AUTOMATIC VALVE
41144 Vincenti Court Novi MI USA 48375-1924
Internet Address www.automaticvalve.com
Telephone 810.474.6700 Facsimile 810.474.6732
World Class Air Valves and Controls

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To: JOHN MACKINNON

From: TODD HUTCHINS

Company NRC

Date & Time: 5/2/97 3:34:09 PM

Fax number: +1 (301) 816.5151

Pages: 5

Subject: 10CFR21 NOTIFICATION

GOOD AFTERNOON:

ATTACHED IS OUR 10CFR21 NOTIFICATION AND CORRECTIVE ACTION PER OUR DISCUSSION/MESSAGE. WE APOLOGIZE FOR THE TROUBLE AND INCONVENIENCE THIS MAY CAUSE.

IF YOU REQUIRE ADDITIONAL INFORMATION, PLEASE CONTACT ME.

BEST REGARDS, TODD.

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DATE: May 2, 1997

SUBJECT: 10CFR21 NOTIFICATION OF POTENTIAL DEFECT

Addressees: All users of safety related solenoid valves manufactured by Automatic Valve (AV) incorporating AC solenoids.

Purpose: AV is issuing this information notification to alert addressees of the potential for degraded performance and/or life expectancy of their AC solenoid valves if they exhibit a buzzing instead of humming sound when energized.

Definitions: BUZZ - any audible metallic clicking sound or sound greater in frequency and intensity than a hum. HUM - sound similar in frequency and intensity to florescent lights from an approximate 3 foot distance in a general office noise environment.

Background: After installation of 89 AC solenoid valves by Vermont Yankee (VY) in September 1996, BC Current of VY advised Todd Hutchins of AV that 5 valves made noise when energized (#06-11 louder than the rest). AV assumed this noise to be normal AC hum since no known product or customer complaint failure had ever been received by AV due to AC hum or buzz. Because of the preceding assumption and facts, AV took no action at that time. All AC solenoids hum to some extent.

April 24, 1997 VY obtained scram times during an auto scram of their plant. These scram times averaged identically to the original 1996 times. However, valve #06-11 took approximately .246 seconds (5 times) longer.

April 25, 1997 VY sent AV valve #06-11 for a failure analysis and visually inspected the internal components of any buzzing solenoids (VY event report #97-0424).

April 28, 1997 AV issued VY an initial root cause report (#2531 attached) and shipped replacement solenoid parts that had been 'noise' tested. Definitions of noise were developed based on VY experience and AV analysis of returns.

After interviews with AV inspection personnel, it was clear that valves at AV had been inspected for 'noise' but this had been done unofficially without any consistent acceptance/rejection criteria. Dimensional differences between solenoids that buzz and hum are not detectable. This was confirmed with 2 solenoid valve competitors. Definitions for acceptable AC hum and rejectable buzz for AC solenoids have now been added to in-process inspection points and final test procedures at AV.

Recommendation: Even though the solenoid valve functioned, it was significantly slower due to the amount of metallic by-product from the buzzing solenoid plunger. Regardless of the manufacturer, solenoids should be checked for buzzing noises as it could degrade the performance and potentially the life of the valve. Any rebuilding of anyone's solenoid valves should require a 'noise' test. Since 1970 AV has not been advised of a single safety related AV product failure due to this cause. VY confirmed this with their check of the NPRDS. → NUCLEAR PLANT RELIABILITY DATA SYSTEM

AV will retest, recertify, and reship at no charge any suspect product. AV will replace and reship at no charge any component found to be field defective.

This information intends to fulfill Automatic Valve's obligation under 10CFR21 and is being sent with all attachments to all known customers who have purchased AC solenoid valves with 10CFR21 imposed on their purchase order.

Should you have any additional questions, please feel free to contact me.

Very truly yours,
AUTOMATIC VALVE CORPORATION

Todd Hutchins
President

REQUIREMENTS:

NUMBER: CORRECTIVE ACTION #2531

Type of Problem: Part B7122-145 [ ] Procedure_____ Date: 04-25-1997
Who found Problem: [ ] AV [ ] Supplier [ ] Distributor Customer
Company: VERMONT YANKEE (VY) **Contact Name:** BC Current
Address:_____ **Phone:** 802-258-5457 **Fax:** 802-258-5544

1. **Team Working on Problem:** Leader: D. S. Swinton Members: K. W. Armstrong, T. TROY

2. **Describe Problem (Initial Concern and Symptoms):** The plunger on solenoid number 1 failed to return to it's de-actuated position in a timely manner when the solenoid was de-energized. As a consequence, air exhausted from the piston in the main valve slower than normal (reference VY event report #97-0424). Upon examination, the top of the solenoid plunger was found to be severely worn and had formed a peened edge around the top of the plunger. This edge interfered with the plunger guide and caused the plunger to drag. The customer reported very loud buzzing of this solenoid at original installation.

   Initial examination of the valve also revealed black dust. Laboratory analysis of this dust confirmed it to be 400 series stainless steel - the same material from which the plunger is constructed.

   Acknowledged by: K. W. Armstrong Title: VP Quality Systems Date: 04-27-1997

3. **Contain Symptom (Action):** Verify that existing valves are free of buzzing (metallic clicking as opposed to 60 cycle hum) by testing the plunger in a minimum of 8 positions and leaving the solenoid energized for a minimum of 4 hours. Replace the plunger guide, spring, and plunger on all units that exhibit any buzzing (shipped 4-28 and 4-29).

   Similar units have been in commercial use for over 40 years and identical units used for utility service for over 27 years and this is the first reported or known incidence of such a condition due to the solenoid being continuously energized.

   Approved by: K. W. Armstrong_____ Title: VP Quality Systems Est. Date:_____ Act Date:4-27-1997

4. **Root Cause/s of Problem:** (initial assessment)
   Loud audible buzzing of the solenoid indicates that the solenoid plunger was moving while in the energized condition and that this movement caused premature and severe wear of the plunger.

   Approved by: K. W. Armstrong_____ Title: VP Quality Systems Est. Date:_____ Act Date:4-27-1997

5. **Corrective Action:**
   Since dimensional inspection cannot differentiate solenoids that buzz vs hum, add 'noise' test at in-process and final inspection points as part of material dedication process.

   Test Conducted to Verify It: VY event report #97-0424 indicates solenoid noise remained consistent for 6 months. AV added additional 4 hour burn-in test to replacement units for VY with no change in noise.

   Approved by: K. Armstrong_____ Title: VP Quality Systems Est. Date:_____ Act. Date: 05-01-97

6. **Implementation (Describe and Include Applicable CN Numbers):**
   Added noise test to AC solenoid prints for in-process control and to final inspection procedure (CN #7413).

   Approved by: K. Armstrong_____ Title: VP Quality Systems Est. Date:_____ Act. Date: 05-01-97

7. **Corrective Action to System to Prevent Recurrence:**
   Not yet assessed.

   Approved by:_____ Title_____ Est. Date: 05-30-97 Act. Date:_____

8. **Verification (Describe):**

   Approved by_____ Title:_____ Est. Date:_____ Act. Date:_____

GENERAL INFORMATION or OTHER

EVENT NUMBER: 32253

LICENSEE: AUTOMATIC VALVES CORPORATION
CITY: NOVI REGION: 3
COUNTY: STATE: MI
LICENSE#: AGREEMENT: N
DOCKET:

NOTIFICATION DATE: 05/01/97
NOTIFICATION TIME: 16:14 [ET]
EVENT DATE: 04/25/97
EVENT TIME: 00:00 [EDT]
LAST UPDATE DATE: 05/02/97

NRC NOTIFIED BY: TODD HUTCHINS
HQ OPS OFFICER: JOHN MacKINNON

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
CCCC 21.21 UNSPECIFIED PARAGRAPH

NOTIFICATIONS

KATHLEEN DOLCE (R1)	RDO
DICK WESSMAN	EO
MARK RING (R3)	RDO
VERN HODGE (RVIB)	NRR
AL CHAFFEE	NRR
RICH BARRETT	IRD

EVENT TEXT

PART 21 REPORT REGARDING FAILURE OF SCRAM SOLENOID PILOT VALVES ISSUED BY AUTOMATIC VALVES CORPORATION, NOVI, MICHIGAN.

IN SEPTEMBER, 1996, AUTOMATIC VALVES CORPORATION (AVCO) WAS NOTIFIED BY VERMONT YANKEE THAT A SCRAM SOLENOID PILOT VALVE WAS MAKING A BUZZING SOUND (RATHER THAN A HUMMING SOUND) WHEN ENERGIZED. AVCO DISCOUNTED THE REPORT AND TOOK NO ACTION AT THAT TIME BECAUSE ALL AC SOLENOIDS HUM TO SOME EXTENT AND THEY ASSUMED THIS NOISE TO BE A NORMAL AC HUM SINCE NO KNOWN PRODUCT OR CUSTOMER COMPLAINT FAILURE HAD EVER BEEN RECEIVED BY AVCO DUE TO AC HUM OR BUZZ.

ON 04/24/97, WHILE VERMONT YANKEE WAS PERFORMING SCRAM TIME TESTING, THE CONTROL ROD ASSOCIATED WITH THE NOISY SCRAM SOLENOID PILOT VALVE #06-11-118 (WHICH HAD BEEN NOISY FOR THE LAST SIX MONTHS) HAD A SCRAM TIME THAT WAS SLOWER THAN THE OTHER CONTROL RODS THAT WERE BEING TESTED, BUT WAS WITHIN THE TECHNICAL SPECIFICATION TIME LIMITS.

AVCO HAS DETERMINED THAT THE NOISE WAS DUE TO METALLIC VIBRATION WITHIN THE SCRAM SOLENOID PILOT VALVE WHICH CAUSED THE VALVE PERFORMANCE TO DEGRADE. DURING PAST ACCEPTANCE TESTS, AVCO DID NOT USE AUDIBLE NOISE EMANATING FROM THE SCRAM SOLENOID PILOT VALVES AS AN ACCEPTANCE CRITERION. AVCO HAS CHANGED THEIR PROCEDURES TO USE THIS CRITERION. AVCO HAS SUPPLIED SCRAM SOLENOID PILOT VALVES TO 20 - 25 NUCLEAR POWER PLANTS IN THE UNITED STATES.

*** UPDATE AT 1640 ON 05/02/97 BY AVCO TODD HUTCHINS TAKEN BY MacKINNON ***

AFTER INTERVIEWS WITH AVCO INSPECTION PERSONNEL, AVCO MANAGEMENT PERSONNEL DETERMINED THAT VALVES AT AVCO HAD BEEN INSPECTED FOR "NOISE" BUT THIS HAD

(Continued on next page)

BEEN DONE UNOFFICIALLY WITHOUT ANY CONSISTENT ACCEPTANCE/REJECTION CRITERIA. DIMENSIONAL DIFFERENCES BETWEEN SOLENOIDS THAT BUZZ AND HUM ARE NOT DETECTABLE. THIS WAS CONFIRMED WITH TWO AVCO SOLENOID VALVE COMPETITORS. DEFINITIONS FOR ACCEPTABLE AC HUM AND REJECTABLE BUZZ FOR AC SOLENOIDS HAVE NOW BEEN ADDED TO IN-PROCESS INSPECTION POINTS AND FINAL TEST PROCEDURES AT AVCO.

AVCO RECOMMENDATION: EVEN THOUGH THE SOLENOID VALVE FUNCTIONED, IT WAS SIGNIFICANTLY SLOWER DUE TO THE AMOUNT OF METALLIC BY-PRODUCT FROM THE BUZZING SOLENOID PLUNGER. REGARDLESS OF THE MANUFACTURER, SOLENOIDS SHOULD BE CHECKED FOR BUZZING NOISES AS IT COULD DEGRADE THE PERFORMANCE AND POTENTIALLY THE LIFE OF THE VALVE. ANY REBUILDING OF ANY SUPPLIER'S SOLENOID VALVES REQUIRE A 'NOISE" TEST. SINCE 1970, AVCO HAS NOT BEEN ADVISED OF A SINGLE SAFETY RELATED AVCO PRODUCT FAILURE DUE TO THIS CAUSE. VERMONT YANKEE CONFIRMED THIS WITH A CHECK OF THE NUCLEAR PLANT RELIABILITY DATA SYSTEM.

AVCO WILL RETEST, RECERTIFY, AND RESHIP AT NO CHARGE ANY SUSPECTED PRODUCT. AVCO WILL REPLACE AND RESHIP AT NO CHARGE ANY COMPONENT FOUND TO BE FIELD DEFECTIVE.

THE OPERATIONS OFFICER NOTIFIED R1DO (MICHAEL MODES), R2DO (CHUCK CASTO), R3DO (MARK RING), R4DO (JOE TAPIA) & NRR VERN HODGE.