

ENGINEERING
CONSULTANTS

CALCULATION COVER SHEET

Calculation No: 52091-C-015Project: N.S.P MONTICELLO UNIT 1 IPEEECalculation Title: EVALUATION OF ANCHORAGE FOR MOTOR
CONTROL CENTERS 43A, 43BReferences: SEE INSIDEAttachments: ATTACHMENT A: 2 PAGESTotal Number of Pages (Including Cover Sheet): 6 EXCLUDING ATTACHMENTS

Revision Number	Approval Date	Description of Revision	Originator	Checker	Approver
0	6-9-95	ORIG ISSUE	RJF	SL	TSH



EQE INTERNATIONAL

SHEET NO. 2

JOB NO. 52091 JOB MONTICELLO UNIT 1 IPEEE

BY RJF

DATE 12/14/93

CALC. NO. C-015 SUBJECT MCC 43A, B

CHK'D SL

DATE 12/17/93

REFERENCES

1. E.Q.E CALC. 52091-C-010 REV 0
2. BLUME CALC. 8158-C-010 REV 0
3. BLUME CALC. 8158-C-069 REV 2
4. EQE CALC. 52091-C-005 SEWS FOR EQUIPMENT NOS. 43A & 43B REV 0
5. AISC MANUAL OF STEEL CONSTRUCTION 9TH ED
6. SEISMIC VERIFICATION OF NUCLEAR PLANT EQUIPMENT ANCHORAGE VOL 1, REV. 1 1991 NP 5228



JOB NO. 52091 JOB MONTICELLO 1PEEE BY RTF DATE 12-14-93
CALC. NO. C-015 SUBJECT MCC 43A, B CHK'D SL DATE 12/17/93

PURPOSE

THE PURPOSE OF THIS CALCULATION IS TO CHECK THE ADEQUACY OF THE ANCHORAGE FOR THE MOTOR CONTROL CENTERS 43A & 43B.

APPROACH

THE PRIMARY CHECK THIS CALCULATION INVESTIGATES IS BENDING IN THE BASE ANCHORAGE DUE TO LATERAL LOADS. PREVIOUS ANALYSES (SEE REFS. 2 & 3) HAVE NEGLECTED THIS FAILURE MODE. THE LATERAL LOADS ARE DERIVED USING A 5% DAMPED RESPONSE SPECTRA WITH A $.3g$ PEAK GROUND ACCELERATION (NUREG 60098)



EQE INTERNATIONAL

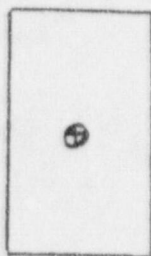
SHEET NO. 4

JOB NO. 52091 JOB NSP MONTICELLO 1PREE BY RJF DATE 12/14/93
 CALC. NO. C-015 SUBJECT MCC 43 A, B CHK'D SL DATE 12/17/93

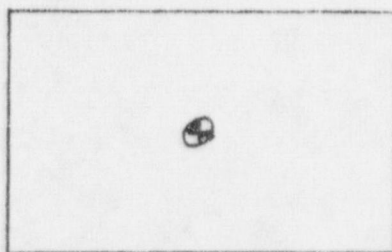
MCC 43A & B BLUME NO 069 & 070

WT OF UNIT = $5648 + 1883 = 7531 \#$ (REF 2)
 ELEV = 931' TURBINE BLD.

$SAMA = 1.59g$ EQE CALC 52091-C-010 (REF 1)
 5% DAMPING $PGA = .3g$

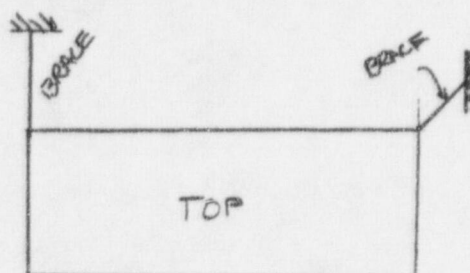
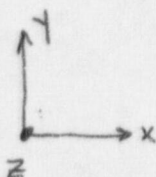
CHECK BOLT BENDING AT BASE

ELEVATION



ELEVATION

CENTER OF GRAVITY IS
 AT MIDHEIGHT OF UNIT
 (SEE REF 2, 3)

FORCES IN X DIRECTION

DIAGONAL BRACE TAKES HALF OF SHEAR FORCE

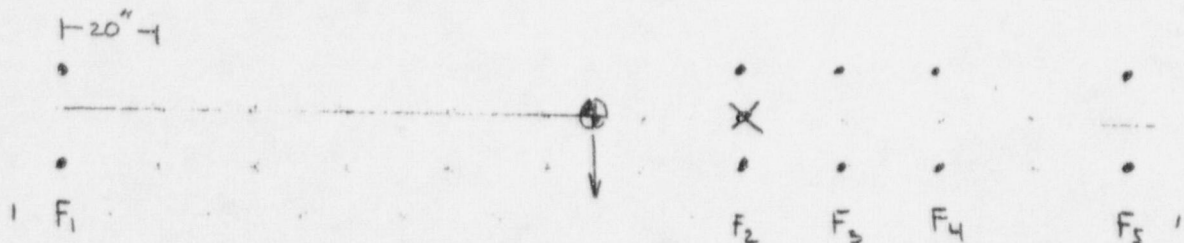
$$\frac{1.59 (7531)}{2} = 5987 \#$$

$$V_k = \frac{5987}{10 * } = 598 \# / \text{BOLT}$$

* 10" ANCHOR BOLTS AT BASE
 PER REF 2

JOB NO. 52091 JOB NSP MONTICELLO IPEEEBY RJF DATE 12/14/93CALC. NO. C-015 SUBJECT MCC 4.3A, BCHK'D SL DATE 12/17/93FORCES IN Y DIRECTION

BRACING TAKES HALF OF SHEAR FORCE

BOLT PATTERN

$$\text{CENTER OF BOLT PATTERN} = \frac{0 + 140 + 160 + 180 + 220}{5} = 140" \text{ FROM } F_1$$

$$5987(30) = F_1(140) + .14F_1(20) + .29F_1(40) + .57F_1(80)$$

$$F_1 = 898.05$$

$$\text{MAX LOAD ON A BOLT} = \frac{898.05}{2} = 449.02 \text{ \#/BOLT}$$

$$V_y = \frac{5987}{10} + 449.02 = 1048. \#$$

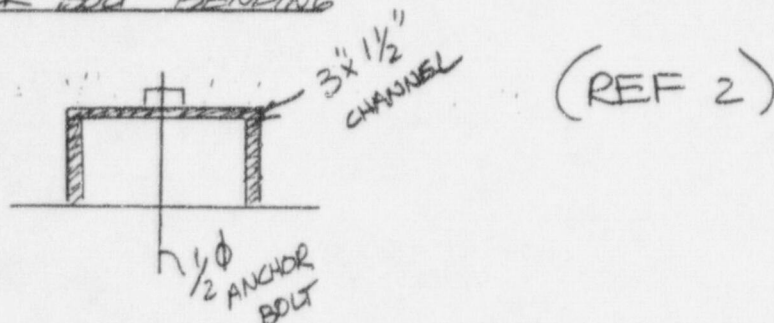
$$V_{\text{req}} = \sqrt{(598)^2 + (1048)^2} = 1206 \text{ \#/BOLT}$$

$$V_{\text{ALL}} \pm \frac{6.78}{\text{F.S.}} = \frac{6.78}{2.0} = 3.39 \text{ \#/BOLT} \quad \text{PER REF 6} \quad f_c = 3000 \text{ psi}$$

$$\text{F.S.} = \frac{3.39}{1.21} = 2.8 > 1.0 \text{ OK} \checkmark$$



EQE INTERNATIONAL

SHEET NO. 6JOB NO. 52091 JOB NSP MONTICELLO IPEEEBY RJF DATE 12/14/93CALC. NO. C-015 SUBJECT MCC 43A, BCHK'D SL DATE 12/17/93CHECK BOLT BENDING

$$M = \frac{VL}{2} = \frac{(1206) 1.5}{2} = 905 \text{ #.in}$$

$$\sigma = \frac{Mc}{I} = \frac{(905)(.25)}{.00306}$$

$$I = \frac{\pi r^4}{4} = \frac{\pi (.25)^4}{4} = .00306$$

$$\sigma = 74 \text{ KSI} \quad \leftarrow (\text{REF 5})$$

$$\sigma_{all} = 1.7(.60)(36) = 37 \text{ KSI KSI} < 74 \text{ KSI N.G.}$$

FROM REF 1 (CRITERIA FOR STEEL)

THIS ITEM CANNOT BE SCREENED OUT

$$F.S. = \frac{\sigma_{all}}{\sigma} = \frac{37}{74} = 0.5 < 1.0$$



EQE INTERNATIONAL

ATTACHMENT A

(TOTAL 2 PAGES)

SHEET NO. 1 OF 2

JOB NO. 52091 JOB MONTICELLO BY _____ DATE _____
 CALC. NO. C-015 SUBJECT ATTACHMENT A FROM REF. 2 CHK'D _____ DATE _____

ITEM NO. 8158-069 0'0"0" ITEM NAME 480 Volt Motor Control Centers (TURRET MOUNTED)
 MANUFACTURER'S NAME GENERAL ELECTRIC MANUFACTURER'S LOCATION PLAINVILLE, CONN
 SERIAL, TYPE, MODEL, ETC., NOS. _____
 LOCATION: BUILDING TURBINE FLOOR 931'0" AREA SE. QUARTER NEAR ENTRY
 DOES POSITIVE ANCHORAGE EXIST: ☒ YES ☐ NO

DESCRIPTION OF ANCHORAGE:

MCC 43 A
 BUS # A1A2T4
 75C243777-7

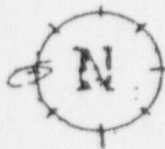
SWING BUS B
 7700 LINE
 CONTROL CENTER

SERIAL # DJA1A2T4 75C243802-1
 ORDER # 79167 A/P
 DATE 7/17/69

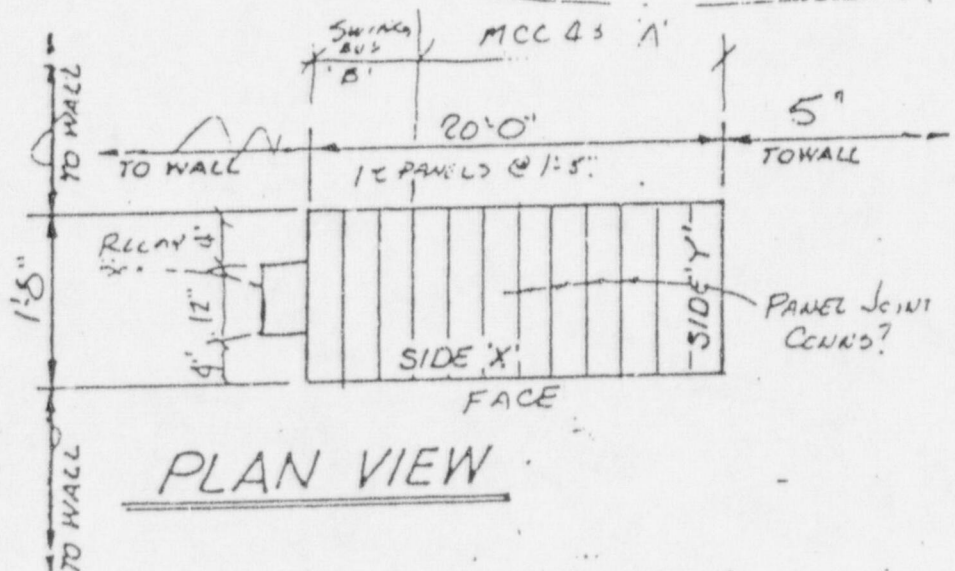
ORDER 6204 A/C RAC N
 DATE 2/21/68

OVERALL DIMENSIONS OF UNIT
 (Simple Sketch)

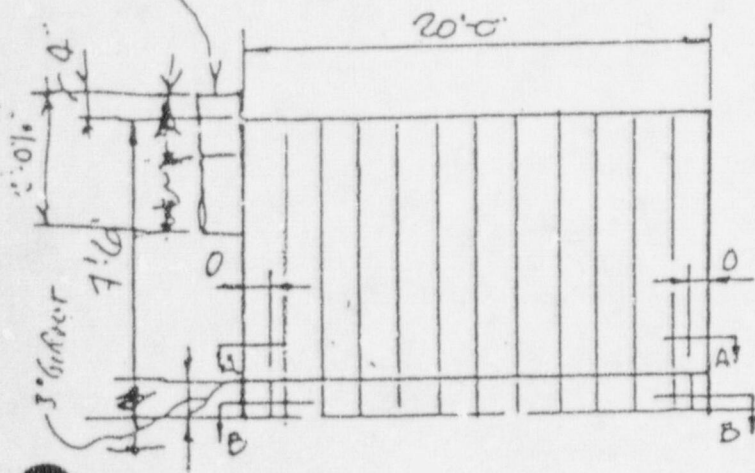
PHOTO NO. _____



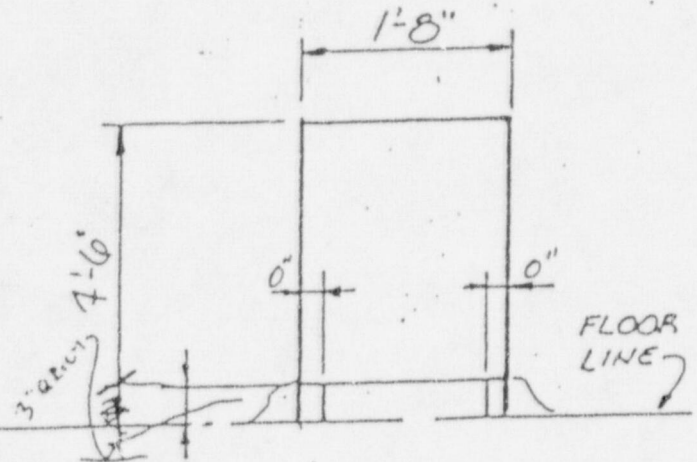
"480V LSSANTINE SWING
 BUS" / TWO VERTICAL
 CHANNELS BUILT
 TO CARRY T. 3 (2" DIA.)
 LINES OUT OF B.



PLAN VIEW



SIDE 'X'



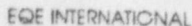
SIDE 'Y'

ARE THERE NON-CATEGORY EQUIPMENT IN THE VICINITY OF CAT. 1 EQUIPMENT, WHICH IF DISLODGED BY A SEISMIC EVENT, COULD IMPACT CAT. 1 EQUIPMENT? ☒ YES ☐ NO

IF YES, LIST ITEM NUMBERS _____

LIST EQUIPMENT ON THE "FIELD SHEET - NON-CAT. 1 EQUIPMENT)

222

SHEET NO. 2 OF 2

JOB NO. 52091 JOB MONTICELLO

BY _____ DATE _____

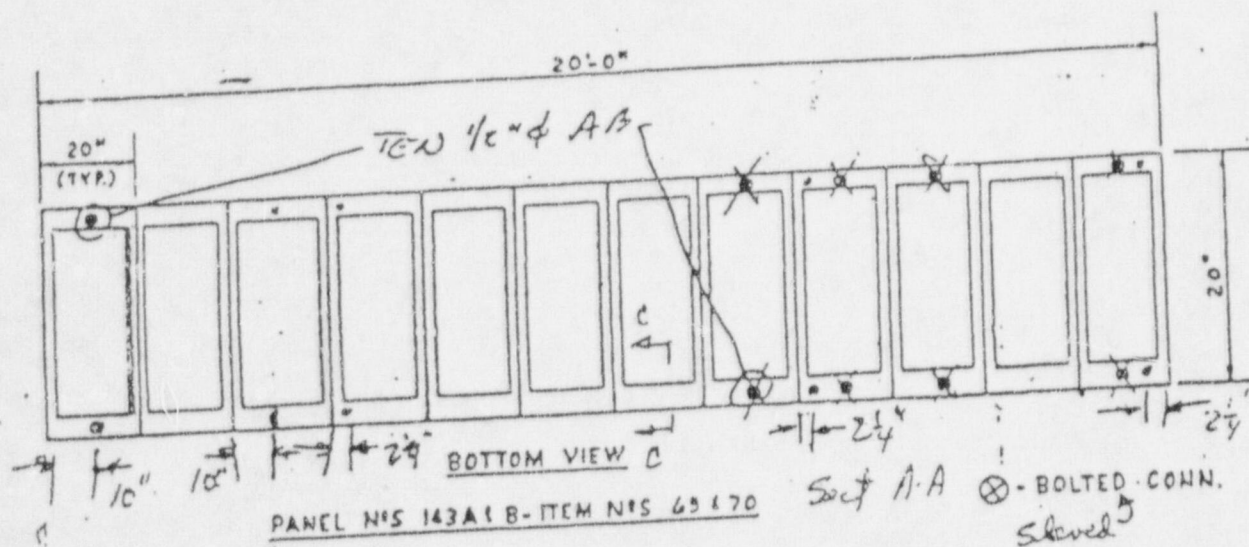
CALC. NO. C-015 SUBJECT ATTACHMENT A FROM REF. 2

CHK'D _____ DATE _____

EM NO. 8158-069470

1 LETTER

N. 4



Hand-drawn sketch of a cabinet installation. The sketch shows a cabinet mounted on a base. The base is labeled "gleered embedded" and "1/2 inch anchors". The cabinet is labeled "cabinet" and "3x1/2 inch channel". The base is labeled "gleered embedded" and "1/2 inch anchors". The cabinet is labeled "cabinet" and "3x1/2 inch channel". The base is labeled "gleered embedded" and "1/2 inch anchors".

3"

3 + 1 1/2" channel

Ant BB

223



RHR PUMPS AND CORE SPRAY PUMPS

RHR Pump SEWS and Photos

Core Spray Pump SEWS and Photos

Calculation 52091-C-025

SCREENING AND EVALUATION SHEET (SEWS)Plant Name: Monticello Unit: 1PART A. DESCRIPTIONEquip. ID No. P-202A/C Equip. Class Vertical pump3 14.45 P-202CEquipment Description RHR pumps (2 total)Equipment Location: Bldg. RB Floor El. 896' Room, Row/Col 52Manufacturer, Model, Etc. Pump Bingham CVDS 12 x 14 x 14 1/2Seismic Input Elevation 896'PART B. PUMP EVALUATIONSame as P-202B/D.

1. Is pump of good seismic design?

(Y) N U N/A

Base flexibility ✓

4- 3/4"Ø M.B. for motor, same as 202B/D

Shaft restraints ✓

Casings ✓

P-202C has different casing, but same pump motor

Differential structural motion ✓

Nozzles loadings — Check anchorage

Unsupported components ✓

2. No other pump concerns?

(Y) N U N/A

Is pump itself screened out?

(Y) N UPART C. ANCHORAGE EVALUATION

1. Is strength assessment based on:

1"Ø A.B. about 200 mm high.
2" edge distance
3 14.45

Judgement (supported by generic analysis)?

Specific analysis? See Calc. NO. 52091-C-025

Other? _____

J

(A)

Other

2. Is strength adequate?

Y (N) U N/A

3. Is stiffness adequate?

(Y) N U N/A

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-202A/CEquip. Class Vertical pump

4. No other anchorage concerns?

(Y) N U N/A

Is anchorage adequate?

Y (N) U

PART D. SYSTEMS INTERACTION EFFECTS

1. Is pump free from influence by adjacent elements?

Y (N) U N/A

Pump contains soft targets

Pump contains essential relays NoFlexibility of connected lines OK

Collapse of nearby equipments or structures

Masonry block walls No

2. No potential sources could flood or spill onto pump

(Y) N U N/A

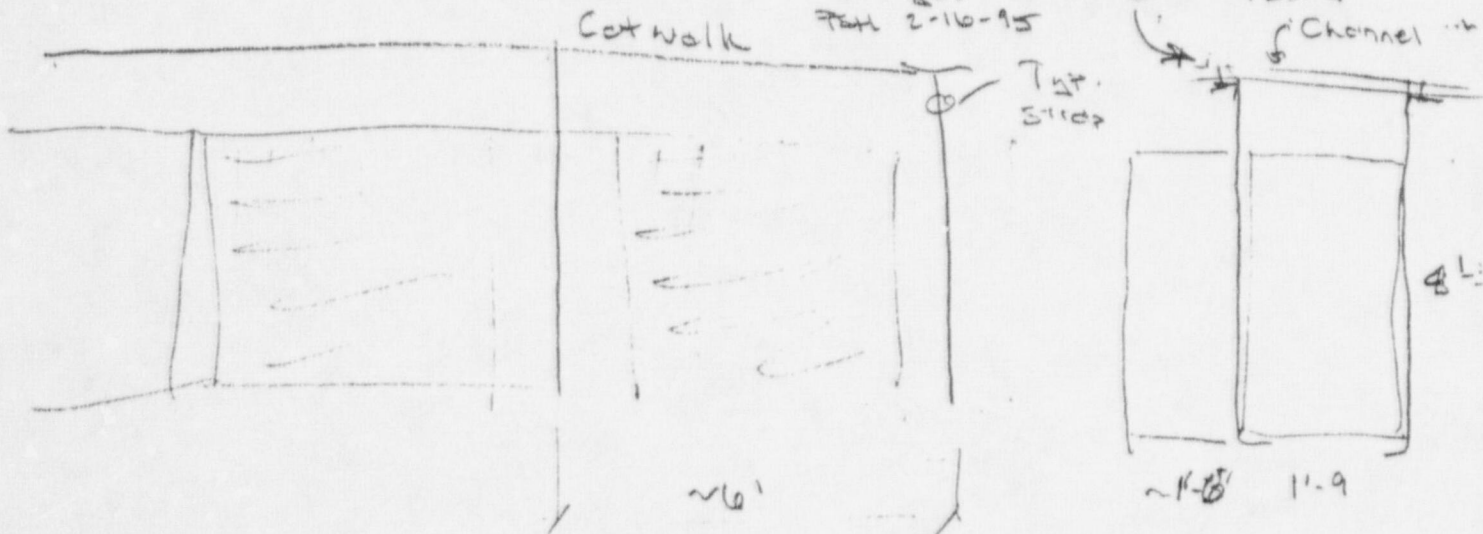
3. No other interaction concerns?

(Y) N U N/A

Is pump free from interaction effects?

Y (N) U

DESCRIBE POTENTIAL PROBLEMS INDICATED BY NO OR UNSATISFACTORY (Use additional sheets, if necessary)

Machine bolts through channel flange. Estimate ~ 5/32" ϕ
Feb 2-16-95

3 15:01

3 15:01

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-202A/C Equip. Class Vertical pump

IS PUMP FREE OF NEED FOR FURTHER INVESTIGATION/ANALYSIS?

YES _____

NO ☒ _____*Puct, unhookage*Evaluated by: PSHDate: 1-25-95Evaluated by: DKHDate: 3-29-95

SCREENING AND EVALUATION SHEET (SEWS)Plant Name: Monticello Unit: 1PART A. DESCRIPTIONEquip. ID No. P-202B/D Equip. Class Vertical pumpEquipment Description RHR pumps (2 total) 3 12:08Equipment Location: Bldg. RB Floor El. 896' Room, Row/Col 53Manufacturer, Model, Etc. Motor GE 5K6329 XC4A
Pump Bingham CVDS 12X14X14 1/2Seismic Input Elevation 896'PART B. PUMP EVALUATION

1. Is pump of good seismic design?

(Y) N U N/A

Base flexibility OKShaft restraints -Casings OKDifferential structural motion OKNozzles loadings Possible. Better checkUnsupported components OK~1" hold-down
Only 4 bolts from motor. Check drawings.

2. No other pump concerns?

(Y) N U N/A

Is pump itself screened out?

(Y) N U

PART C. ANCHORAGE EVALUATION

1. Is strength assessment based on:

Great pad similar to core 3 prop
pump 208 B. Include nozzle loads

Judgement (supported by generic analysis)?

Specific analysis? See Calc. No. 52091-C-025

Other? _____

(A)

Other

2. Is strength adequate?

Y (N) U N/A

3. Is stiffness adequate?

(Y) N U N/A

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-202B/ DEquip. Class Vertical pump

4. No other anchorage concerns?

(Y) N U N/A

Is anchorage adequate?

Y (N) U

PART D. SYSTEMS INTERACTION EFFECTS

1. Is pump free from influence by adjacent elements?

Y (N) U N/A

Pump contains soft targets

Pump contains essential relays NO

Flexibility of connected lines OR

Collapse of nearby equipments or structures
Masonry block walls

V-AC-4 A/C Unit. See below

2. No potential sources could flood or spill onto pump

(Y) N U N/A

3. No other interaction concerns?

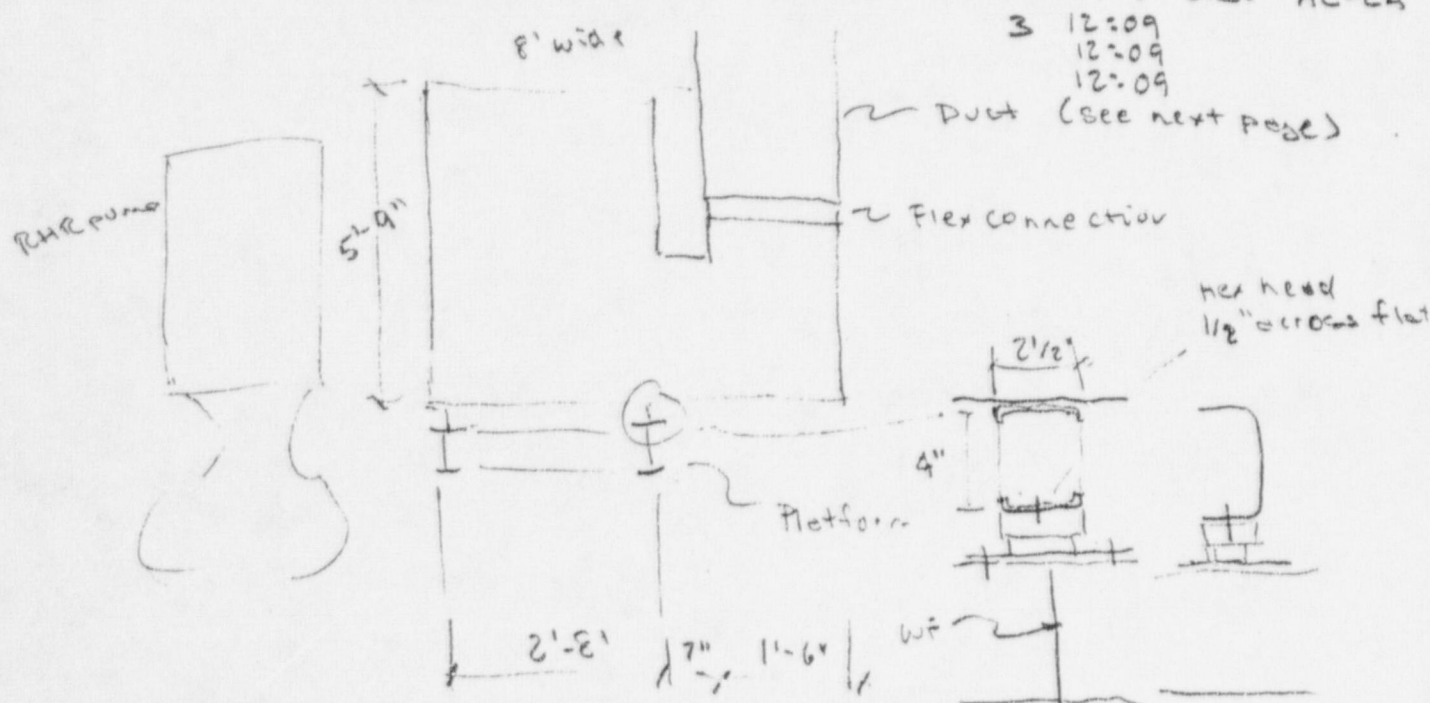
(Y) N U N/A

Is pump free from interaction effects?

Y (N) U

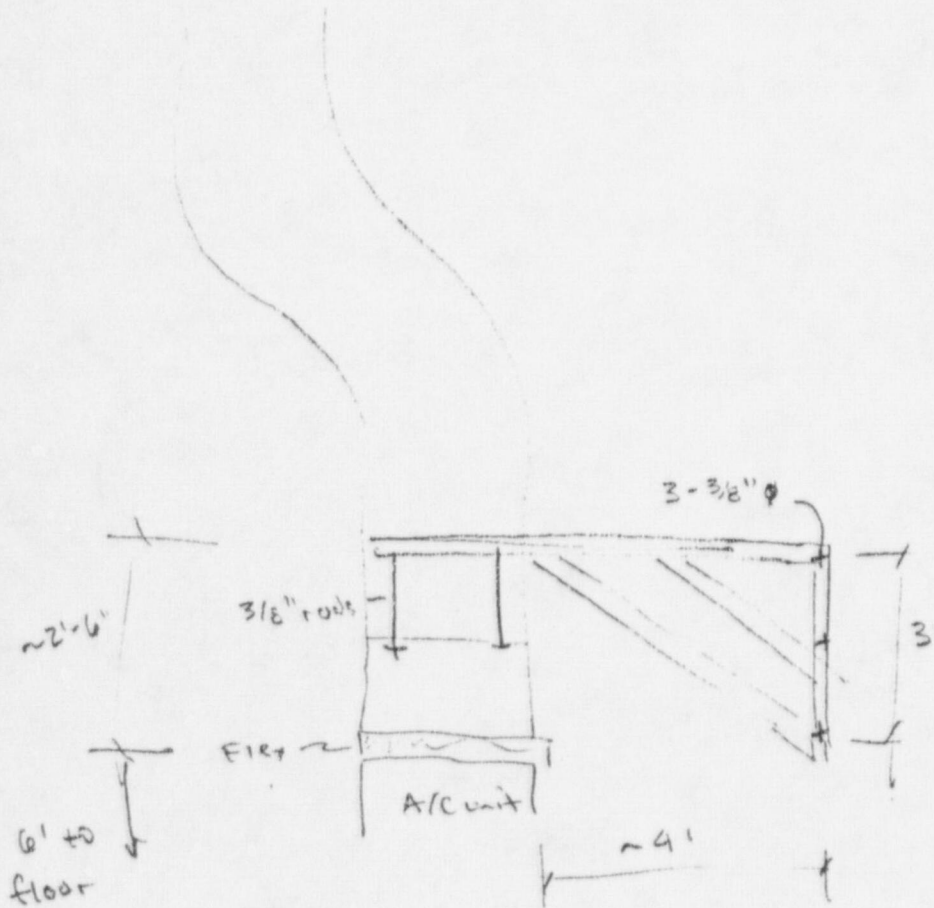
DESCRIBE POTENTIAL PROBLEMS INDICATED BY NO OR UNSATISFACTORY (Use additional sheets, if necessary)

A/C Unit V-AC-4 American Air Filter Unit No. V-2150-AC-2A



SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-202B/DEquip. Class Vertical pump

Duct

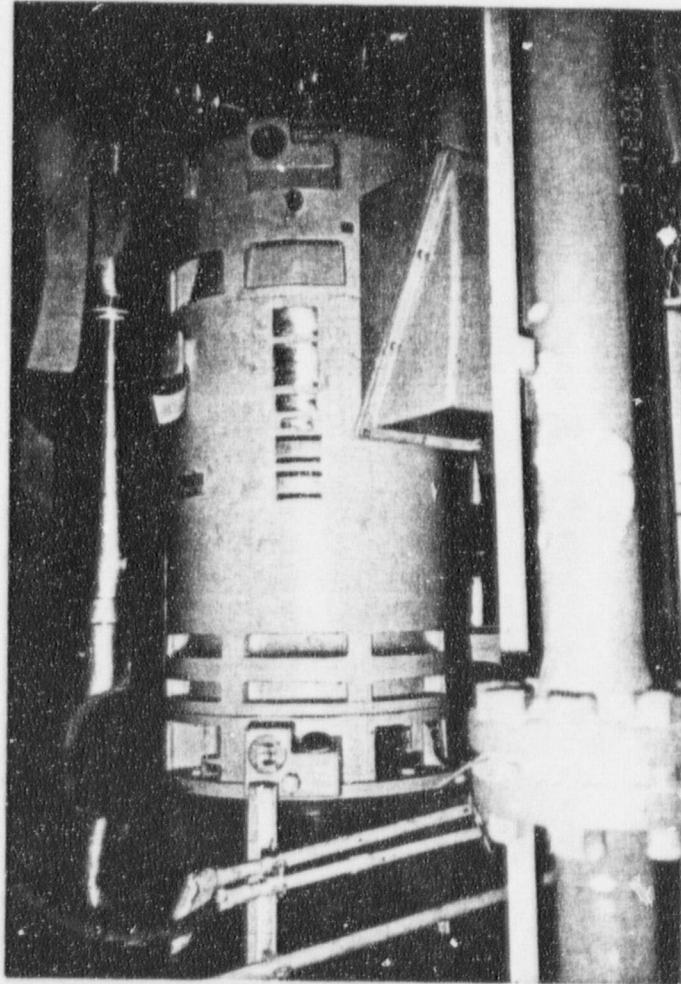


IS PUMP FREE OF NEED FOR FURTHER INVESTIGATION/ANALYSIS?

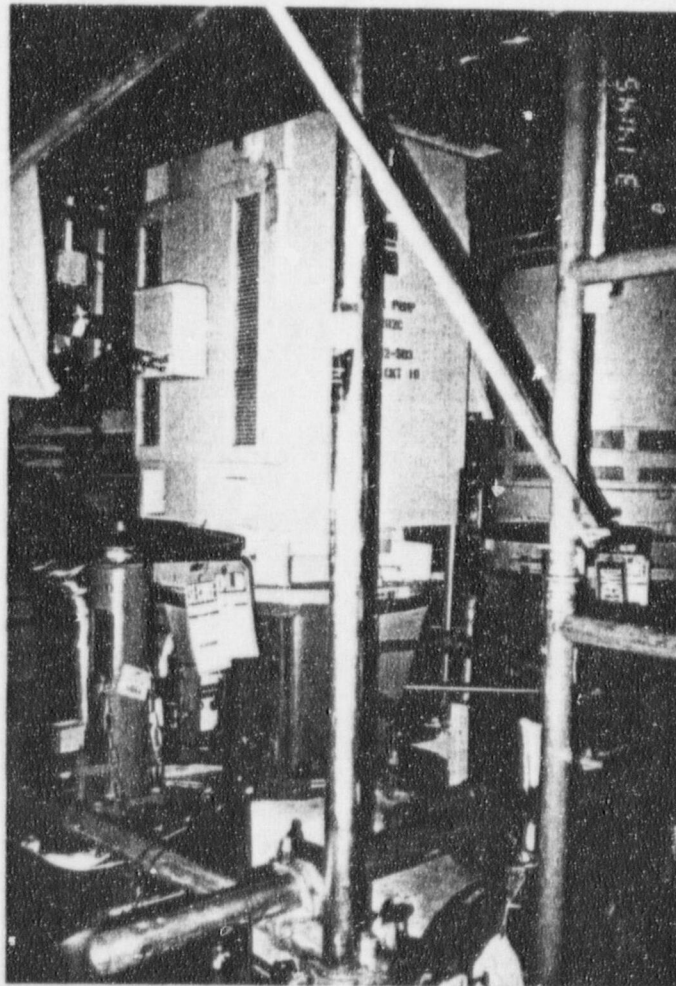
YES NO X

- Anchorage
- A/C unit

Evaluated by: PSHDate: 1-18-95Evaluated by: DKHDate: 3-29-95



RHR Pump P-202B



RHR Pump P-202C

SCREENING AND EVALUATION SHEET (SEWS)Plant Name: MonticelloUnit: 1PART A. DESCRIPTIONEquip. ID No. P-208B A Equip. Class Vertical pumpEquipment Description CS pumpEquipment Location: Bldg. RB Floor El. 896' Room, Row/Col 53Manufacturer, Model, Etc. Pump Bingham CVDS 10x13x14 1/2Seismic Input Elevation 896'-3"PART B. PUMP EVALUATION

Same as P-208B

1. Is pump of good seismic design?

☒ Y ☐ N ☐ U ☐ N/A

Base flexibility

Shaft restraints

Casings

Differential structural motion

Nozzles loadings

Unsupported components

10" ϕ
Vertical pipe run about 15'
to next horiz. support. Check
drawings for horiz. line

2. No other pump concerns?

☒ Y ☐ N ☐ U ☐ N/A

Is pump itself screened out?

☒ Y ☐ N ☐ UPART C. ANCHORAGE EVALUATION

1. Is strength assessment based on:

Judgement (supported by generic analysis)?

Specific analysis? See Calc. No. 52091-C-025

Other? _____

J
☒ A
Other

2. Is strength adequate?

Y ☒ N ☐ U ☐ N/A

3. Is stiffness adequate?

☒ Y ☐ N ☐ U ☐ N/A

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-208BA Equip. Class Vertical pump

4. No other anchorage concerns?

☒ Y ☐ N ☐ U ☐ N/A

Is anchorage adequate?

Y ☒ N ☐ UPART D. SYSTEMS INTERACTION EFFECTS

1. Is pump free from influence by adjacent elements?

Y ☒ N ☐ U ☐ N/A

Pump contains soft targets

Pump contains essential relays NOFlexibility of connected lines OKDuct over power cables
See data sheet for RHR Pumps P-202A/C

Collapse of nearby equipments or structures

Masonry block walls None

2. No potential sources could flood or spill onto pump

☒ Y ☐ N ☐ U ☐ N/A

3. No other interaction concerns?

☒ Y ☐ N ☐ U ☐ N/A

Is pump free from interaction effects?

Y ☒ N ☐ U

DESCRIBE POTENTIAL PROBLEMS INDICATED BY NO OR UNSATISFACTORY (Use additional sheets, if necessary)

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-208B/A Equip. Class Vertical pump

IS PUMP FREE OF NEED FOR FURTHER INVESTIGATION/ANALYSIS?

YES _____

NO ✓Evaluated by: PSHDate: 1-25-95Evaluated by: DKNDate: 3-29-95

SCREENING AND EVALUATION SHEET (SEWS)Plant Name: Monticello Unit: 1PART A. DESCRIPTIONEquip. ID No. P-208AB Equip. Class Vertical pumpEquipment Description CS pump 3 11:28Equipment Location: Bldg. RB Floor El. 896' Room, Row/Col 52Manufacturer, Model, Etc. GE 3# 4000 V Hp 800
Pump Bingham Pump CVDS 10 x 12 x 14 1/2

Seismic Input Elevation _____

PART B. PUMP EVALUATION

1. Is pump of good seismic design?

(Y) N U N/A

Base flexibility OKShaft restraints as manufacturer onCasings /Differential structural motion OKNozzles loadings Get I pipe support & added to vertical line, butUnsupported components OK not horiz. line. Better check

2. No other pump concerns?

(Y) N U N/A

Is pump itself screened out?

(Y) N U

PART C. ANCHORAGE EVALUATION

1. Is strength assessment based on:

Judgement (supported by generic analysis)?

Specific analysis? See Calc. No. 52091-C-025

Other? _____

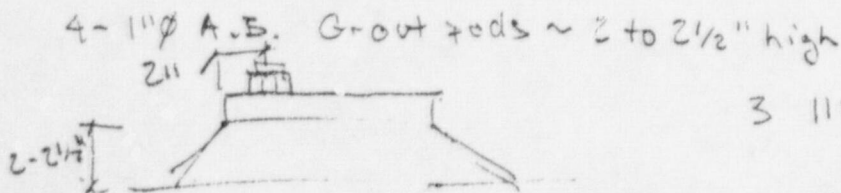
J
(A)
Other

2. Is strength adequate?

Y (N) U N/A

3. Is stiffness adequate?

(Y) N U N/A



3 11:28

SCREENING AND EVALUATION SHEET (SEWS)Equip. ID No. P-208A~~B~~Equip. Class Vertical pump

4. No other anchorage concerns?

Y ☒ N U N/A

Is anchorage adequate?

Y ☒ N UPART D. SYSTEMS INTERACTION EFFECTS

1. Is pump free from influence by adjacent elements?

Y ☒ N U N/APump contains soft targets NOPump contains essential relays NOFlexibility of connected lines OK

Collapse of nearby equipments or structures

Masonry block walls NoneRIC Unit - See P-202B/D.

2. No potential sources could flood or spill onto pump

Y ☒ N U N/A

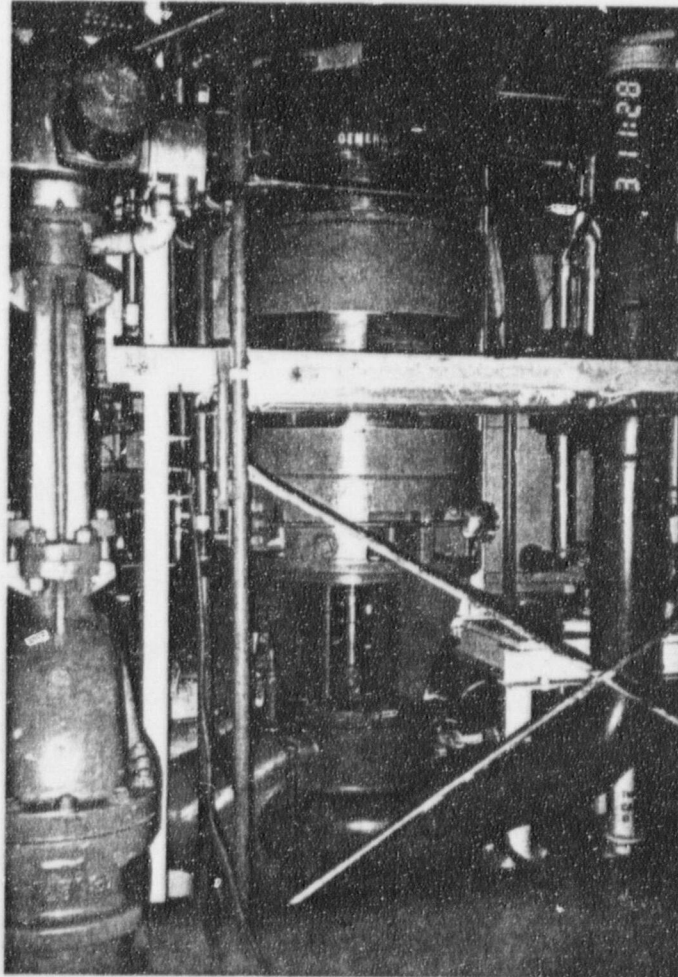
3. No other interaction concerns?

Y ☒ N U N/A

Is pump free from interaction effects?

Y ☒ N U

DESCRIBE POTENTIAL PROBLEMS INDICATED BY NO OR UNSATISFACTORY (Use additional sheets, if necessary)



Core Spray Pump