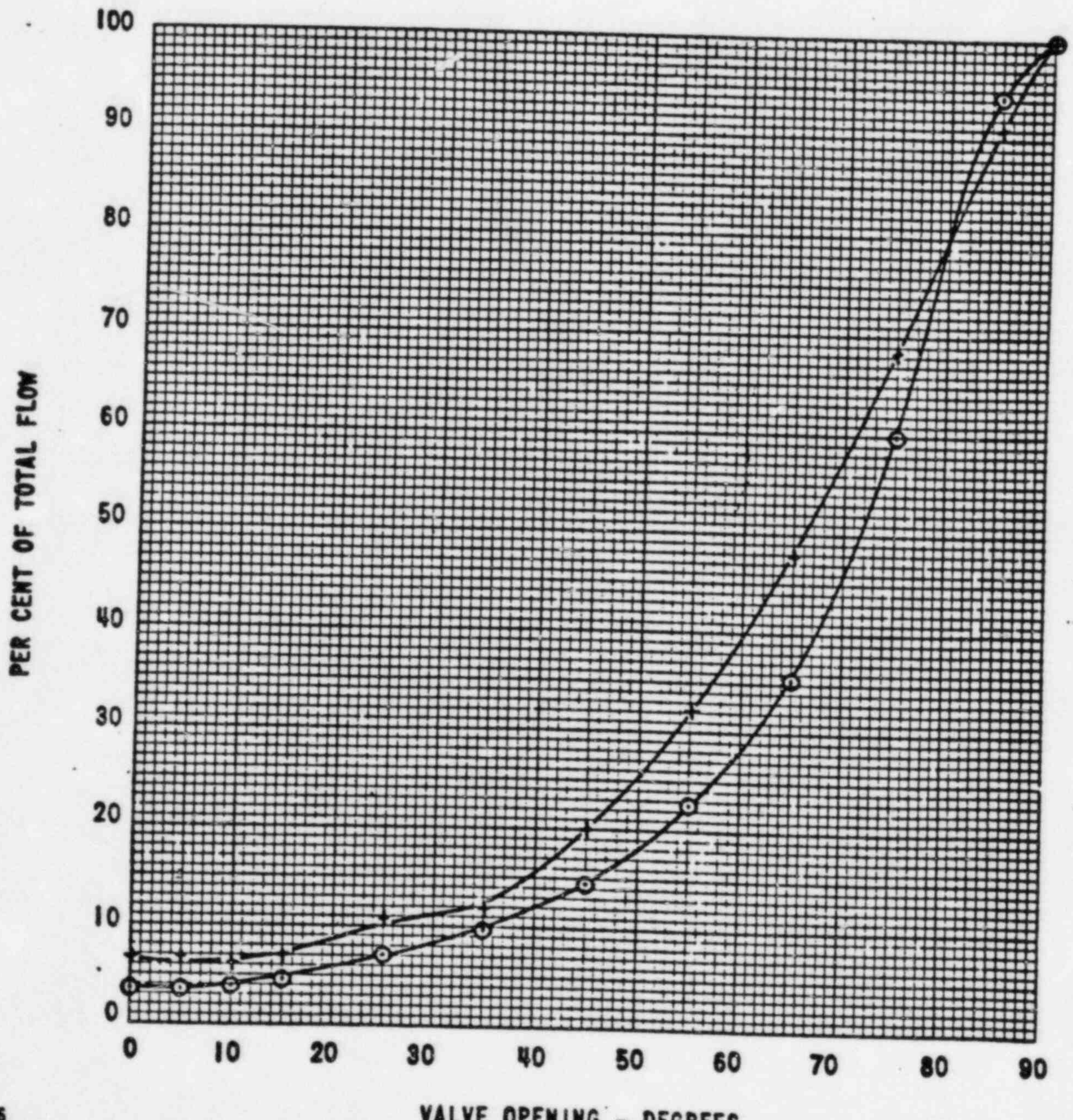
BODY INLET PRESSURE >100 PSIG BODY PRESSURE DROP 5 PSI

AVERAGE C_v = 1370

+ AIR TEST

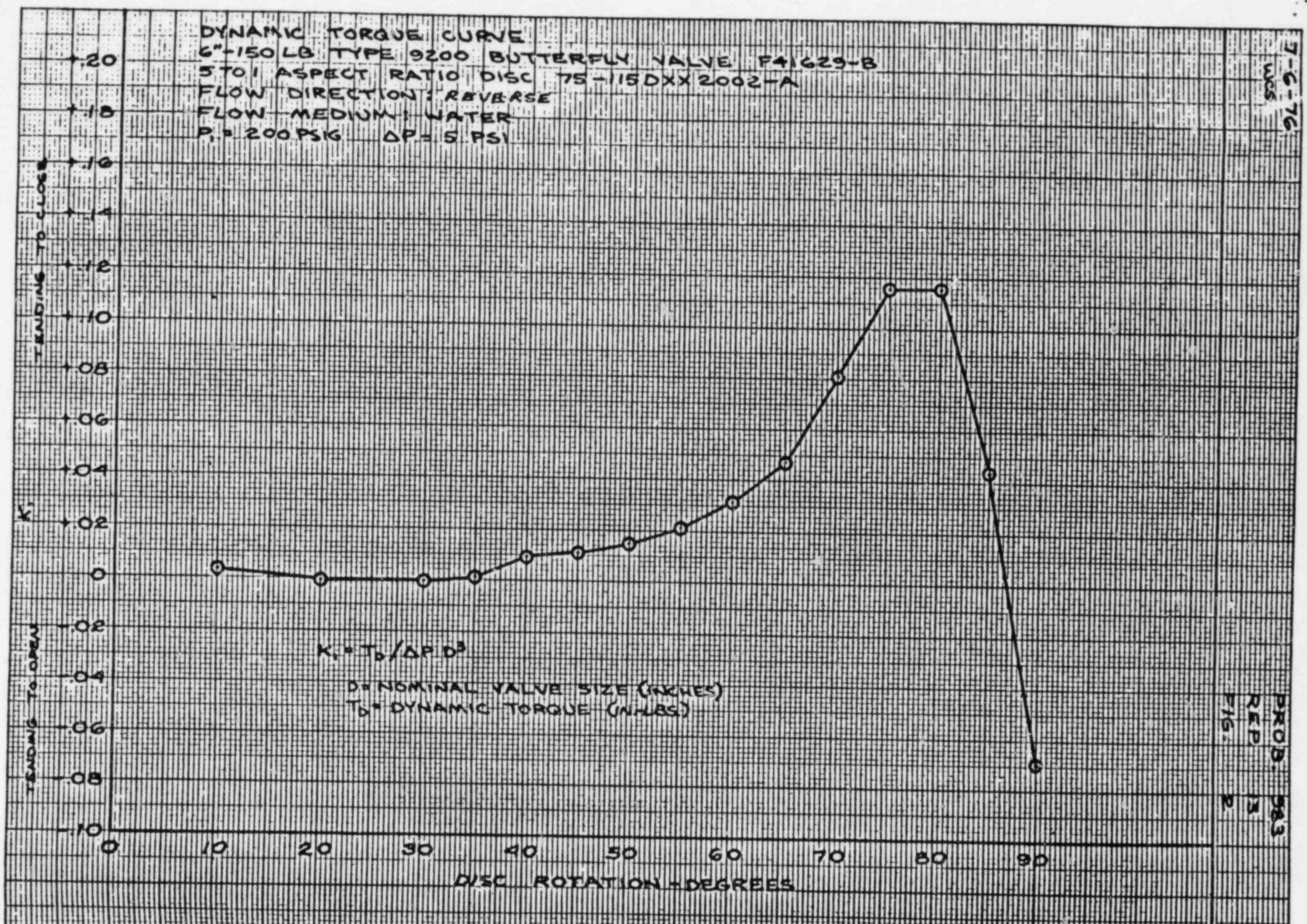
BODY INLET PRESSURE 64.3 PSIA BODY PRESSURE DROP CRITICAL

AVERAGE C_g = 25700



IES. FORM 06

K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM. KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1512



ATTACHMENT 2

NRC DOCKET 50-321
OPERATING LICENSE DPR-57
EDWIN I. HATCH NUCLEAR PLANT UNIT 1
PROPOSAL FOR TECHNICAL SPECIFICATION CHANGES
DOSE EQUIVALENT IODINE

In accordance with the provisions of 10 CFR 50.90 as required by 10 CFR 50.59(c)(1), Georgia Power Company (GPC) hereby proposes an amendment to the Edwin I. Hatch Nuclear Plant Unit 1 Technical Specifications (Appendix A to the Operating License). This application revises the Unit 1 Dose Equivalent Iodine (DEI) Specification in accordance with current Standard Technical Specification guidance.

Unit 1 was licensed with a site specific DEI Limit of 10 microcuries per gram of coolant. The submittal changes this basis to a worst-case non-site specific limit of 0.2 microcuries per gram. This change is in the conservative direction. Additional changes have been made in the sampling requirements to more closely define the expected changes in DEI under various plant conditions.

The Plant Review Board and Safety Review Board have reviewed this proposed change and have determined that this change does not constitute an unreviewed safety question or a significant hazard as defined in 10 CFR 50.92. Because the values in this proposed change were established by NRC approved methodology, the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety are not increased above those analyzed in the FSAR nor is the margin of safety as defined in the Technical Specifications reduced due to this change. Since this change introduces no new mode of operation, the possibility of an accident or malfunction of a different type than analyzed in the FSAR does not result.

The determination of amendment class is attachment 3. The proposed change has been determined to be Amendment Class III type. The appropriate payment is enclosed.

ATTACHMENT 3

NRC DOCKET 50-321
OPERATING LICENSE DPR-57
EDWIN I. HATCH NUCLEAR PLANT UNIT 1
DETERMINATION OF AMENDMENT CLASS

Pursuant to 10 CFR 170.12 (c), Georgia Power Company has evaluated the attached proposed amendment to Operating License DPR-57 and has determined that:

a. The proposed amendment does not require the evaluation of a new Safety Analysis Report or rewrite of the facility license;

b. The proposed amendment does not contain several complex issues, does not involve ACRS review, and does not require an environmental impact statement;

c. The proposed amendment does not involve a complex issue or more than one environmental or safety issue;

d) The proposed amendment does involve a single safety issue, namely, changes to the Dose Equivalent Iodine limit.

e. The proposed amendment is therefore a Class III amendment.

ATTACHMENT 4

NRC DOCKET 50-321
OPERATING LICENSE DPR-57
EDWIN I. HATCH NUCLEAR PLANT UNIT 1
PROPOSAL FOR TECHNICAL SPECIFICATION CHANGES
DOSE EQUIVALENT IODINE

The proposed change to the Technical Specification (Appendix A to Operating License) would be incorporated as follows:

Remove Page	Insert Page
3.6-4	3.6-4
3.6-5	3.6-5
3.6-18	3.6-18