



DUKE POWER

March 15, 1996

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Subject: Duke Power Company
McGuire Nuclear Station
Docket Numbers 50-369 and -370
Catawba Nuclear Station
Docket Numbers 50-413 and -414
Safety Valve Modeling

- References: 1) November 15, 1995 letter from W. R. McCollum
(DPC) to NRC, "Proposed Technical
Specifications (TS) Changes."
2) December 19, 1995 letter from M. S. Tuckman
(DPC) to NRC, "Minor Change to NRC-Approved
Methodology."

The purpose of this letter is to provide additional information concerning the two submittals referenced above. The intent of the November 15, 1995 submittal was to pursue an increase in the main steam code safety relief valve setpoint tolerance for the current plant configuration. As such, the transient analyses discussed in the technical justification section were those based on the existing Model D steam generator design. This submittal is completely independent of steam generator replacement, although the approval of the submittal will affect the replacement steam generator licensing plan as described below. The corresponding McGuire submittal was approved by the NRC on August 2, 1994.

The December 19, 1995 submittal seeks NRC concurrence for a revision to the pressurizer and main steam safety valve lift modeling in NRC-approved analysis methodologies. This revision will use a pop-open modeling approach rather than a linear ramping open approach. This change was made necessary primarily by the turbine trip transient, which was reanalyzed in support of the steam generator replacement. During the course of this reanalysis, it was discovered that due to the increased heat transfer area of the replacement steam generator, the peak secondary pressure case did not

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meet the acceptance criterion. Below is a summary of the peak secondary pressure results for the pertinent analysis cases:

Acceptance criterion (110% of 1185 psig)	1303.5 psig
Model D S/G:	
+3% setpoint drift, original lift setpoints, linear ramp model	1295 psig
Replacement S/G:	
+3% setpoint drift, original lift setpoints, linear ramp model	>1311 psig
+3% setpoint drift, reduced lift setpoints, linear ramp model	1295.8 psig
+3% setpoint drift, original lift setpoints, pop-open model	1285.7 psig

The revised modeling assumes that the safety valves pop open to a full open position in 0.5 seconds after the drifted lift setpoint is reached. This assumption is based on the attached documents, in which the valve manufacturers, Crosby and Dresser, and the McGuire/Catawba valve engineering staff concur that this modeling is adequate to conservatively bound the performance of both the pressurizer and main steam safety valves. Approval of the increased setpoint tolerance and NRC concurrence with the revised pop-open modeling approach is requested. No additional Technical Specification changes or engineering effort are necessary to resolve this issue with this approach. There are no NUREG-0737 commitments regarding the transient analysis modeling of the safety valves that conflict with this request.

If the increased setpoint tolerance is approved and the valve pop-open modeling is not, the main steam safety valve setpoints will have to be lowered in conjunction with the steam generator replacement. This will require submittal of additional Technical Specification revisions. If the increased tolerance is not approved, the turbine trip analysis will not necessitate any setpoint or valve modeling changes. However, the consequence of this course of action will be a continuation of licensee reports and engineering evaluations due to the safety valves failing their Technical Specification surveillance and being declared inoperable.

If you would like to discuss this letter further, please call Scott Gewehr at (704) 382-7581.

Very truly yours,

M. S. Tuckman

M. S. Tuckman

cc: Mr. V. Nerses, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 14H25, OWFN
Washington, D. C. 20555

Mr. R. E. Martin, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 14H25, OWFN
Washington, D. C. 20555

Mr. S. D. Ebnetter, Regional Administrator
U.S. Nuclear Regulatory Commission - Region II
101 Marietta Street, NW - Suite 2900
Atlanta, Georgia 30323

Mr. G. F. Maxwell
Senior Resident Inspector
McGuire Nuclear Station

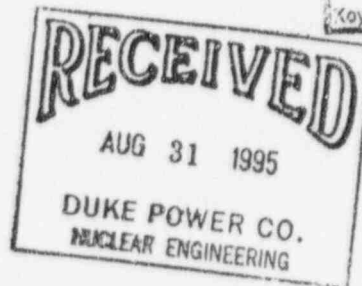
Mr. R. J. Freudenberger
Senior Resident Inspector
Catawba Nuclear Station

Attachment 1

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<input type="checkbox"/> NRC	<input type="checkbox"/> DOE	<input type="checkbox"/> B&W	<input type="checkbox"/> W	<input type="checkbox"/> Other
Key Word: Secondary Equipment				

August 29, 1995

Christy Ray
NGD Safety Analysis Group



Re: McGuire Nuclear Station
MSSV Opening Response Time
Tech Spec Submittal

This is to summarize the expected opening response times of the McGuire's Main Steam Safety Valves and to demonstrate that they will open fully within the 0.5 seconds assumed in the Safety Analysis. The following valves were manufactured by Crosby and are the subject of this review.

<u>Style</u>	<u>Size</u>	<u>Set Pressure</u>	<u>Open Time</u>	<u>Tag Nos.</u>
HA-65-FN	6Q8	1170 psig*	0.160 sec	1/2 SV2, 8, 14, 20
HA-65-FN	6Q8	1190 psig*	0.090 sec	1/2 SV3, 9, 15, 21
HA-75-FN	6R10	1205 psig*	0.110 sec	1/2 SV4, 10, 16, 22
HA-75-FN	6R10	1220 psig*	0.060 sec	1/2 SV5, 11, 17, 23
HA-75-FN	6R10	1225 psig	unavailable	1/2 SV6, 12, 18, 24

All valves at McGuire were tested at Crosby's high flow test loop to determine unique ring setting for each valve to assure blowdown performance within a range less than or equal to 10%. The tests simultaneously recorded 1) inlet pressure, 2) outlet pressure and 3) spindle position on Crosby's Data Acquisition System. Although the test was not specifically intended to demonstrate the opening response time for the valves, the data did record the opening time for each valve at test conditions with its own unique ring settings.

Crosby recently provided one set of test curves, for one valve at each set pressure indicated above with an asterisk (*). These curves (Attachment 1) show typical response time for valves installed at McGuire. Crosby has not yet provided curves for all valves but has indicated that these curves should represent the opening response of all MSSV's at McGuire.

Since the Crosby tests were intended primarily to validate ring settings for blowdown performance, the inlet pressure ramp rate was not varied to study its effect on opening times. EPRI, however, conducted extensive tests on Pressurizer Safety Valves as required by NUREG-0737. These tests by EPRI on a Crosby style HB-BP-86, size 6N8, demonstrated no appreciable relationship between inlet pressurization rate and opening times. With ramp rates varying between 2 psi/sec and 325 psi/sec, opening times varied little between 0.018 and 0.021 seconds. See Attachment 2, tables 4-2 and 4-3.

Although the Pressurizer Valve tested by EPRI and the Main Steam Safety Valves tested at Crosby are different styles, they both have a two-ring internal design and are similar in body size. Tests also demonstrate that both style valves, under varying conditions, open with a rapid "pop" at valve setpoint. We would expect similar inlet pressurization rates to have little effect on the opening time of the MSSV's.

Therefore, the tests performed by Crosby, coupled with those performed by EPRI demonstrate valve opening response times under various inlet conditions, are well within the assumed time of 0.500 seconds.

If you wish to discuss this subject further, please contact the undersigned at 875-5627.

A handwritten signature in cursive script that reads "Grant Cutri".

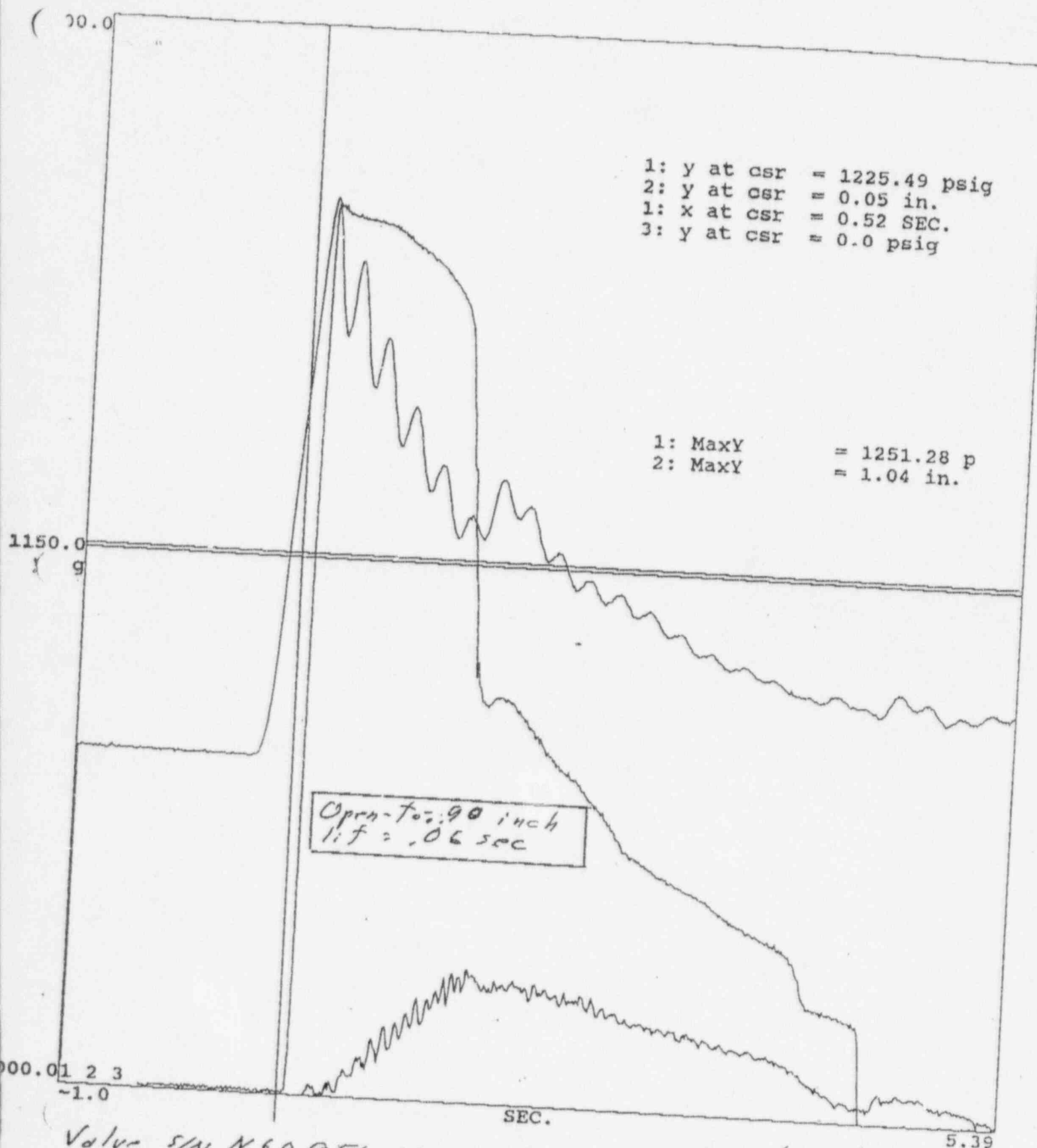
Grant Cutri
McGuire Valve Engineering

Attachments (2)

Christy Ray

8/29/95

Attachment 1 sh 2 of 5



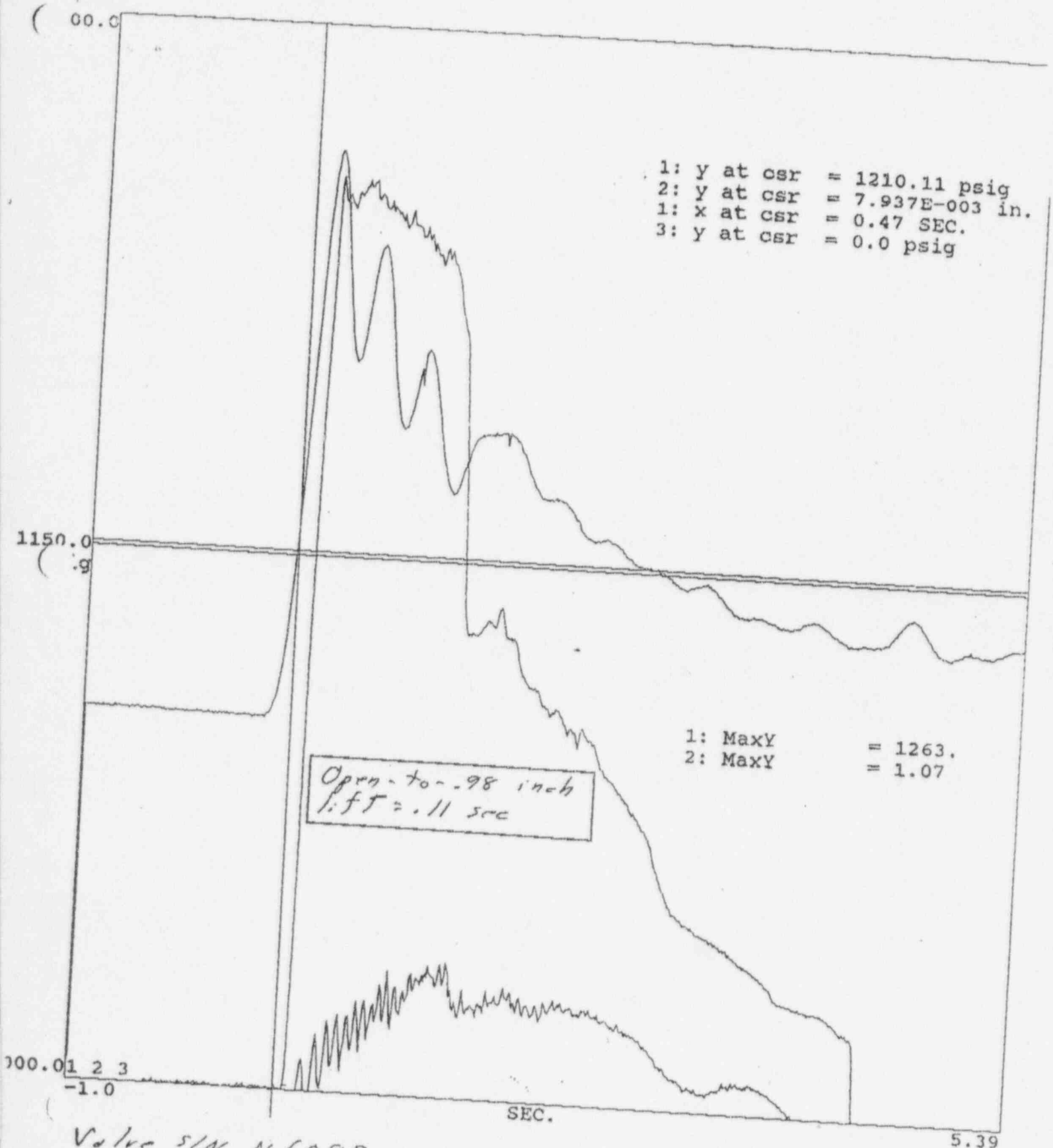
Valve S/N N60951-01-0025
6 R 10 Set Pressure = 1220 psig
Sheet 1 of 1

Open-to-close = 3.9/sec

Christy Ray

8/29/95

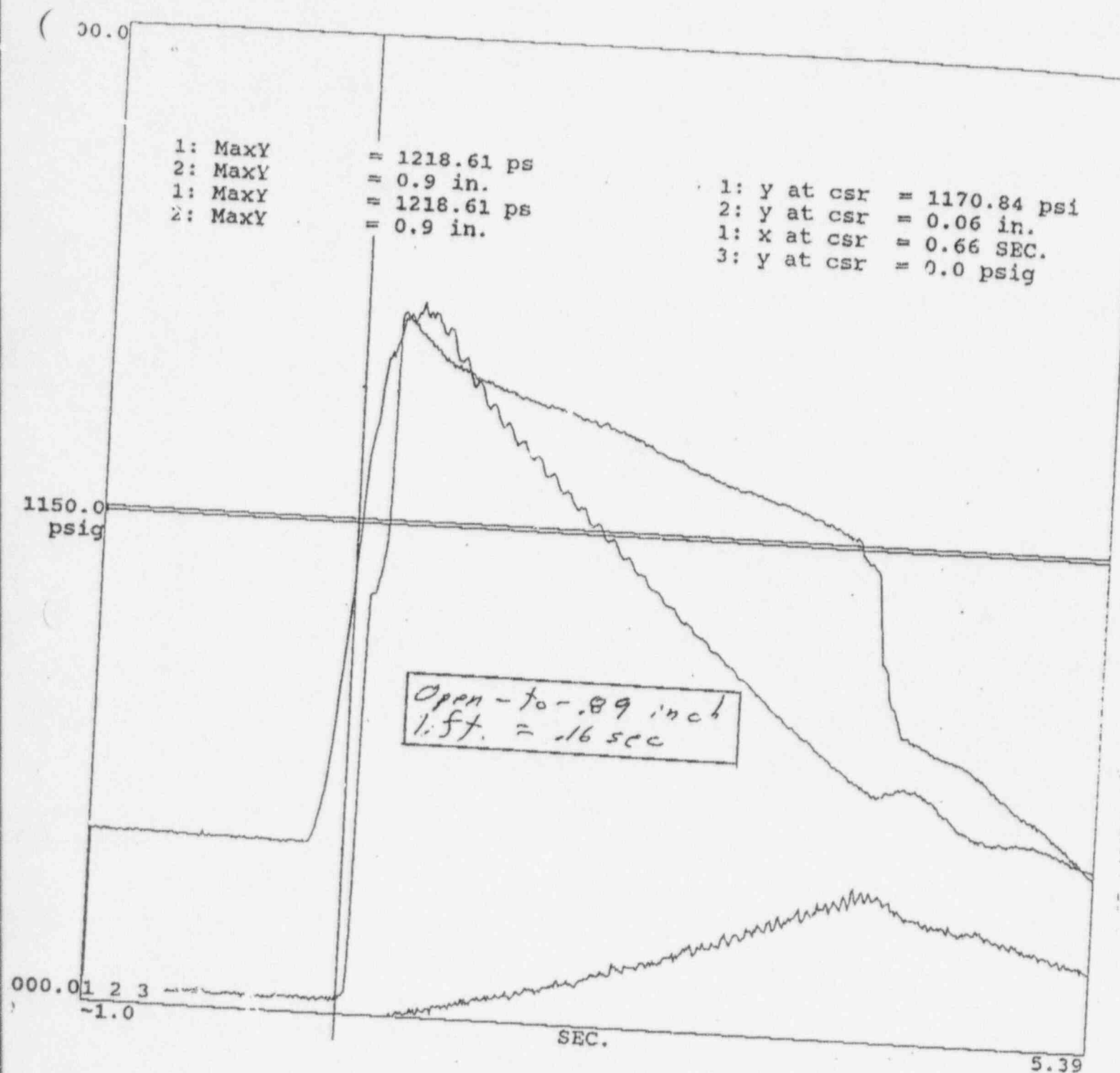
Attachment 1 sh 3 of 5



Christy Ray

8/29/95

Attachment 1 sh 4 of 5



Valve S/N N56937-01-0001

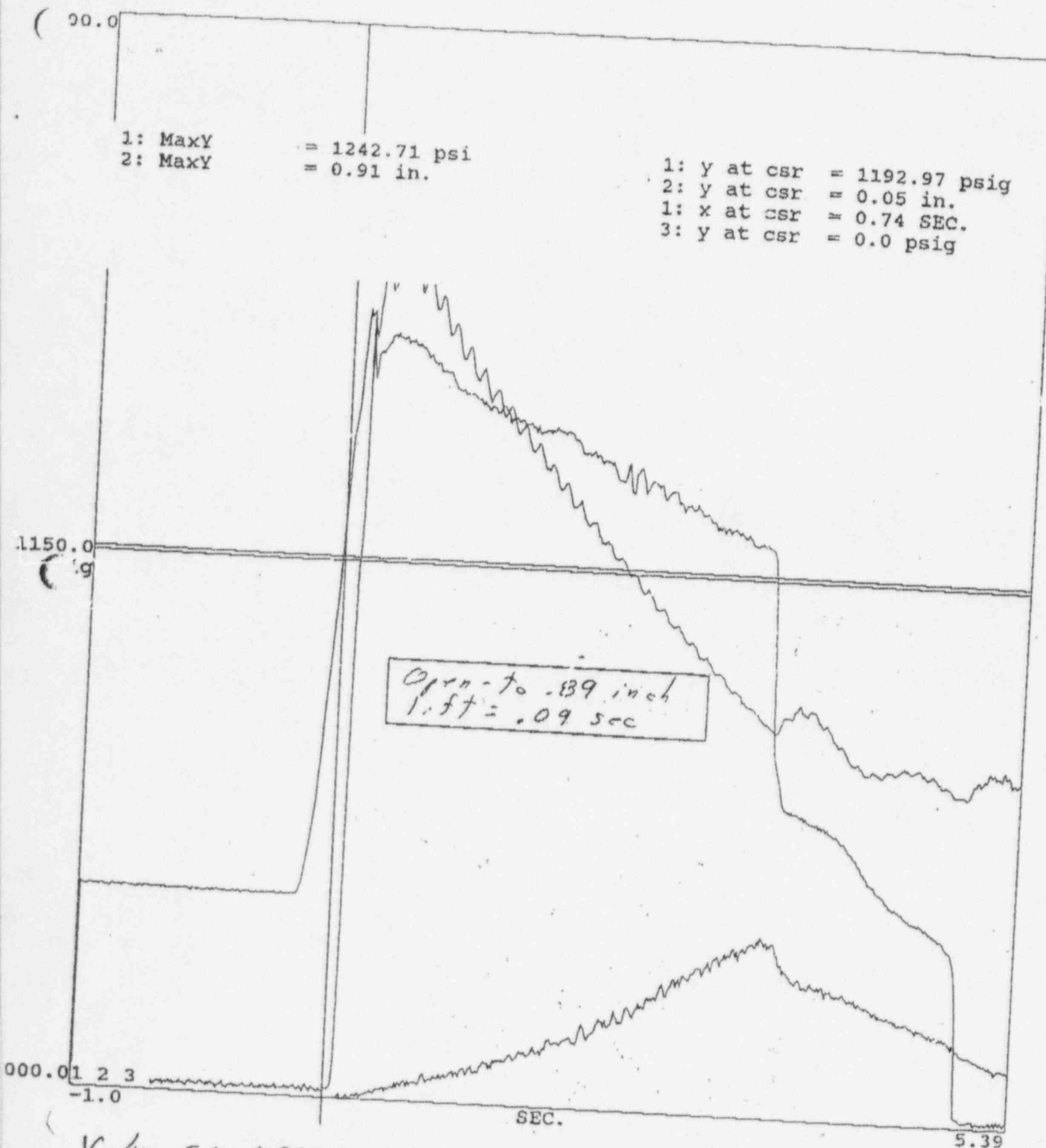
6 Q 8 Set Pressure = 1170 psig

Sheet 1 of 2

Christy Ray

8/29/95

Attachment 1 sh 5 of 5



Valve S/N NS6937-01-0005
6 Q B Set Pressure = 1190 psig
Sheet 1 of 1

Open-to-close = 4.28 sec

Attachment 2

~~CNC 1552.08-00-0238~~

DPC-1552.08-00-0165



DUKE POWER

April 12, 1995

Rolland S. Huffman, Senior Engineer
Dresser Industries
PO Box 1430
Alexandria, LA 71309

Subject: MSSV (Dresser Model 3787) Opening Times
File No: CN1205.09

Dear Sir,

Due to a historical trend of Main Steam Safety Valve (MSSV) setpoint drift outside of $\pm 1\%$ and a recent trend of performance outside of $\pm 3\%$, Catawba has initiated a comprehensive safety analysis considering the potential impact of MSSV setpoint drift. A significant contributor to our computer modeled analysis is the valve "opening" time.

Catawba Engineering believes that Duke Power assumed an overly conservative MSSV Opening Time during the initial safety analysis. Based on review of extensive, well documented EPRI Safety Relief Valve Test Data performed after TMI, as required by NUREG-0737; the opening times of Dresser Pressurizer Safety Valves (PSV) was consistently shown to be less than 0.1 of a second. Multiple tests were performed with Dresser Model 31709na and 31739a PSV's under varied conditions of pressurization rate, system media, ring positions, etc. and validate this position. In addition, Crosby spring actuated safety valves of similar design, model HB-BP-86 6N8, also had opening times of less than 0.1 of a second. The "POP" action of these safety valves is clearly demonstrated by review of these comprehensive EPRI Test Reports.

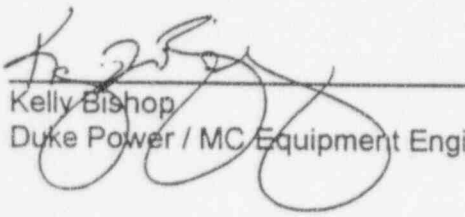
Attached are excerpts from the EPRI Test Reports representing typical test data and graphical plots of both stem position and steam flow vs time. These two parameters distinctly define the valve opening time. A summary of test results are documented on the Test Matrix Table noting the valve "simmer" time, "POP" time, pressurization rate, test media, etc. for each test run. In addition, plots for stem movement and steam flow for Dresser test number 603, 606, 611, and 1305 which are typical and notably represent varied conditions of pressurization (from 2.9 to 322 psi/sec) are attached.

The following information is a simple summary of key parameters of stem travel, steam flow, and time which have been recorded from the attached test data/plots.

	Time to Full Stem Travel Simmer + POP Time (Rated lift Of .588 ")	Time to Maximum Steam Flow (> rated steam flow of 508k lb/hr)	Pressurization Rate (psi/sec)
603	.016 sec	.080 sec	2.9
606	.020 sec	.075 sec	296
611	.024 sec	.072 sec	322
1305	.031 sec	.082 sec	308
1202	.020 sec	not available	2.0
1207	.019 sec	not available	317

Catawba does not have actual full flow test data for the Dresser 3787 MSSV's to support the position of valve opening times of .1 of a second, but CNS Engineering believes that the extensive PSV test data adequately demonstrates the "pop" action of a safety valve of this design and that the MSSV opening times will also be less than .1 seconds. Conservatively, Catawba proposes to model the valves with an opening time of .5 of second or over 500% of the slowest time observed for the PSV.

As per our telephone conversation, please review Catawba's Engineering Evaluation of MSSV opening times and the attached supporting documentation. As the original OEM of Catawba's MSSV's, we need your concurrence of our evaluation that the valves will open in less than .5 seconds. If you concur with the our evaluation please sign below and return ;otherwise, provide comments as to your position and the expected opening time we should assume for our analysis.


Kelly Bishop
Duke Power / MC Equipment Engineer

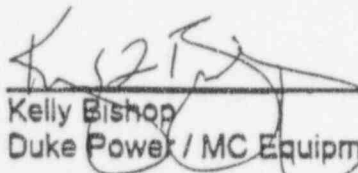
OEM (Dresser) Engineering Concurrence
R.S. Huffman
Dresser Industries /SR. Engineer

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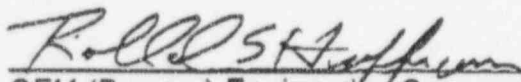
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 Kelly Bishop
 Duke Power / MC Equipment Engineer

We agree that safety valve 3787 will open in less than .0.5 seconds.


 OEM (Dresser) Engineering Concurrence
 R.S. Huffman
 Dresser Industries /SR. Engineer