CONTRACTORS
ENGINEERS
DEVELOPERS

MORRISON-KNUDSEN COMPANY, INC.

EXECUTIVE OFFICE
TWO MORRISON-KNUDSEN PLAZA
P.O. BOX 7808 / BOISE, IDAHO 83729 / U.S.A.
PHONE: (208) 345-5000 / TELEX: 368439

84 MAY 23 A9:04

L-QTS-84-009

May 17, 1984

Mr. Dave Verrelli
Nuclear Regulatory Commission
101 Marrietta NW, Suite 2900
Atlanta, Georgia 30303

Reference: M-K letter L-QTS-84-006 dated 3/16/84, M. Grayson to D. Verrelli, concerning Part 21 Reportable Deficiency.

Dear Mr. Verrelli:

Attached please find follow-up information for the 10CFR Part 21 Reportable Deficiency identified in the referenced letter. This information is a correction to our assessment of the actual cause of the weld defect based on additional information obtained from Fright Dynamics, Inc.

Please contact me at (208) 386-5793 if you have any questions or need any further information.

Very truly yours,

Murlin D. Grayson

Murlin D. Grayson
Power Group
Quality & Technical Support Manager

MDG/SFS/so
Attachment
cc: R. Hicks (w/attachment)
H. Falter-PSD Rocky Mount, NC (w/attachment)
File

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CREATORS OF ELECTRICAL
POWER SUPPLY SYSTEMS

POWER SYSTEMS
A MORRISON-KNUDSEN DIVISION

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ROCKY MOUNT, NORTH CAROLINA 27801
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TELEX 802507 PSD-RYMO

MAY 16 2 47 PM

SENT/REC. BY TELECOPY
SENT:
REC'D.:
DATE:
TIME:

TELECOPY

DATE: May 16, 1984

COMPANY: Morrison-Knudsen Company, Inc.

ADDRESS: Morrison-Knudsen Plaza, P.O. Box 7808

CITY & STATE: Boise, Idaho 83729

ATTENTION: Mr. Murlin Grayson

REFERENCE: Title 10 Code of Federal Regulations Part 21 (10CFR21)
PSD NO. 10CFR21-0018 (TVA NCR W-165-P)

TELECOPY NO.: S/N M-DE-0-0360 (Memo to E.Martin 4/5/84)

MESSAGE

Attached is agenda for meeting which will resolve the 10CFR-0018 based on new information.

We will forward a copy of this report to you along with the Flight Dynamics' Report #A-10-84.

FROM: Harry W. Falter, Principal Engineer
POWER SYSTEMS
A MORRISON-KNUDSEN DIVISION

TRANSMITTED HEREWITH ARE (7) PAGES, INCLUDING THE COVER SHEET.

IF YOU DO NOT RECEIVE ALL PAGES LISTED, PLEASE CALL (919)-977-2720, EXTENSION NOS. 210 OR 212 FOR VERIFICATION.

10CFR21 COMMITTEE MEETING HELD MAY 16, 1984

HARRY W. FALTER, Division Engineer	5/16/84
JIM G. RUTHERFORD, Sr. Manager-Administration	UNABLE TO ATTEND
MARC. CAKE, Manager - Operations	UNABLE TO ATTEND
ED MARTIN, Manager - Contracts	5/16/84
JERRY WINSTEAD, Manager - Purchasing	5-16-84
TOM IANNUZZI, Manager - Engineering	UNABLE TO ATTEND
DAVID BROWN, Business Manager	UNABLE TO ATTEND
BOB STAUBER, Manager - Quality Control	5-16-84

REFERENCE: TVA NCR W-165-P
PSD/Boise Notification to NRC (L-QTS-84-006 dated March 16, 1984)
PSD 10CFR21 Committee Meeting 3/30/84 (PSD Document #10CFR21-0018-002)

A control panel bracket support welded to the diesel lube oil cooler has developed cracks in the weld and resulted in a small lube oil cooler leak.

COMPONENT: ELECTRO-MOTIVE DIVISION
16-645E4 Tandem Diesel Generators

LOCATIONS: TVA - Watts Bar
TVA - Sequoyah

SUBJECT: A 10CFR21 report was issued to Morrison-Knudsen, Boise, on March 28, 1984 based upon initial data furnished with TVA NCR W-165-P. On March 30, Power Systems was informed that a support structure had been added to the brace. An investigation was made at the site to collect data necessary to analyze the actual cause of the defect.

POWER SYSTEMS
A MORRISON-KNUDSEN DIVISION

PSD DOCUMENT NO. 10CFR21-0018-003

10CFR21 COMMITTEE MEETING HELD MAY 16, 1984

CONCLUSION: Flight Dynamics' Report No. A-10-84 was delivered to Power Systems on May 15, 1984. This report has been reviewed by Power Systems on May 16, 1984.

The report concludes:

a) The original arrangement was not the cause of failure. The report shows very low stress levels.

b) The addition of the supports caused excessive stress at the subject weld joint as a result of its cantilevered construction, coupled with the fact that some of the assemblies had a natural frequency close to the 3d harmonic of the engine speed. The structures where natural frequencies were higher showed no weld distress.

DISCUSSION: 1) Power Systems issued a 10CFR21 Report #10CFR21-0018, based upon initial information furnished by the Owner.

2) Subsequently, it was discovered that a cantilevered structure (FIG. 1) had been added recently to the brace to support newly added vent piping for the diesel engine lube oil system.

3) A site investigation was initiated jointly by the Owner and Power Systems to determine the actual cause of the defect.

4) The result of this investigation is contained in Flight Dynamics, Inc. Report A-10-84.

The report shows, by calculation, that the stresses at the brace and lube oil cooler junction are low as it was originally installed. However, the addition of the cantilevered support introduced high cyclic stresses in cases where the added support structure was close to the 3d harmonic (45 Hz) of diesel speed (900 RPM/15 Hz) as indicated on Table II. Note, those with considerable higher natural frequencies showed no weld distress.

10CFR21 COMMITTEE MEETING HELD MAY 16, 1984

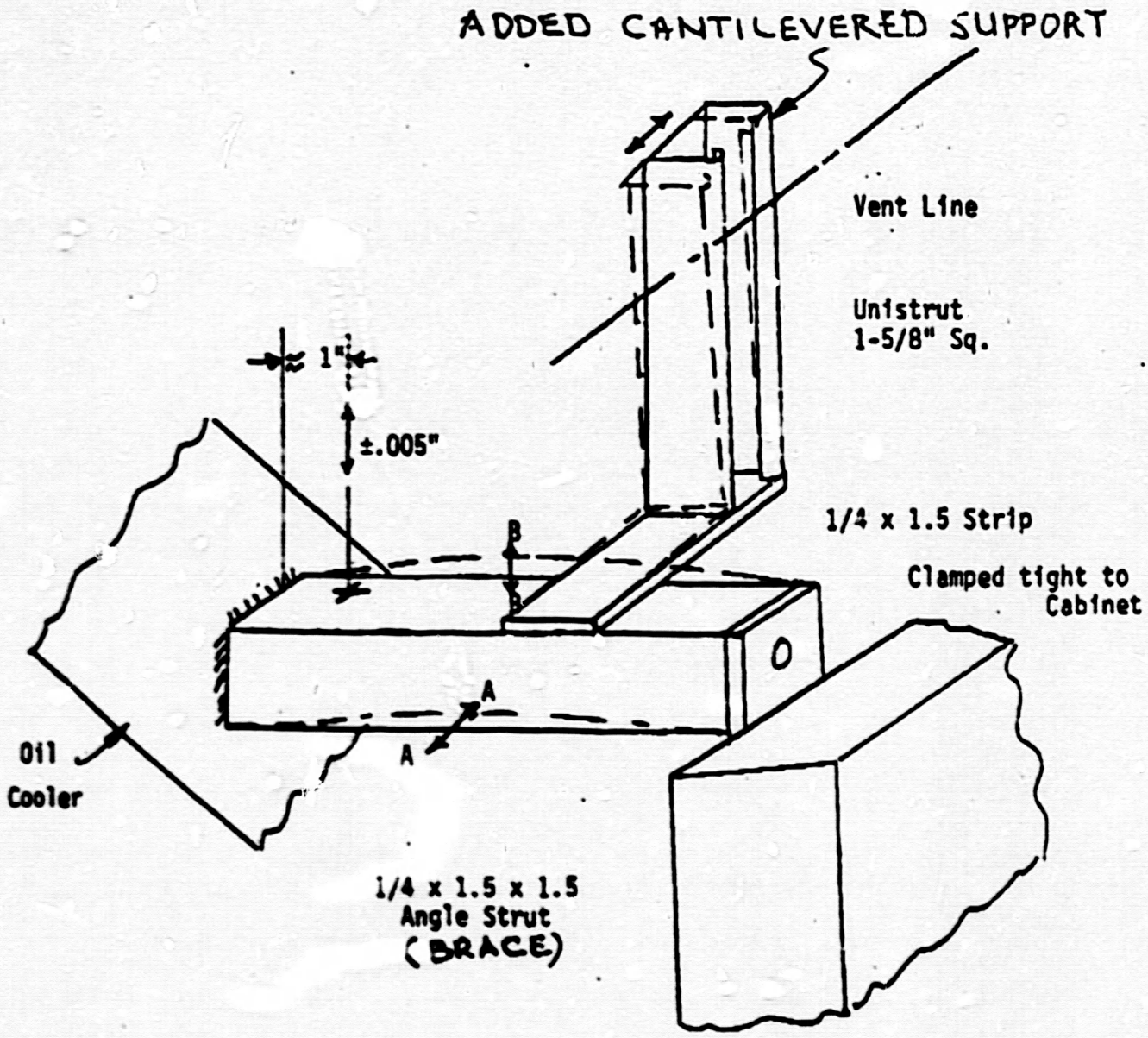
5) The conclusion that the added cantilevered supports are the cause of failure is supported by the fact that the joint between the lube oil cooler and the angle brace showed no distress after approximately 200 hours of engine operation but showed distress within a few hours of operation following the addition of the support.

   The corrective action taken at the site was to remove the cantilever type support and install a support that is to be connected down to the skid base as shown in Figure 2.

6) The PSD corrective action is:

   a) To correct the notification to Owners that was issued based upon the initial data.

   b) To instruct PSD engineering, field service, test, quality control, and assembly personnel.



Motions "AA" and "BB" are Torsional Mode

in Cooler-Cabinet Strut

FIG 1

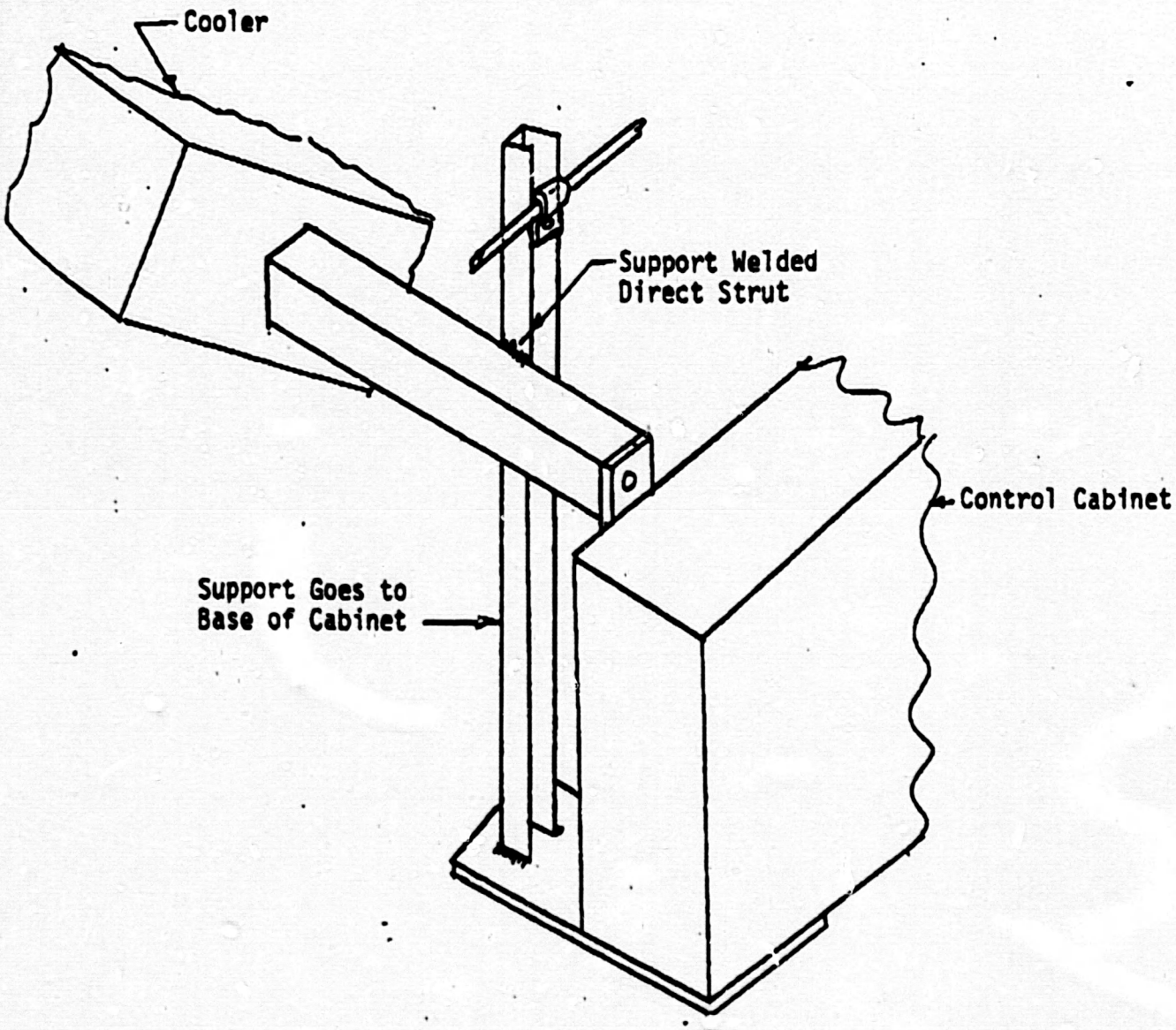


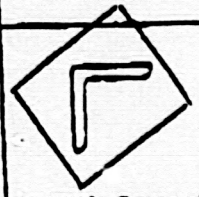
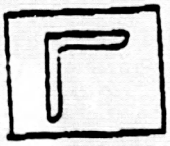
FIGURE 2

DIAGRAM SHOWING STIFFENED SUPPORT FOR

COOLER VENT PIPE

TABLE II

SURVEY OF VENT LINE SUPPORT CHARACTERISTICS

Engine No.	Dimension		Natural Frequency		Paint Condition At Cooler
	A Inches	B Inches	Lateral Hz	Long. Hz	
1A-1	11-1/2	3	50	45	 Chipped
1A-2	9-1/2	1-1/4 Not welded front side	58	50	
2A-1	12-1/4	3-5/8	45	50	 TVA Rework
2A-2	10	1-3/8	60-70	55	No Chips
1B-1	11-1/4	2-5/8	45	45	 TVA Rework
1B-2	10	1-1/2	70	53	No Chips
2B-1	11-1/2	3-3/8	45	45	CHIPS See Photo No. 3
2B-2	10-3/4	2-1/4	60-70	50	No Chips