SUMMARY/MINUTES OF THE ACRS SUBCOMMITTEE
MEETING ON MECHANICAL COMPONENTS
OCTOBER 26-27, 1988
BETHESDA, MARYLAND

The ACRS Subcommittee on Mechanical Components met on October 26-27, 1988 at Bethesda, Maryland to review the NRC Staff's proposal regarding the draft generic letter requiring that all nuclear power plant owners implement a program to establish, maintain and periodically verify the design basis operability of all safety-related, motor-operated values (MOVs). This was the second meeting of the subcommittee on this subject; the first was held on October 4, 1988.

Notice of the meeting was published in the Federal Register on October 6, 1988, (Attachment A). The schedule of items covered in the meeting is in Attachment B. A list of handouts kept with the office copy of the minutes is included in Attachment C. There were no written or oral statements received or presented from members of the public at the meeting. E. G. Igne was Cognizant ACRS Staff member for the meeting.

Principal Attendees

ACRS

C. Michelson, Chairman
C. Wylie, Member
J. Carroll, Member
P. Wohld, ACRS Consultant

Others

J. Edson, INEL
R. Van Lear, Babcock & Wilcox
D. Lowry, Liberty Technology
M. Asztalos, Westinghouse

NRC

R. Kiessel
D. Persinko
H. Ornstein
O. Rothberg
E. Brown
R. Baer
J. Jacobson
G. Weidenhamer
S. Tingen

R. Bailey, Limitorque
R. Slovic, Bechtel KWU
R. Carr, MOVATS
R. Elfstrom, Toledo Edison
R. McPherson, Southern Cal. Ed.
R. Callaway, NUMARC
B. Curry, Philadelphia Electric Co.
L. Gifford, General Electric
T. Tipton, NUMARC
E. Moore, INPO
K. DeWall, INEL
R. Steele, INEL
C. Thibault, Wyle Labs.
J. Hayes, Toledo Edison
J. Nadeau, MOVATS
J. Lang, EPRI

Highlights

1. K. DeWall, INEL, discussed test results of gate valve isolation during high energy BWR line break performed at Wyle Laboratories. The purpose of the test program was to provide insights for the technical basis in the resolution of Generic Issue 87, "Failure of HPCI Steam Line Without Isolation." The objective of the program was to determine if isolation valves in BWR process lines will close against the flow resulting from a high energy line break outside of the containment. The valves used in these systems includes 3-10 inch, 900 lb., flexible wedge gate valves with Limitorque SMB-type, motor operators, both AC and DC operated.

   Two valve assemblies were tested; 1) 6", 900 lb. pressure seal, flex-wedge gate valve and hard faced disc with Limitorque SMB-2-40 motor operator and 2) 6", 900 lb. bolted bonnet, flexwedge gate valve with hard faced disc and guide with a Limitorque SMB-0-25 motor operator. These MOV valves were diagnostically tested using

equipment by Liberty Technology Center, Inc. (VOTES), Limitorque Corporation (MAC), MOVATS, Inc. Oak Ridge National Laboratory (MSCA) and Wyle Laboratories (V-MODS). Manufacturers participation was not a competition but rather an attempt to determine what factors need to be considered to provide assurance of valve operability with each device. The results of these diagnostic tests to determine valve operability will be available within the next few months with a NUREG published before the end of the fiscal year. A total of 14 hot water blowdown tests were performed at full scale blowdown at 350 to 580^{0} F. and at 600 to 1400 psig. Flashing with choked flow occurred at the test valves. Preliminary results indicated that the valves successfully isolated flow under all test conditions although some valve assemblies did not fully seat during the highest energy test and that higher than calculated stem forces were observed. In conclusion, he stated that given enough thrust, typical wedge type gate valves will close against the high flow resulting from a line break.

2. R. Steele, Jr., INEL, discussed valve testing and its regulatory impact. He stated that generic issues, seismic uncertainty and severe accident concerns resulted in the following four valve test programs:

- o Containment Penetration Systems (CPS) (Gate, globe & butterfly valves)
- o Generic Issue 87 (gate valve)
- o Purge and Vent (butterfly valve)

- HDR (German Decommissioned Nuclear Power Plant) (gate valve)

Each program was planned to investigate as many qualification issues as possible within the scope of the program.

The results of the CPS program show that the hardware had a large margin of safety for a west coast design basis earthquake and forces resulting from 17 inches of containment growth (mainly thermal) in a severe accident. Three items of concern identified were 1) water trapped between isolation valves is not a sound design practice, 2) valve motor operators exhibit amplified seismic response frequencies above 33 HZ, and 3) valve end loading qualification requirements of ANSI B16.41 is not conservative.

The results of Generic Issue 87 reviewed to date indicate that ANSI B16.41 flow interruption test may not be conservative for all valve designs. Concerns include the correct modelling of the up and down-stream fluid conditions and defining the correct valve position where the maximum torques occur.

The results of the Purge and Vent program are as follows:

- The industry valve operator sizing equations of butterfly valves were not conservative,
- Determined that the valve installation orientation and piping upstream geometry influenced closing torque requirements up to 150%.

The results of the HDR valve test program indicates that structurally the valve assemblies have a large margin of safety in an earthquake loading except that it confirmed the CPS findings of the motor operated response frequencies above 33 Hz. The test also determined that the coil torque springs in SMA operators are subject to aging (permanent set) and that the torque output vs. torque switch setting is lower than specififed. In addition, it was determined that DC motor heating can significantly reduce output torque in all DC powered motor operators.

3. G. Weidenhamer, RES, discussed past valve research programs. Major efforts are as follows:

   - o 1985 - Butterfly valve tests were performed to confirm safety of purge valves in operating plants

   - o 1986 - Earthquake test of typical containment penetration isolation valves were performed. In addition, low level earthquake test on aged valves were run at HDR.

   - o 1987 - Accidental tests on typical containment penetration isolation valves were performed.

   - o 1988 - A test program in hot water environment and high level earthquake test were performed.

   - o 1989 - Steam blowdown tests are planned.

He stated that because of decreasing budgets, research in the equipment operability area is being phased out. However, he stated that additional work may be needed.

4. C. Thibault, Wyle Laboratories, described the Wyle valve motor operator monitoring system V-MODS. He stated that Wyle's valve diagnostic system consist of two complementary segments as follows:

   MCSA (Motor Current Signature Analysis) which has been developed by ORNL. Wyle is the ORNL licensee for this technology. MSSA consists of one clamp on ammeter, signal conditioning unit, FM portable tape recorder and computer/software.

   V-MODS (Valve Motor Operator Diagnostic System) is utilized to establish base line parameters and was developed entirely by Wyle Labs. [Note: The use of load washer is the only new hardware; other systems use load cells.]

V-MODS verifies torque switch, torque bypass and limit switched settings, and stem load on valve motor operators by gathering valve operational data, either during static actuations or under full differential pressure conditions. It also provides information useful for predicting valve condition and for performing failure evaluation.

5. J. Hayes, Toledo Edison, discussed the air operated valve program at Davis Besse. He stated that air supply systems are generally non-safety related and therefore must be analyzed in order to

assure adequacy. Regulators need to give proper guidance on programmatic air operator valve program; one that is integrated and not piecemeal. He stated that industry and the NRC through a code group will be providing guidance on this matter soon.

6. P. Wohld, consultant, discussed the air-operated valve diagnostic testing program being performed at Davis Besse Nuclear Power Plant. The diagnostic system consists of two sensors, a 0-100 psig pressure transmitter and a spring loaded lanyard potentiometer to sense valve stem motion. An IBM compatible, portable computer based data acquisition system is used to collect, store and analyze data from the two sensors.

7. H. Ornstein, AEOD, discussed solenoid valve failures that have degraded numerous safety system. Failures have been widespread and many appear to be common mode. The failure frequency also appears to be increasing. Common mode failures have a potential to result in multiple train/system failures which are beyond the plant safety analyses. He stated that the primary causes of failures are design and maintenance deficiencies, misapplications, and contaminants in the air system.

8. O. Rothberg, RES, discussed the comments received on the proposed MOV generic letter by CRGR and industry. The major CRGR comments are as follows:

- The program in the generic letter is for safety and it should be sent.

- The letter should clearly indicate that documentation of the design bases includes consideration of degraded voltage, wiring line losses and power supply to the extent indicated in the owners commitment.

- The implementation schedule was questioned.

- The list of degraded conditions should be clarified.

- That owners should consider augmented surveillance of the balance-of-plant MOVs.

- Owners should be given credit for work done to comply with Bulletin 85-03.

The major industry (NUMARC, EPRI) comments are as follows:

- The industry disagreed with the NRC estimates of the cost (too low) and implementation schedules (not enough time),

- Suggested that testing schedule be prioritized based on the importance of the specific MOVs contribution to avoid a core melt accident.

- Differential pressure testing in-situ was considered to be difficult and expensive, especially for some valves.

- Detailed test information on butterfly valve operators may be difficult to obtain.

Questions from a member of the subcommittee and the NRC Staff's response on the draft generic letter are as follows:

- Question: Regarding pipe break design criteria; What size pipe breaks are used in the design criteria?

  Answer: Owners are to use the pipe break criteria committed to in the FSAR

  Comments: It was stated that the leak-before-break criteria shall be used only for pipe whip restraint consideration only, except for equipment qualification if justified and not other ECCS and containment sizing. If valve operability falls under "the umbrella" of the leak-before-break criteria, the differential pressure across the valve assembly may be smaller and less conservative than a design basis accident.

- Question: Are new plants covered under your implementation plans?

Answer: No

Comment: NRR and not the Research is responsible for plant applicability.

9. T. Tipton, NUMARC, led the industry presentation on its comments on the draft generic letter. The first speaker was E. Moore of INPO. He stated that INPO is continuing its efforts to upgrade MOV performance industrywide. A review of NPRDS reveals that 1) limitorque models SMB-000 and 00 account for nearly 60% of all installed MOVs and experience about 37% higher failure rate than do other operators, and 2) torque switches, limit switches and motors account for about 70% of all MOV failures. DC motors do not track closely with the overall MOV failure rate trend. This indicates failure mechanisms other than torque switches and limit switches may be the cause of some DC motor failures.

EPRI's Nuclear Maintenance Assistance Center (NMAC) is addressing the below MOV issues:

- Technical repair guidelines. These guidelines will include detailed recommendations on topics such as preventive maintenance, testing, equipment overhauls and common industry problems.

- Initial guidelines for the SMB-000 operator is expected to be available this fall (1988).

- INPO is working closely with EPRI in the development of these repair standards.

INPO is continuing to evaluate and provide recommendations concerning check valve performance. A review of NPRDS reveals the following:

- Larger check valves (greater than 4 inches) are subject to more failures. Service water, main steam feed system check valves are particularly prone to failure.

- Most frequent failure is stuck open valve exhibiting gross leakage.

INPO has evaluated the progress of the industry's check valve efforts with increased attention during 1988. Focus has been on recommendations of SOER 86-03: Establishment of a preventative maintenance program and performance of design reviews (size, type, and orientation).

INPO is also involved in instrument air/air operated valve evaluation program. Many pneumatic valve failures are directly attributed to instrument air system problems. Some air-operated valves have been installed with failure modes opposite to that assumed in safety analysis and some supply and exhaust lines have been found reversed. In addition, training and SOER 88-01 evaluation guidelines have been provided to evaluators.

In summary, he stated that valve performance is improving, overall industry response has been positive and that evaluations are focusing on valve maintenance, design and operability issues.

10. J. Lang, EPRI, discussed its activities on MOVs. Their efforts are directed by Nuclear Maintenance Assistance Center (NMAC) and are concentrated on technical repair and application guidelines which will be published about November 1988. Future activities will include extensive MOV testing in order to predict its performance.

11. R. McPherson, Southern California Edison, R. Elfstrom, Toledo Edison and B. Curry, Philadelphia Electric, discussed the industry comments on the generic letter in the areas of cost impact, testing at design basis conditions, and implementation schedule respectively. Industry stated that the cost of this program is about 100 times the BNL report and that design basis testing is at best very difficult. Industry proposed to prioritize the testing of its safety-related valves on the basis of PRA methodology or valves contributing to high core melt frequency be tested first. Industry also stated that because of external and internal restraints, the testing schedule should be relaxed.

Subcommittee Action:

The Subcommittee in its deliberation stated that the proposed generic letter is not yet available for full ACRS review and comments because significant changes are being proposed by the NRC Staff. The proposed

final draft of the generic letter should be available for our planned subcommittee meeting on December 12, 1988. Full ACRS review and comments are planned for the December meeting.

****** ****** ******

NOTE: A transcript of the meeting is available at the NRC Public Document, Gelman Bldg., 2120 "L" St. NW., Washington, D.C. Telephone (202) 634-3383 or can be purchased from Heritage Reporting Corporation, 1220 L Street, NW., Washington, D.C. 20005, Telephone (202) 628-4888

exemption will have either no significantly different environmental impact or greater environmental impact.

The principal alternative would be to deny the requested exemption. This would not reduce environmental impacts as a result of plant operations.

Alternative Use of Resources

This action does not involve the use of resources not previously considered in connection with the "Final Environmental Statement Related to the Operation of the Sequoyah Nuclear Plant, Units 1 and 2," dated July 1974.

Agencies and Persons Consulted

The NRC staff has reviewed the licensee's request that supports the proposed exemption. The NRC staff did not consult other agencies or persons.

Finding of No Significant Impact

The Commission has determined not to prepare an environmental impact statement for the proposed exemption.

Based upon the foregoing environmental assessment, we conclude that the proposed action will not have a significant effect on the quality of the human environment.

For details with respect to this action, see the licensee's request for an exemption dated September 19, 1988, which is available for public inspection at the Commission's Public Document Room, Gleman Building, 2120 L Street, NW., Washington, DC., and at the Chattanooga-Hamilton County Bicentennial Library, 1001 Broad Street, Chattanooga, Tennessee 37402.

Dated at Rockville, Maryland, this 30th day of September 1988.

For the Nuclear Regulatory Commission.

Suzanne Black,

Assistant Director for Projects, TVA Projects Division, Office of Special Projects.

[FR Doc. 88-23059 Filed 10-5-88, 8:45 am]

BILLING CODE 7590-01-M

Advisory Committee on Reactor Safeguards, Subcommittee on Mechanical Components; Meeting

The ACRS Subcommittee on Mechanical Components will hold a meeting on October 26-27, 1988, Room P-114, 7920 Norfolk Avenue, Bethesda, MD.

The entire meeting will be open to public attendance.

The agenda for subject meeting shall be as follows:

Wednesday, October 26, 1988—8:30 a.m. Until the Conclusion of Business

Thursday, October 27, 1988—8:30 a.m. Until the Conclusion of Business

The Sucommittee will discuss recent work related to valve reliability, including: isolating high energy line tests at Wyle Labs., compressed air systems and valves, seismic tests on an aged Shippingport valve, etc.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman; written statements will be accepted and made available to the Committee. Recordings will be permitted only during those portions of the meeting when a transcript is being kept, and questions may be asked only by members of the Subcommittee, its consultants, and Staff. Persons desiring to make oral statements should notify the ACRS staff member identified below as far in advance as practicable so that appropriate arrangements can be made.

During the initial portion of the meeting, the Subcommittee, along with any of its consultants who may be present, may exchange preliminary views regarding matters to be considered during the balance of the meeting.

The Subcommittee will then hear presentations by and hold discussions with representatives of the NRC Staff, its consultants, and other interested persons regarding this review.

Further information regarding topics to be discussed, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtaind by a prepaid telephone call to the cognizant ACRS staff member, Mr. Elpidio Igne (telephone 301/492-8192) between 7:30 a.m. and 4:15 p.m. Persons planning to attend this meeting are urged to contact the above named individual one or two days before the scheduled meeting to be advisded of any changes in schedule, etc., which may have occurred.

Dated: September 29, 1988.

Morton W. Libarkin,

Assistant Executive Director for Project Review.

[FR Doc. 88-23050 Filed 10-5-88, 8:45 am]

BILLING CODE 7590-01-M

Draft Regulatory Guide; Issuance, Availability

The Nuclear Regulatory Commission has issued for public comment a draft of a proposed revision to a guide in its Regulatory Guide Series. This series has been developed to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits and licenses.

The draft, temporarily identified by its task number, MS 804-4 (which should be mentioned in all correspondence concerning this draft guide), is the second proposed Revision 1 to Regulatory Guide 7.8, "Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material." This guide is being developed to present the initial conditions that are considered acceptable by the NRC staff for use in the structural analysis of Type B packages used to transport radioactive material within the United States.

This draft guide is being issued to involve the public in the early stages of the development of a regulatory position in this area. It has not received complete staff review and does not represent an official NRC staff position.

Public comments are being solicited on the guide, including any implementation schedule. Comments should be accompanied by supporting data. Written comments may be submitted to the Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration and Resources Management, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Comments will be most helpful if received by November 25, 1988.

Although a time limit is given for comments on these drafts, comments and suggestions in connection with (1) Items for inclusion in guides currently being developed or (2) improvements in all published guides are encouraged at any time.

Regulatory guides are available for inspection at the Commission's Public Document Room, 2120 L Street NW., Washington, DC. Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Director, Division of Information Support Services. Telephone requests cannot be accommodated. Regulatory guides are

~~TI: Inservice Inspections goes to Regional~~
~~GI 55 RES; TI NRR~~

ATTACHMENT B

REVISION 2 - 10/25/88

Tentative Agenda

ACRS SUBCOMMITTEE MEETING ON MECHANICAL COMPONENTS
OCTOBER 26-27, 1988
7920 NORFOLK AVENUE, ROOM P-114
BETHESDA, MD

8:35 8:40
~~8:30~~ - ~~8:45~~ A.M. I. CHAIRMAN'S OPENING STATEMENTS
(C. Michelson, ACRS Subcommittee Chairman)

II. MOV TESTING AND OPERATING EXPERIENCE

1. Blowdown Tests at Wyle Laboratories

8:40 - 8:45
~~8:45~~ - ~~9:15~~ A.M. - Introduction
(G. Weidenhamer, RES)
8:45 - 10:00
~~9:15~~ - ~~10:15~~ A.M. - Test Set-up and Results
(K. DeWall, INEL)
Kevin

10:00 - 10:15
~~10:15~~ - ~~10:30~~ a.m. ---------- BREAK ----------

10:15 11:50
~~10:30~~ - 11:30 a.m. - Regulatory Impacts
(R. Stelle, INEL)
Bob

2. Overview of Current MOV Operating Experience

11:50 - 12:10
~~11:30~~ - ~~12:00~~ a.m.* - Current Activities of the Office of Analysis and Evaluation of Operational Data
Carl (E. Brown, AEOD, will be available for answering questions from subcommittee.)

1:23
12:10 ~~1:10~~
~~12:00~~ - ~~1:00~~ p.m. ---------- LUNCH ----------
1:23 ~~2:00~~ 2:07
~~1:00~~ - ~~1:30~~ p.m. - Plans for Valve-Related Research
(G. Weidenhamer, RES)

2:07 2:
~~1:30~~ - ~~2:30~~ p.m. 3. Details Concerning Development of MOV Testing Technique (V-MODS)
(C. Thibault, Wyle Labs.)
Claude

~~2:~~ 2:45 - 3:04
~~2:30~~ - 2:45 p.m. ---------- BREAK ----------

4:03
3:04 - ~~3:00~~
~~2:45~~ - 3:30 p.m. III. AIR-OPERATED VALVE TESTING AND OPERATING EXPERIENCE

1. Program on Air-Operated Valves
John (J. Hayes, Toledo Edison) Task Force Leader at D.B. only

* NOTE: If E. Brown is not present at the meeting, the 30 minutes time will be distributed to C. Thibault and J. Hayes.

4:03 - 4:15 — Joe Nadeau, MOVATS ... on friction factor
~~3:30 - 4:00~~ p.m. IV. SUBCOMMITTEE DISCUSSION AND RECESS
4:15 - 4:

OCTOBER 27, 1988

8:25 - 8:40
~~8:30 - 8:45~~ A.M. V. RESUMPTION OF MEETING

1. Chairman's Remarks (C. Michelson)

VI. AIR-OPERATED VALVE TESTING AND OPERATING EXPERIENCE (CONT'D)

8:40 - 9:35
~~8:45 - 9:45~~ A.M. 2. Diagnostic Testing Techniques (P. Wohld, ~~ACRS Consultant~~ Invited Expert)

9:35 - 10:15
~~9:45 - 10:15~~ A.M. 3. Operating Experience of Air and Hydraulic Valves/Systems (H. Ornstein, AEOD)

10:15 - 10:30
~~10:15 - 10:30~~ A.M. ---------- BREAK ----------

10:30 - 10:55 → Discussion: with NRC staff on Schedule of GL

~~10:30 - 11:30~~ A.M. VII. NRC STAFF'S REPORT ON CRGR'S AND INDUSTRY'S ~~Ltr~~. COMMENTS ON THE GENERIC LETTER (O. Rothberg, NRR)
10:55 - 12:15

~~11:15 - 12:15~~
~~11:30 - 12:30~~ P.M. ---------- LUNCH ----------
12:15 - 1:15

12:30 - 3:45 P.M. (includes 15 min. break) VIII. INDUSTRY PRESENTATION

1. The industry (T. Tipton, NUMARC, lead presenter) will discuss the valve problems, and in particular, the scope of implementing the NRC Staff's generic letter in terms of resources, equipment, and cost and schedule. EPRI, INPO, and utilities are expected to participate.

3:45 - 4:00 P.M. IX. SUBCOMMITTEE DISCUSSION AND ADJOURNMENT

1:15 - 1:20 Introduction — Tom Tipton — 5 min, Director of Operations
1:20 - 2:20 INPO Prog — Ed Moore — 30 min
2:20 - 2:50 EPRI Prog — Jim Long — 30 min

2:40 - 2:53 Comments on generic letter from Industry
2:53 - 3:20 — Bob McPherson, Southern Cal — 15 min.
Bob Elfstrom, Toledo Edison — 15 min.
Brian Curry, Philadelphia Elec. Co — 15 min
3:20 -

ATTACHMENT C

LIST OF HANDOUTS
FOR MECHANICAL COMPONENTS SUBCOMMITTEE MEETING
OCTOBER 26-27, 1988

1. Gate Valve Isolation During High Energy BWR Line Breaks presented by K. G. DeWall, Idaho National Engineering Laboratory

2. Valve Testing and Regulatory Impact presented by R. Steele, Jr., Dr. G. H. Weidenhamer, NRC Technical Monitor, Idaho National Engineering Laboratory

3. Equipment Operability FIN A6857 - INEL

4. Past Valve Research - G. Weidenhamer

4a. Wyle Valve Motor Operator Monitoring System - Claude Thibault, Wyle Scientific Services & Systems Group

5. Presentation to ACRS Subcommittee on Air Operated Valve Program by John H. Hayes, Toledo Edison

6. Air-Operated Valve Diagnostic Testing - P. R. Wohld

7. Solenoid Valves - Hal Ornstein, NRC/AEOD

8. Memo for R. L. Baer, Chief, Engineering Issue Branch, thru Frank Cherny from Owen Rothberg dated October 26, 1988, Subject: Summary of Meeting Between NRC Staff and Industry Representatives on 10/19/88 to Discuss in Situ Testing of Motor Operated Valves (MOVS)

9. Industry Initiatives to Upgrade Valve Performance - Ed Moore, Institute of Nuclear Power Operations, Oct. 27, 1988

10. EPRI Activities on Motor Operated Valves - Jim Lang, EPRI

11. Nuclear Management and Resources Council Meeting with ACRS Subcommittee on Mechanical Components on Industry Activities and Draft Generic Letter on MOVs, October 27, 1988