

RECEIVED  
1163

103 MAR 32 PM 12:41

REGIONAL

Docket Nos. 50-528/529/530

50.55(e) Report

Arizona Public Service Company

P.O. BOX 21666 • PHOENIX, ARIZONA 85036

March 28, 1983  
ANPP-23374-BSK/RQT

U. S. Nuclear Regulatory Commission  
Region V  
Creskide Oaks Office Park  
1450 Maria Lane - Suite 210  
Walnut Creek, CA 94596-5368

Attention: Mr. D. M. Sternberg, Chief  
Reactor Projects Branch 1

Subject: Final Report - DER 82-42  
A 50.55(e) Reportable Condition Relating to Unit 1 Reactor  
Coolant Pump Pressure Tap Nozzle Weld Leak Due To Overheating  
Stainless Alloy  
File: 83-019-026; D.4.33.2

Reference: A) Telephone Conversation between J. Eckhardt and G. Duckworth  
on July 9, 1982  
B) ANPP-21577 dated August 9, 1982  
C) ANPP-22204 dated November 4, 1982 (Time Extension)  
D) ANPP-22609 dated December 28, 1982 (Time Extension)  
E) ANPP-23166 dated February 28, 1983 (Time Extension)

Dear Sir:

Attached is our final written report of the Reportable Deficiency under  
10CFR50.55(e), referenced above.

Very truly yours,

*E.E. Van Brunt, Jr. by BJA*

E. E. Van Brunt, Jr.  
APS Vice President,  
Nuclear Projects  
ANPP Project Director

EEVB/RQT:wp  
Enclosure

cc: See Attached Page Two

8304070410 830328  
PDR ADCK 05000528  
S PDR

1827

U. S. Nuclear Regulatory Commission  
Page Two  
ANPP-23374-BSK/RQT

cc: Richard DeYoung, Director  
Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

T. G. Woods, Jr.  
G. C. Andognini  
J. A. Roedel  
D. B. Fasnacht  
A. C. Rogers  
B. S. Kaplan  
W. E. Ide  
J. Vorees  
J. R. Bynum  
D. D. Green  
P. P. Klute  
A. C. Gehr  
W. J. Stubblefield  
W. G. Bingham  
R. L. Patterson  
R. W. Welcher  
R. M. Grant  
D. R. Hawkinson  
L. E. Vorderbrueggen  
G. A. Fiorelli

FINAL REPORT - DER 82-42  
DEFICIENCY EVALUATION 50.55(e)  
ARIZONA PUBLIC SERVICE COMPANY (APS)  
PVNGS UNITS 1, 2 & 3

I. Description of Deficiency

While filling the reactor coolant system for initial hydrostatic tests (no fuel in reactor), a leak was detected from the discharge pressure-tap nozzle on Reactor Coolant Pump 2B. This nozzle consists of a nickel-chromium-iron piece which is welded (partial penetration) to the interior of the pump discharge nozzle and to a Type-316 stainless steel external piece. This external piece has a socket-weld end which receives connecting piping. The leak was through the wall of the stainless steel portion of one pressure tap nozzle on Pump 2B only. There are two such pressure nozzles (suction and discharge) on each of four pumps, or eight per NSSS. Only one of eight leaked.

Investigations into the post weld heat treatment practices for the pump nozzle to main coolant piping weld revealed that a three-hour soak at 1150°F caused the pressure tap nozzle to be exposed in the sensitizing range for that material. The upper or stainless steel portion of the pressure tap had been sensitized during the field weld post weld heat treatment in February, 1980, and then subjected to a corrosive environment causing intergranular attack and leaking of the pressure boundary. The corroding species could not be identified during subsequent metal-lurgical examination of the failed pressure tap, however, fluoride-containing contaminants will cause intergranular attack. The other seven nozzles apparently had not been exposed to the corrosive environment since being exposed to post weld heat treatment, and successfully passed the hydrostatic tests.

There are flow restrictors in the nickel-chromium-iron portion of these pressure tap nozzles. Failure of one nozzle or piping system outboard of these restrictors would allow orderly shutdown using normal makeup. However, since all the stainless steel nozzles have probably been sensitized to some degree, there is the potential of more than one failure occurring. Since core load had not occurred, there are no safety implications for this event. However, if this condition had gone uncorrected, then simultaneous failure of two or more nozzles may have potentially created a small break LOCA. This condition is therefore evaluated as reportable under the requirements of 10CFR50.55(e).

II. Analysis of Safety Implications

The stainless steel portion of the 2B nozzle was returned to CE Windsor Nuclear Laboratories for investigation. It received an ASTM A262 Practice E test. In addition, a similar but uninstalled complete pressure tap nozzle was also returned. This latter nozzle was put

through a post-weld heat treatment cycle, and then the nickel-chromium-iron portion received a modified Huey test for sensitization. The base material was not sensitized, but the heat-affected zone was.

### III. Corrective Action

For Units 1 and 2, all of the pumps' pressure tap nozzles will have the stainless portion of the nozzle removed and replaced by a double socket piece of inconel (essentially a custom coupling for the discharge tap and custom elbow for the suction tap). Replacement will occur prior to core loading. Corrective action will be completed as per CE letter V-CE-16870 dated August 12, 1982 and V-CE-17050 dated September 3, 1982.

For Unit 3, the corrective action plan is outlined as follows:

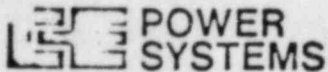
1. Post Weld Heat Treat (PWHT) the casing nozzle girth welds with the pressure taps nozzles in place. After PWHT, remove the stainless steel portion of the nozzles as was done on Unit #2.
2. Install replacement couplings in the same manner as was done on Unit #2. CE will provide Inconel 60u replacement couplings and supervision as required.

CE is conducting a continuing investigation of the potential for corrosion of the nickel-chromium-iron material which receives post weld heat treatment. It is anticipated that the results of this investigation will assist CE in implementing a corrective action plan which will preclude recurrence of this condition in future projects.

C-E Power Systems  
Combustion Engineering, Inc.  
1000 Prospect Hill Road  
Windsor, Connecticut 06095

Tel 203/688-1911  
Telex 99297

Attachment to DER 82-42



September 3, 1982  
V-CE-17050

Mr. W. J. Stubblefield  
Bechtel Power Corporation  
P.O. Box 49  
Palo Verde, Arizona 85343

Subject: Arizona Nuclear Power Project  
Reactor Coolant Pump Pressure  
Tap Replacement Unit 2 - Information  
Required by Bechtel

Reference: (A) CE letter V-CE-17031 dated 9/3/82  
Subject Unit 1 RCP Pressure Tap Replacement

Enclosures: (1) C-E Manufacturing Order No. 9403834  
(2) C-E Manufacturing Order No. 9230163

173337

JOB 10407	
FILE	N. 6.0
SEP 10 '82	
R	A
3	PE STEAMS
2	API KEISH
1	API NISJARIAN
	API ALEY
	PE BLACK
	COORD 1
	COORD 2
	POL
	PA
	PL/WR (SFC)
	PA DA
	ARCH
	C/S
	CONTROLS
	ELECT
EC	MICH
	NUCLEAR
	PLANT DESIGN
	SIR & SUP
	CLIENT
CC	PO FILE

Dear Mr. Stubblefield:

In response to the request of the field for the subject pressure tap replacement work for Unit 2, Enclosure (1) invokes the revised pump specification which moves the boundary. The revised specification (in paragraphs 2.3.8 and 4.1.15) forwarded as Enclosure (1) to the referenced letter, moves the boundary of the pressure tap from the former field stainless socket weld to the end of the inconel tube of the pump suction and discharge nozzles.

The replacement inconel nozzle coupling design has been approved by C-E Engineering and formal supporting documentation will be forwarded for the design.

CE-Avery Field Engineering Service has been authorized by the Enclosure (2) manufacturing order to replace the Unit 2 suction and discharge nozzle pressure taps under their Section III code authorization in the field as you have requested.

The above responds to the field requested information by Bechtel to move the code boundary of responsibility on the RCP Nozzles for Unit 2.

Should you have questions, please advise.

Very truly yours,  
  
For C. Ferguson  
Project Manager

CF/VSK/mg  
Enclosure

cc: Messrs:

E. E. Van Brunt, Jr. w/e J. W. Dilk  
G. C. Andognini w/e G. A. Butterworth  
J. Vorees S. N. Mager w/e  
W. H. Wilson S. W. Shock w/e  
W. G. Bingham w/e D. B. Amerine w/e

W. L. MacDonald



**POWER SYSTEMS**  
COMBUSTION ENGINEERING INC

COMBUSTION ENGINEERING, INC.  
1000 PROSPECT HILL ROAD  
WINDSOR, CONN. 06095

TEL. 203-588-1911/TWX 710-447-1870/TELEX 099-297

A. SHIPPING TAGS, PACKING LISTS  
AND SHIPPING PAPERS MUST INCLUDE  
THE APPLICABLE C-E CONTRACT NO.,  
COMPONENT CODE NO., AND ORDER NO.

PURCHASE ORDER NUMBER	SHIP TO
PURCHASE ORDER DATE	SHIP DATE

VENDOR CODE

TO: •

PAGE OF

SHOW PURCHASE ORDER NUMBER, SHIP TO AND MARK ON ALL DOCUMENTS.  
SHIP TO AND MARK.

Enclosure (1) to  
V-CE-17050

MO 9403834

THIS ORDER AND SELLERS SUB ORDERS ARE SUBJECT TO EXPEDITING BY  
PURCHASER AND/OR HIS AGENT.

REFER COMMUNICATIONS TO

TERMS: 20th of FOLLOWING MONTH

BUYER

ACCT. NO.

CONTRACT NO. & SECT.

SHOP JOB NO.

14373

F.O.B. POINT

SHIPPING CHARGES

SHIP VIA

SHIP ON

ITEM	QUANTITY	COMPONENT CODE	DESCRIPTION	EVENT	PRICE
------	----------	----------------	-------------	-------	-------

31-14-54-0200

REACTOR COOLANT PUMPS

The following specification revision is invoked on this order.  
This revision supersedes all previous revisions:

CE Project Specification for Reactor Coolant Pumps for  
Arizona Nuclear Power Project No. 14273-PE-480, Rev. 03.

Five (5) copies of the above specification are enclosed.

☐ INVOICE TAX ☐ DO NOT INVOICE TAX REGISTRATION NO.

COMMODITY CODE

ADDITIONAL INFORMATION

Vendor: CE Avery

FABR. RELEASE DUE

OTHER AUTHORITY (A)

OTHER AUTHORITY (B)

OTHER AUTHORITY (C)

CONTRACT NAME

ANPP - Unit #2

REQUISITION WRITER

CHARGE TO:

14373 Tab No. 525904

SUPV. MGR. SECT. MGR.

CONTRACT ESTIMATE VALUE

AS OF

CONT. ADMIN.

REQ'D. SHIPPING DATE

NO. SUPV. MGR.

SECT. MGR.

QUALITY ASSURANCE

9/3/82 9/3/82 9/3/82

**POWER  
SYSTEMS**  
COMBUSTION ENGINEERING INC

COMBUSTION ENGINEERING, INC.

1000 PROSPECT HILL ROAD  
WINDSOR, CONN. 06095

TEL. 203 688-1911/TWX 710-447-1870/TELEX 099-297

ALL SHIPPING TAGS, PACKING LISTS  
AND SHIPPING PAPERS MUST INCLUDE  
THE APPLICABLE C-E CONTRACT NO.,  
COMPONENT CODE NO., AND ORDER NO.

DATE ORDER OTHER	DATE OTHER
New Order	
DATE ORDER OTHER	DATE OTHER

VENDOR CODE

TO:

PAGE OF

SHOW PURCHASE ORDER NUMBER, SHIP TO AND MARK ON ALL DOCUMENTS,  
SHIP TO AND MARK.

ENCLOSURE (2) TO  
V-CB-17050

M.O. 9230163

THIS ORDER AND SELLERS SUB ORDERS ARE SUBJECT TO EXPEDITING BY  
PURCHASER AND/OR HIS AGENT.

REFER COMMUNICATIONS TO.

TERMS: 20th of FOLLOWING MONTH

BUYER

ACCT. NO.

CONTRACT NO. & SECT.

SHOP JOB NO.

14373

F.O.B. POINT

SHIPPING CHARGES

SHIP VIA

SHIP ON

ITEM	QUANTITY	COMPONENT CODE	DESCRIPTION	EVENT	PRICE
		31-14-54-0200	REACTOR COOLANT PUMPS		
1			Install inconel couplings on suction and discharge nozzle pressure taps in accordance with:		
			a. CE Specification for Standard Plant for Reactor Coolant Pumps No. SYS80-PE-480, Rev. 02.		
			b. CE Project Specification for Reactor Coolant Pumps No. 14273-PE-480, Rev. 03.		
			c. ASME B&PV Code, Section III, Subsection NB, 1974 Edition.		
			d. CE-KSB Instruction Manual No. 8109-101-500, Rev. 0.		
			e. CE Avery Quality Assurance Field Manual.		
			f. CE-KSB drawing C-8000-101-2017, Rev. 01, Wall Static Pressure Nozzle - Suction Safe End.		
			g. CE-KSB drawing C-8000-101-2018, Rev. 01, Wall Static Pressure Nozzle - Discharge Safe End.		

☐ INVOICE TAX ☐ DO NOT INVOICE TAX REGISTRATION NO.

COMMODITY CODE

ADDITIONAL INFORMATION

Vendor: CE-Avery

ORDER TO TASK 526904

CONTRACT NAME

ANPP Unit #2

CHARGE TO:

FABR. RELEASE DUE

OTHER AUTHORITY (A)

OTHER AUTHORITY (B)

OTHER AUTHORITY (C)

QUALITY ASSURANCE

CONTRACT ESTIMATE VALUE

AS OF

CONT. ADMIN.

REQ'D SHIPPING DATE

REQUISITION WRITER

SUBMITTAL SECT. MGR

APPROV. DATE

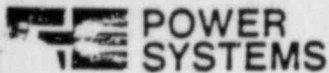
APPROV. DATE

APPROV. DATE

APPROV. DATE

APPROV. DATE

APPROV. DATE



August 12, 1982  
V-CE-16870

Mr. G. C. Andognini  
Arizona Public Service Company  
P. O. Box 21666 - Sta. 4015  
Phoenix, Arizona 85036

Subject: Arizona Nuclear Power Project  
Units 1 and 2 Reactor Coolant  
Pump Pressure Nozzle Sensitization

Reference: (A) C-E Letter V-CE-16760 dated July 19, 1982  
Subject - Unit 1 Reactor Coolant Pump 2B  
Pressure Nozzle Leak 10CFR50.55(e) Reportability

Enclosures: (1) C-E-KSB Sketch SC-8000-0098 Rev. 00, Alteration  
of Discharge Nozzle Pressure Tap  
(2) C-E-KSB Sketch SC-8000-0099 Rev. 00, Alteration  
of Suction Nozzle Pressure Tap

171920  
JOB 10407  
FILE N.6.02  
AUG 16 '82

R	PE - DIV/NAME	A
✓	PE SIENS	
3	APL RUTH	
1	APL NAJARIAN	
	APL ALEY	
	RE BLACK	
	COORD 1	
	COORD 2	
	PGE	
	PZ	
	PE/WRT (SFO)	
	PA DA	
	ARCH	
	C/S	
CC	CONTROLS	
	ELECT	
CC	MECH	
	NUCLEAR	
CC	PLANT DESIGN	
	STR & SUP	
	CLIENT	
	FO FILE	
CC	WTS	
CC	WKS	
CC	WOLCHOL	
CC	STUBER/NIK	

Dear Mr. Andognini:

Enclosure (1) to Reference (A) described in general terms the corrective action necessary to remove the sensitized 316 stainless steel RCP pressure taps and to address the sensitization of the inconel Heat Affected Zone (HAZ). The purpose of this letter is to delineate this action in detail.

PVNGS #1

A. Discharge Pressure Tap 2B

1. Perform thorough visual examination of pressure tap from inside the primary pipe prior to fuel load and report results.
2. Perform dye penetrant examination of J-weld inside primary pipe to include the Heat Affected Zone (HAZ) at the same time.

B. Discharge Pressure Taps 1A, 1B and 2A

1. Remove the 316 stainless steel portion of the nozzle, the weld and as much as 1/4" of the inconel portion as possible. Return the removed portion to C-E since it is intended that the HAZ of the inconel be inspected at C-E Windsor. However, there is concern that access to the replacement fillet weld shown on Enclosure (1) might be overly restrictive. An optimum cutting elevation should be selected and its affect on the overall length of the replacement nozzle evaluated versus the field connected pressure piping. For Unit 1, replacement pressure nozzles have been fabricated to the Enclosure (1) dimensions.



August 12, 1982  
V-CE-16870

2. Conduct a hydro on the completed field welds.

C. All Suction Taps

1. Enclosure (2) depicts the removal of the stainless steel portion at about the centerline of the weld. This location of cut was assumed to be optimum for two reasons:

- a. There would be sufficient access to make the fillet weld.
- b. Dressing the stub OD so that it fit into the  $1.000^{+0.010}_0$  socket would be a reasonable task.

If dressing the OD of the shop stainless steel-inconel weld is easier than anticipated, the location of cut could be raised slightly. For Unit 1, there replacement suction pressure nozzles have been fabricated to the Enclosure (2) dimensions.

2. Hydro test the completed field welds.

PVNGS #2

A. All Discharge Pressure Taps

1. Same steps as B above including returning the cut-off nozzles to C-E Windsor.

B. All Suction Pressure Taps

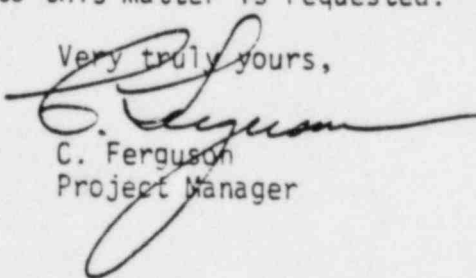
1. Same steps as C above.

The replacement pressure nozzles have not been fabricated for Unit 2.

There are four (4) similarly constructed pressure nozzles in each of the hot legs near the steam generators. They are approximately 44 inches from the centerline of the steam generator to hot leg field welds. We feel it is prudent for you to perform a re-review of the post weld heat treat procedure for these welds on Units 1 and 2, to determine if these pressure nozzles have been subjected to sensitization temperatures during post weld heat treatment. Please inform C-E of the results of this review.

C-E has been proceeding in the interest of maintaining safety and schedule to provide a resolution to this problem. We must, at this time, request that a Field Material Requisition be issued to cover our expenditure of man-hours and material costs. Your attention to this matter is requested.

Very truly yours,

  
C. Ferguson  
Project Manager

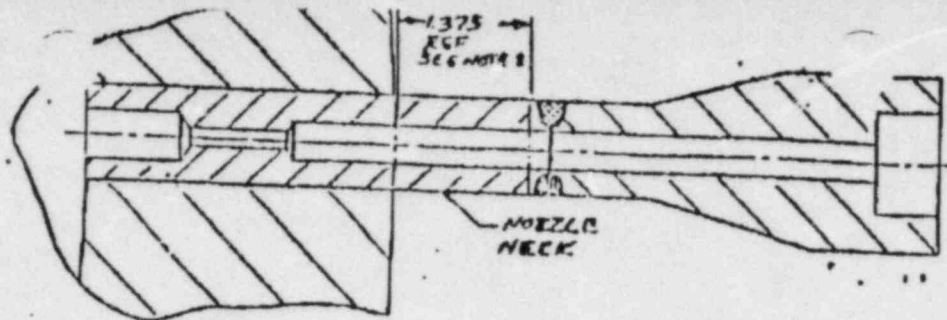
CF/DEW/VSK/eh

August 12, 1982  
V-CE-16870

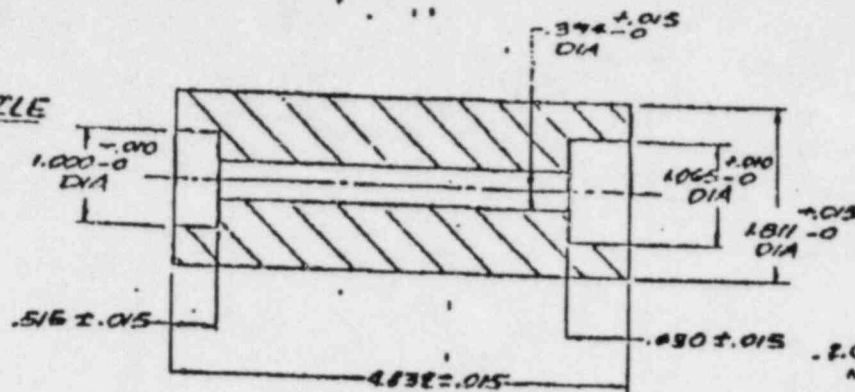
cc: Messrs:

E. E. Van Brunt, Jr. - w/e  
J. Vorees - w/e  
W. H. Wilson  
W. G. Bingham - w/e  
R. H. Holm  
J. W. Dilk  
G. A. Butterworth  
S. N. Mager  
D. B. Amerine - w/e  
W. L. MacDonald  
J. M. Allen - w/e

ENCLOSURE (1) TO  
V-CE-16870



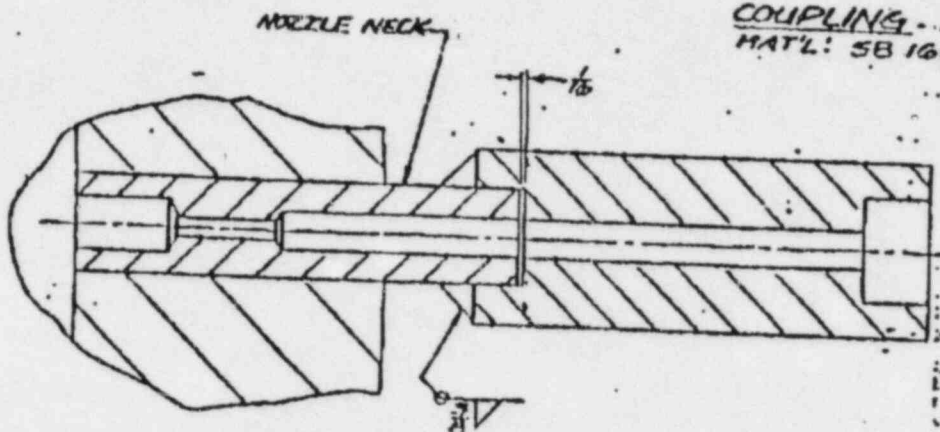
CUTOFF FOR DISCHARGE NOZZLE  
PRESSURE TAP



COUPLING - SEE NOTE 1  
MAT'L: SB 166

1. L.P. C'BORE & MACHINED O.D. PER NB-2551 (3) OF THE ASME BCPV CODE 1974 EDITION, NO ADDENDA
2. CUT PRESSURE TAP TO LENGTH REQUIRED TO MAINTAIN INTERFERENCE OF FIELD PIPING.

SC-8000-009

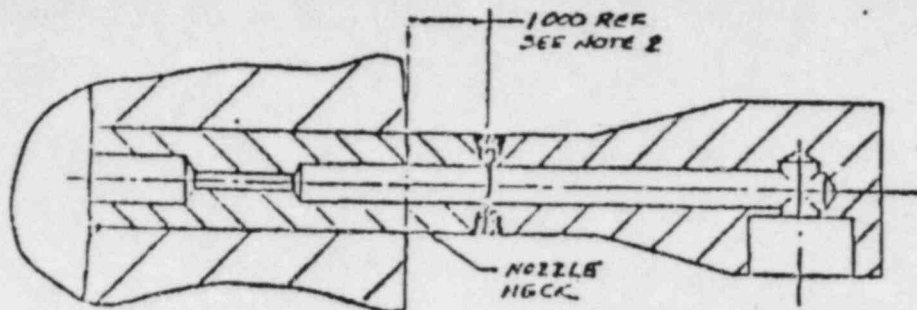


INSTALLATION OF COUPLING  
TO NOZZLE NECK PIN 8000-207-002

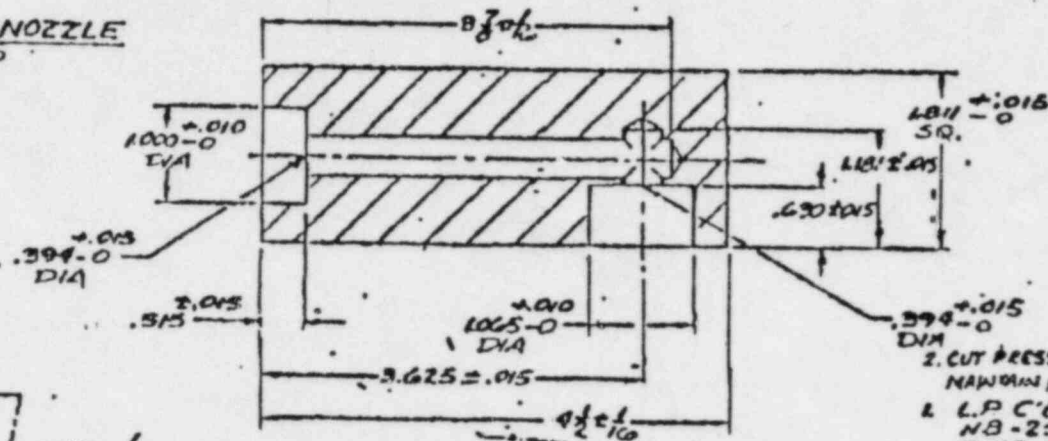
PRELIMINARY  
FOR INFORMATION ONLY

CONTRACT NO.		CE-KSB PUMP CO. INC.
REVISED BY		HEWINGTON, N.H. 07837
DATE		
APPROVED BY		
SCALE 1/1		DO NOT SCALE DIMS
CE-KSB PUMP TYPE 101		ALTERATION OF DISCHARGE NOZZLE PRESSURE TAP
REVISED BY		SC-8000-00900
DATE		
APPROVED BY		
SCALE 1/1		DO NOT SCALE DIMS

ENCLOSURE (2) TO  
V-CE-16870

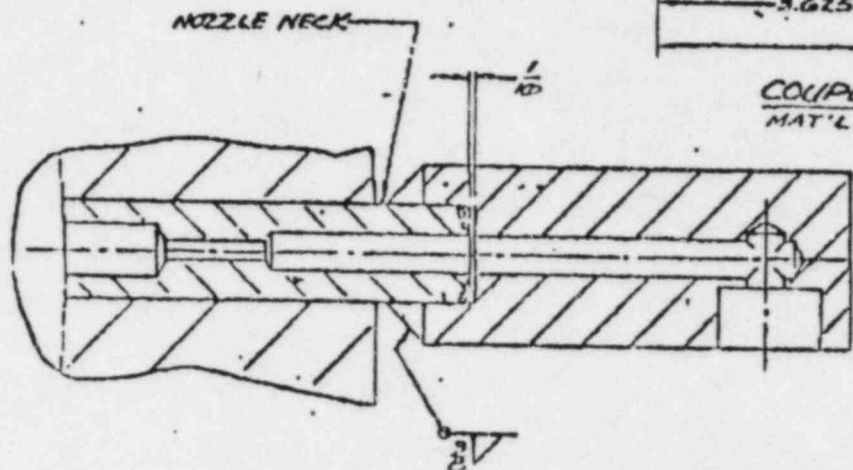


CUTOFF FOR SUCTION NOZZLE  
PRESSURE TAP



2. CUT PRESSURE TAP TO LENGTH REQUIRED TO  
MAINTAIN INTERFACE OF FIELD PIPINGS.  
3. L.P. C'BORE & MACHINED O.D. PER  
NB-2551 (3) OF THE ASME 3B PV.  
CODE 1974 EDITION, NO ADDENDA.

SC-8000-0099



INSTALLATION OF COUPLING  
TO NOZZLE NECK P/N 8000-214-002

PRELIMINARY  
FOR INFORMATION ONLY

DRAWING BY: [Signature]		CHECKED BY: [Signature]		DATE: 11-15-78	
SCALE: 1/16" = 1"		DO NOT SCALE DIMS.		CE-KSB PUMP CO. INC. NEWINGTON, N.H. 03891	
CE-KSB PUMP TYPE BCP		ALTERATION OF SUCTION NOZZLE PRESSURE TAP			
PART NO.:		SC-8000-0099		00	