



Consumers
Power
Company

James W Cook
Vice President - Projects, Engineering
and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

March 29, 1984

84-02 #1

Mr J G Keppler, Regional Administrator
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND ENERGY CENTER PROJECT
DOCKET NOS 50-329 AND 50-330
EXCESSIVE WEAR - LINEAR CONVERTER SHAFT GUIDES
FILE: 0.4.9.89 SERIAL: 28057

On February 28, 1984, Consumers Power Company notified your staff of a potential 10CFR50.55(e) condition involving excessive wear in the shaft guides of Pacific Air Products linear converters.

This letter is an interim 10CFR50.55(e) report. Attachments 1 and 2 provide the descriptions of the deficiencies and the Project's planned investigative actions, probable cause, and corrective actions as of March 13, 1984. Subsequent to this Project work, Attachment 3 was received by the Project from Pacific Air Products Company. Information in this attachment conflicts with some of the initial information we had received in terms of root cause of the excessive wear on the linear converter shafts. This information must be reconciled as part of our future activities.

Another report, either interim or final, will be sent on or before July 9, 1984.

James W. Cook

JWC/AHB/lr

- Attachments 1: MCAR-81, Initial Issue, dated March 2, 1984
- 2: MCAR-81, Interim Report 1, dated March 13, 1984
- 3: Pacific Air Products Letter dated March 7, 1984,
Log No 7043-31

8404090346 840329
PDR ADOCK 05000329
S PDR

OC0384-0027A-MP01

APR 2 1984

IE27
11

CC: Document Control Desk, NRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

DSHood, NRC Office of NRR
Bethesda, MD

INPO Records Center

OM/OL SERVICE LIST

Mr Frank J Kelley
Attorney General of the
State of Michigan
Ms Carole Steinberg
Assistant Attorney General
Environmental Protection Division
720 Law Building
Lansing, MI 48913

Mr Myron M Cherry, Esq
Suite 3700
Three First National Plaza
Chicago, IL 60602

Mr Wendell H Marshall
RFD 10
Midland, MI 48640

Mr Charles Bechhoefer, Esq
Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
East-West Towers, Room E-413
Bethesda, MD 20014

Dr Frederick P Cowan
6152 N Verde Trail
Apt B-125
Boca Raton, FL 33433

Mr Fred C Williams
Isham, Lincoln & Beale
1120 Connecticut Ave, NW, Suite 840
Washington, DC 20036

Mr James E Brunner, Esq
Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Atomic Safety & Licensing
Appeal Board
U S Nuclear Regulatory Commission
Washington, DC 20555

Mr C R Stephens (3)
Chief, Docketing & Services
U S Nuclear Regulatory Commission
Office of the Secretary
Washington, DC 20555

Ms Mary Sinclair
5711 Summerset Street
Midland, MI 48640

Mr William D Paton, Esq
Counsel for the NRC Staff
U S Nuclear Regulatory Commission
Washington, DC 20555

Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
Washington, DC 20555

Ms Barbara Stamaris
5795 North River Road
Rt 3
Freeland, MI 48623

Dr Jerry Harbour
Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
East-West Towers, Room E-454
Bethesda, MD 20014

Mr M I Miller, Esq
Isham, Lincoln & Beale
Three First National Plaza
52nd Floor
Chicago, IL 60602

Mr D F Judd
Babcock & Wilcox
PO Box 1260
Lynchburg, VA 24505

Mr Steve Gadler, Esq
2120 Carter Avenue
St Paul, MN 55108

Mr P Robert Brown
Clark, Klein & Beaumont
1600 First Federal Bldg
Woodward Ave
Detroit, MI 48226

Mr John DeMeester, Esq
Dow Chemical Building
Michigan Division
Midland MI 48640

Ms Lynne Bernabei
Government Accountability Project
1901 Q Street, NW
Washington, DC 20009

3/14/84

144232

Attachment 1
Serial 28057
84-02 #1BECHTEL POWER
CORPORATION

QUALITY ASSURANCE PROGRAM MANAGEMENT CORRECTIVE ACTION REPORT

MCAR-1

REPORT NO. 81

JOB NO. 7220

Q NO. _____

DATE 3/2/84

I^o DESCRIPTION (Including references):

Pacific Air Products Company (PAPCo) notified the NRC and Consumers Power Company (CPCo) of a potential 10CFR21 concern regarding excessive wear of shaft guides in the linear converters of damper operators used on certain HVAC units (ref: com 142465 - PAPCo to CPCo dated 2/1/84). To date, it has been determined that subject converters supplied to Midland have been used on the following eight safety related dampers:

(continued)

* RECOMMENDED ACTION (Optional)

1. Prepare complete listing of all safety related dampers utilizing subject converters and determine safety impact of those not previously identified.
2. Obtain final results of PAPCo's investigation of the concern relative to closure of their 10CFR21 report.

(continued)

REFERRED TO ☒ ENGINEERING ☐ CONSTRUCTION ☐ QA MANAGEMENT ☐ _____

☐ PROCUREMENT

ISSUED BY M. Bagale 3/2/84
for Project QA Engineer Date

** This concern was reported to the NRC by CPCo as
a potentially reportable condition on 2/28/84.

II REPORTABLE DEFICIENCY

NOTIFIED CLIENT

☐ NO**☒ YES

Project Manager

Alan Booc / 1/28 3/2/84
Date Date

III CAUSE

CORRECTIVE ACTION TAKEN

AUTHORIZED BY _____ Date

STANDARD DISTRIBUTION

ADDITIONAL DISTRIBUTION - AS APPROPRIATE

DIVISION QA MANAGER
MANAGER OF QA - BPC
GPD - QA MANAGER
LAPD QA MANAGER
SFPD QA MANAGER
PROJECT MANAGER
CLIENT

ENGINEERING MANAGER
PROJECT ENGINEER
QE SUPERVISOR

CONSTRUCTION MANAGER
PROJ SUPT/PROJ CONSTR MANAGER
CHIEF CONSTR QC ENGINEER

DIVISION PROCUREMENT MGR
PROJ PROCUREMENT MGR
PROCUREMENT SUPPLIER QUALITY MGR AND
DIV SUPPLIER QUALITY MGR

FORMAL REPORT TO CLIENT _____
(If Section II Applies) Date

CORRECTIVE ACTION IMPLEMENTED

VERIFIED BY _____
Project QA Engineer Date

*Describe in space provided and attach reference document.

144232

1. DESCRIPTION (continued):

- 2 Auxiliary building normal exhaust isolation dampers (OMO-54003, OMO-54004)
- 2 ESF filtration system control dampers (OMO-54005, OMO-54006)
- 4 Diesel generator building exhaust modulating dampers (1TV-6803 Al/Bl, 2TV-6803 Al/Bl)

Of the above safety related applications, Bechtel engineering has concluded that a malfunction or failure of the auxiliary building exhaust isolation dampers and the ESF filtration system dampers would pose no safety concern during plant operations at Midland. The safety impact of a malfunction or failure of the diesel generator exhaust modulating dampers cannot be determined at this time due to insufficient information. As such, the condition is considered indeterminate until a more definitive conclusion can be made.

RECOMMENDED ACTION (continued):

- 3. If it is determined from PAPCo's investigative results that the related hardware is found to be nonconforming, initiate proper controls in accordance with project procedures for nonconforming items.
- 4. Evaluate corrective action(s) provided by PAPCo and provide process corrective action, as appropriate.
- 5. Determine root cause of condition and provide corrective action to preclude recurrence.
- 6. Based on determination of root cause from 4 above, investigate, as appropriate, for similar or related conditions which may exist on the Midland project.
- 7. Issue report, interim or final, by March 19, 1984.

145070

Bechtel Associates Professional Corporation

145178

SUBJECT: MCAR 81

Excessive Wear of Pacific Air Products Company Linear
Converter Shaft Guides

INTERIM REPORT 1

DATE: March 13, 1984

PROJECT: Consumers Power Company
Midland Plant Units 1 and 2
Bechtel Job 7220

REFERENCE: Letter, Pacific Air Products to CPGCo, 2/1/84

Introduction

This report addresses linear converter shaft guides supplied on HVAC dampers manufactured by Pacific Air Products that have potential excessive shaft guide wear problems. The converters transform linear actuator motion to rotary motion to operate the dampers.

Background

Pacific Air Products received two linear converters that exhibited excessive wear to the brass shaft guides from the nonnuclear Edgewood generating plant as reported in the referenced letter. Pacific Air Products notified the NRC and Consumers Power Company of the potential 10 CFR 21 reportability. Subsequently, Pacific Air Products received two additional converters exhibiting excessive shaft guide wear from the Byron Nuclear Station.

Investigative Action

Pacific Air Products is investigating the causes for the shaft guide wear in its laboratory. As part of its investigation, converters with and without shaft guide lubrication have been cycled to obtain additional data. As a result, the vendor has been able to duplicate the shaft guide wear with a side load on the shaft and no lubrication. Preliminary indications are that the cause of the wear is a combination of shaft misalignment and lack of lubrication. Bechtel's review of the operating and maintenance instructions supplied by the vendor indicated that maintenance, lubrication, and inspection of converters are not specifically addressed.

MCAR 81
Interim Report 1

145178

Page 2

Analysis of Safety Implication

The linear converters are used on the eight safety-related dampers listed below:

<u>Quantity</u>	<u>Tag No.</u>	<u>Nomenclature</u>
2	OMO-54003 OMO-54004	Auxiliary building normal exhaust isolation damper
2	OMO-54005 OMO-54006	Engineered safety features (ESF) filtration system control damper
4	1TV-6803A1 1TV-6803B1 2TV-6803A1 2TV-6803B1	Diesel generator building exhaust modulating damper

The possibility exists that excessive wear of the converter shaft guides could lead to failure of a damper to function. The auxiliary building exhaust isolation dampers and the ESF filtration system dampers are used after a loss-of-coolant accident (LOCA) to provide filtration of the ESF pump room air. These dampers are not expected to function often during plant operation, and wear would not be a factor during plant life. Damper failure is acceptable because the current Final Safety Analysis Report radiation analysis does not take credit for the ESF filtration of normal leakage in ESF systems post-LOCA. Even assuming a passive failure, such as pump seal leakage, it can be shown using realistic assumptions that the doses released will be below 10 CFR 100 guidelines, without taking credit for the ESF filters.

The diesel generator building exhaust modulating dampers are used for temperature control in each of the four diesel generator rooms. Shaft guide wear is a common mode failure. Failure of the damper to operate could lead to excessive temperatures in the diesel generator room. There is insufficient information currently available to justify a conclusion of damper failure. Therefore, the safety impact of this concern is indeterminate.

Probable Cause

Based on vendor-supplied information, the following are probable causes of excessive wear:

- a. A combination of shaft misalignment and operation without lubrication
- b. Vendor's operation and maintenance instructions not specifically addressing lubrication and inspection of converters

145070

Bechtel Associates Professional Corporation

MCAR 81
Interim Report 1

145178

Page 3

Corrective Action

1. The vendor drawings have been reviewed to ensure that all safety-related dampers that use this converter have been identified. Those dampers are the eight listed in the Analysis of Safety Implication section of this report.
2. Pacific Air Products is presently investigating this concern and is expected to submit a report by May 1, 1984.
3. If evaluation of Pacific Air Product's report indicates that the converters do not conform to requirements, nonconformance reports will be initiated and processed in accordance with project procedures.
4. Pacific Air Product's recommended corrective action will be evaluated and incorporated into project documentation as appropriate. If needed, dampers at the Midland jobsite will be inspected, reworked, or repaired in accordance with vendor instructions.
5. A root cause will be determined before issuance of a final report and action(s) will be taken to preclude recurrence.

Reportability

This concern was reported to the NRC by Consumers Power Company as a potential reportable condition on February 28, 1984.

Submitted by:

E.B. Poser
E.B. Poser

Project Engineering Manager

Approved by:

H.T. Fravel
H.T. Fravel

Mechanical Chief Engineer

Approved by:

E.H. Smith
E.H. Smith

Engineering Manager

Concurrence by:

M.A. Dietrich
M.A. Dietrich

Project Quality Assurance
Engineer

RAW

MAR 15 1984

PACIFIC AIR PRODUCTS CO.

3133 West Harvard Street • Santa Ana, California 92704 • P.O. Box 5277 • Telephone 714/557-1710 • Telex No. 67-8319

March 7, 1984

Log No. 7043-31

Consumers Power Company
Midland Nuclear Power Station
Midland, Michigan 48640

Attention: Quality Assurance Director

Regarding: Midland Nuclear Power Station
Linear Converter Investigation Update

Gentlemen:

On February 1, 1984, we issued a concern regarding abnormal wear on the linear converters manufactured by Pacific Air Products Co. I would like to bring you up-to-date on the progress of our investigation.

1. Our testing program is well underway and is running according to plan and schedule. We have been able to duplicate the pattern of wear that has been reported to us from the field.
2. Our investigation of field conditions is providing us with some insight into the causes of excessive wear and I would like to relay some of this information to you.

- A. Actual field conditions confirm that the excessive wear on the linear converters is caused by "hunting" of the control circuitry. For example, in one case a volume sensing device was installed downstream of the dampers. When the dampers opened, the air was aimed directly on the velocity sensing device. At that moment, the device sensed the increased velocity and caused the damper to change position thereby deflecting the airstream away from the sensing device. The sensing device once again called for the damper to open, etc., etc.. This field condition, "velocity stratification", caused the damper to "hunt". (We estimate that this condition could cause short cycle response at about 21,000 strokes per day or 651,000 strokes per month or 3,906,000 strokes in a six month period.)
- B. Not only can velocity sensing devices cause hunting but temperature sensing devices, where the differential is closely set, may also cause the same condition.

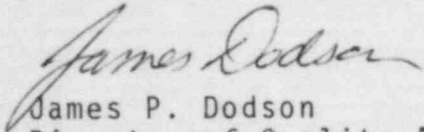
I am enclosing a photograph of the input shaft of a linear converter that was returned to us from the field. The wear pattern is indicative of the hunting problem. I would suggest that your project be inspected to determine whether any of the tell-tale signs are present. Hunting caused by the control circuit not only affects the linear converter but it also affects the damper and the actuator. If this condition exists, it should be remedied as soon as possible. A determination of the number of cycles run by the equipment should also be made to assist in evaluating the replacement or servicing that may be required.

We are starting the final phase of our testing program and will have some definitive data available soon.

(3)

If you have any questions concerning the information contained herein, please call me at (714) 557-1710.

Very truly yours,
PACIFIC AIR PRODUCTS CO.



James P. Dodson
Director of Quality Assurance

Enclosure: (1)

JPD:dg

cc: Bechtel Ann Arbor (Q.A.)

