May 12, 2008

**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Entergy Nuclear Vermont Yankee, LLC | ) | Docket No. 50-271-LR |
| and Entergy Nuclear Operations, Inc. | ) | ASLBP No. 06-849-03-LR |
| | ) | |
| (Vermont Yankee Nuclear Power Station) | ) | |

# EXHIBITS TO ENTERGY'S DIRECT TESTIMONY ON NEC CONTENTION 4 – FLOW-ACCELERATED CORROSION

## INCLUDES EXHIBITS E4-30 THROUGH E4-42

VOLUME 2

# Vermont Yankee

## Piping Flow Accelerated Corrosion (FAC)

## Inspection Program



# EPRI CHECWORKS

# WEAR RATE ANALYSIS RESULTS

**(CHECWORKS Version 1.0F Build 52)**

**Cycle 25 with Inspection Data up to RFO 25.**

**DRAFT** **Page 1 of 186**

JRH 9/28/06

Company Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 10:39:20
Plant: Vermont Yankee
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*******************************************************
*** FAC Database: Component Inspection Summary Report ***
*******************************************************

SELECTION CRITERIA:

Line Name: *
Drawing Name: *
Comp. Service Status: *



Line Name : 001-16"-FDW-01

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD01RD01 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 19 | 03-21-1998 |
| | | RFO 21 | 04-28-2001 |
| | | RFO 24 | 04-03-2004 |
| FD01EL01 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 19 | 03-21-1998 |
| | | RFO 21 | 04-28-2001 |
| | | RFO 24 | 04-03-2004 |
| FD01TE05 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 19 | 03-21-1998 |
| | | RFO 21 | 04-28-2001 |
| | | RFO 24 | 04-03-2004 |
| FD01EL02 | | RFO 14 | 09-01-1990 |
| | | RFO 19 | 03-21-1998 |
| FD01SP02 US | | RFO 14 | 09-01-1990 |
| | | RFO 19 | 03-21-1998 |
| FD01SP02 DS | | RFO 14 | 09-01-1990 |
| | | RFO 21 | 04-28-2001 |
| FD01EL03 | | RFO 14 | 09-01-1990 |
| | | RFO 21 | 04-28-2001 |
| FD01SP03 US | | RFO 14 | 09-01-1990 |
| | | RFO 21 | 04-28-2001 |
| FD01EL04 | | RFO 18 | 09-07-1996 |
| | | RFO 24 | 04-03-2004 |
| FD01SP04 US | | RFO 18 | 09-07-1996 |
| | | RFO 24 | 04-03-2004 |
| FD01SP05 DS | | RFO 13 | 02-12-1989 |

Line Name : 002-16"-FDW-02

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| OUTLET P-1-1B | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| FD02RD01 | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |
| FD02EL01 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |
| FD02TE01 | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |
| FD02EL02 | | RFO 15 | 03-07-1992 |
| | | RFO 20 | 10-30-1999 |
| FD02SP02 US | | RFO 15 | 03-07-1992 |
| | | RFO 20 | 10-30-1999 |
| FD02SP02 DS | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD02EL03 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD02SP03 US | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD02SP04 DS | | RFO 18 | 09-07-1996 |
| FD02EL05 | | RFO 18 | 09-07-1996 |
| FD02SP05 US | | RFO 18 | 09-07-1996 |
| FD02SP05 DS | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |

Line Name : 003-16"-FDW-03

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| OUTLET P-1-1C | | RFO 13 | 02-12-1989 |

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| FD03RD01 | | RFO 13 | 02-12-1989 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| FD03EL01 | | RFO 13 | 02-12-1989 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| FD03TE01 | | RFO 13 | 02-12-1989 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| FD03SP01 | | RFO 24 | 04-03-2004 |
| FD03EL02 | | RFO 17 | 03-18-1995 |
| FD03SP02 US | | RFO 17 | 03-18-1995 |
| FD03SP02 DS | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| FD03EL03 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 21 | 04-28-2001 |
| FD03SP03 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 21 | 04-28-2001 |
| FD03EL04 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| | | RFO 21 | 04-28-2001 |
| FD03SP04 US | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| | | RFO 21 | 04-28-2001 |
| FD03SP04 DS | | RFO 17 | 03-18-1995 |
| FD03EL05 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD03SP05 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD03EL06 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD03SP06 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD03EL07 | | RFO 20 | 10-30-1999 |
| FD03SP07 US | | RFO 20 | 10-30-1999 |
| FD03SP07 DS | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |

Line Name : 004-24"-FDW-01

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD01TE01 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD01SP06 DS | | RFO 13 | 02-12-1989 |
| FD01SP06 US | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD01TE02 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD01SP07 US | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD01SP10 DS | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD01TE04 | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD01EL08 | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| FD01SP11 | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 23 | 10-06-2002 |

Line Name : 005-18"-FDW-07

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD07RD01 | | RFO 13 | 02-12-1989 |
| FD07EL01 | | RFO 13 | 02-12-1989 |
| | | RFO 19 | 03-21-1998 |
| | | RFO 20 | 10-30-1999 |
| FD07SP01 US | | RFO 13 | 02-12-1989 |
| | | RFO 19 | 03-21-1998 |
| | | RFO 20 | 10-30-1999 |
| FD07SP01 DS | | RFO 18 | 09-07-1996 |
| FD07EL02 | | RFO 18 | 09-07-1996 |
| FD07SP02 US | | RFO 18 | 09-07-1996 |
| FD07SP02 DS | | RFO 24 | 04-03-2004 |
| FD07EL03 | | RFO 24 | 04-03-2004 |
| FD07RD02 | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| FD07RD03 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |
| FD07SP03 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |
| FD07EL04 | | RFO 14 | 09-01-1990 |

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| | | RFO 19 | 03-21-1998 |
| FD07SP04 | | RFO 14 | 09-01-1990 |
| | | RFO 19 | 03-21-1998 |
| FD07EL06 | | RFO 19 | 03-21-1998 |
| FD07SP07 | | RFO 19 | 03-21-1998 |
| FD07EL07 | | RFO 19 | 03-21-1998 |
| FD07SP08 US | | RFO 19 | 03-21-1998 |
| FD07SP09 | | RFO 17 | 03-18-1995 |
| FD07EL09 | | RFO 17 | 03-18-1995 |
| FD07SP10 US | | RFO 17 | 03-18-1995 |

Line Name : 007-18"-FDW-12

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD12SP07 | | RFO 25 | 10-08-2005 |
| FD12EL06 | | RFO 25 | 10-08-2005 |
| FD12SP08 | | RFO 25 | 10-08-2005 |
| FD12SP10 DS | | RFO 19 | 03-21-1998 |
| FD12EL08 | | RFO 19 | 03-21-1998 |
| FD12EL09 | | RFO 19 | 03-21-1998 |

Line Name : 008-16"-FDW-14

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD14SP02 | | RFO 14 | 09-01-1990 |
| FD14EL03 | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 25 | 10-08-2005 |
| FD14SP03 US | | RFO 14 | 09-01-1990 |
| | | RFO 15 | 03-07-1992 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 25 | 10-08-2005 |
| FD14SP06 US | | RFO 13 | 02-12-1989 |
| FD14SP06 DS | | RFO 23 | 10-06-2002 |
| FD14EL05 | | RFO 23 | 10-06-2002 |
| FD14TE02 | | RFO 23 | 10-06-2002 |
| FD14SP07 US | | RFO 23 | 10-06-2002 |

Line Name : 008-18"-FDW-14

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD14TE01 | | RFO 14 | 09-01-1990 |
| FD14RD01 | | RFO 14 | 09-01-1990 |

Line Name : 009-16"-FDW-14

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD14SP08 DS | | RFO 24 | 04-03-2004 |
| FD14EL07 | | RFO 24 | 04-03-2004 |

Line Name : 009-16"-FDW-16

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD16SP05 | | RFO 19 | 03-21-1998 |
| FD16EL01 | | RFO 19 | 03-21-1998 |

Line Name : 010-10"-FDW-19

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD19SP04 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |

Line Name : 010-10"-FDW-21

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD21SP01 US | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |

Line Name : 010-16"-FDW-19

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD19SP03 DS | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |

| | | | |
|---|---|---|---|
| | | RFO 24 | 04-03-2004 |
| FD19TE01 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |
| FD19RD01 | | RFO 14 | 09-01-1990 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 24 | 04-03-2004 |

Line Name : 011-18"-FDW-08

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD08RD01 | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 23 | 10-06-2002 |
| FD08EL01 | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 23 | 10-06-2002 |
| FD08SP01 US | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 23 | 10-06-2002 |
| FD08RD02 | | RFO 17 | 03-18-1995 |
| FD08VA02 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| FD08RD03 | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 25 | 10-08-2005 |
| FD08SP02 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 18 | 09-07-1996 |
| | | RFO 20 | 10-30-1999 |
| | | RFO 25 | 10-08-2005 |
| FD08EL03 | | RFO 13 | 02-12-1989 |
| FD08SP03 US | | RFO 13 | 02-12-1989 |
| FD08EL04 | | RFO 20 | 10-30-1999 |
| FD08SP04 | | RFO 20 | 10-30-1999 |
| FD08EL05 | | RFO 20 | 10-30-1999 |
| FD08SP05 US | | RFO 20 | 10-30-1999 |

Line Name : 012-18"-FDW-08

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD08EL06 | | RFO 19 | 03-21-1998 |
| FD08SP06 US | | RFO 19 | 03-21-1998 |

Line Name : 013-18"-FDW-13

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD13EL05 | | RFO 18 | 09-07-1996 |
| FD13SP06 | | RFO 18 | 09-07-1996 |

Line Name : 014-16"-FDW-15

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD15SP02 | | RFO 13 | 02-12-1989 |
| FD15EL03 | | RFO 13 | 02-12-1989 |
| FD15SP09 | | RFO 13 | 02-12-1989 |
| FD15EL04 | | RFO 13 | 02-12-1989 |
| | | RFO 19 | 03-21-1998 |
| FD15SP10 | | RFO 13 | 02-12-1989 |
| | | RFO 19 | 03-21-1998 |
| FD15EL05 | | RFO 19 | 03-21-1998 |
| FD15SP03 | | RFO 19 | 03-21-1998 |

Line Name : 014-18"-FDW-15

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD15TE01 | | RFO 13 | 02-12-1989 |
| FD15RD01 | | RFO 13 | 02-12-1989 |

Line Name : 015-16"-FDW-15

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD15EL07 | | RFO 19 | 03-21-1998 |
| FD15SP08 US | | RFO 19 | 03-21-1998 |

Line Name : 016-10"-FDW-18

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD18SP04 US | | RFO 13 | 02-12-1989 |

| | | | |
|---|---|---|---|
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |

Line Name : 016-10"-FDW-20

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD20RD01 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |
| FD20SP01 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |

Line Name : 016-16"-FDW-18

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD18SP01 DS | | RFO 23 | 10-06-2002 |
| FD18EL01 | | RFO 23 | 10-06-2002 |
| FD18SP02 US | | RFO 23 | 10-06-2002 |
| FD18TE01 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| | | RFO 21 | 04-28-2001 |

Line Name : 017-04"-FDW-04

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD04RD01 | | RFO 19 | 03-21-1998 |
| | | RFO 20 | 10-30-1999 |

Line Name : 018-04"-FDW-05

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD05SP01 | | RFO 13 | 02-12-1989 |
| FD05EL01 | | RFO 13 | 02-12-1989 |
| FD05SP02 US | | RFO 13 | 02-12-1989 |
| FD05SP03 | | RFO 15 | 03-07-1992 |
| | | RFO 18 | 09-07-1996 |
| FD05VA02 | | RFO 15 | 03-07-1992 |
| FD05SP04 | | RFO 15 | 03-07-1992 |
| FD05EL02 | | RFO 15 | 03-07-1992 |
| | | RFO 18 | 09-07-1996 |
| FD05SP05 US | | RFO 15 | 03-07-1992 |
| | | RFO 18 | 09-07-1996 |
| FD05RD01 | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| FD05TE01 | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| INLET COND A | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| FD05CP01 | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |



Line Name : 019-04"-FDW-06

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD06SP01 DS | | RFO 13 | 02-12-1989 |
| FD06EL01 | | RFO 13 | 02-12-1989 |
| FD06SP02 US | | RFO 13 | 02-12-1989 |
| FD06RD01 | | RFO 20 | 10-30-1999 |

Line Name : 020-06"-FDW-09

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD09SP06 | | RFO 15 | 03-07-1992 |

Line Name : 021-10"-FDW-11

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD11SP12 DS | | RFO 13 | 02-12-1989 |
| FD11SP13 DS | | RFO 14 | 09-01-1990 |

Line Name : 022-08"-FDW-22A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD22SP02 DS | | RFO 13 | 02-12-1989 |
| FD22EL01 | | RFO 13 | 02-12-1989 |
| FD22SP03 US | | RFO 13 | 02-12-1989 |
| FD22SP05 | | RFO 15 | 03-07-1992 |
| FD22EL04 | | RFO 15 | 03-07-1992 |

| | | | |
|---|---|---|---|
| FD22SP06 | | RFO 15 | 03-07-1992 |
| FD22EL05 | | RFO 15 | 03-07-1992 |

Line Name : 023-05"-FDW ORIFICE R063-3C

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD22OR06A | | RFO 15 | 03-07-1992 |
| FD22OR06 | | RFO 15 | 03-07-1992 |
| FD22OR06B | | RFO 15 | 03-07-1992 |

Line Name : 023-08"-FDW-22B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD22SP13 | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |
| FD22TE04 | | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| | | RFO 17 | 03-18-1995 |

Line Name : 023-10"-FDW-23B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| FD23CP02 | | RFO 15 | 03-07-1992 |
| FD23TE04 | | RFO 15 | 03-07-1992 |

Line Name : 032-20"-C-27

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD27EL12 | | RFO 21 | 04-28-2001 |
| CD27EL13 | | RFO 21 | 04-28-2001 |

Line Name : 034-20"-C-29

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD29EL02 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| CD29SP02 US | | RFO 13 | 02-12-1989 |
| CD29EL03 | | RFO 13 | 02-12-1989 |
| CD29SP03 US | | RFO 13 | 02-12-1989 |
| CD29SP03 DS | | RFO 13 | 02-12-1989 |

Line Name : 035-20"-C-30

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD30EL02 | | RFO 21 | 04-28-2001 |
| CD30EL03 | | RFO 21 | 04-28-2001 |
| CD30SP01 US | | RFO 21 | 04-28-2001 |

Line Name : 036-24"-C-30

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD30SP03DS | | RFO 24 | 04-03-2004 |
| CD30TE02 | | RFO 24 | 04-03-2004 |
| CD30SP04 US | | RFO 24 | 04-03-2004 |
| CD30SP04 DS | | RFO 13 | 02-12-1989 |
| CD30TE03 | | RFO 13 | 02-12-1989 |
| CD30SP05 US | | RFO 13 | 02-12-1989 |
| CD30SP06 | | RFO 18 | 09-07-1996 |
| CD30EL06 | | RFO 18 | 09-07-1996 |
| CD30SP07 | | RFO 18 | 09-07-1996 |
| CD30TE04 | | RFO 18 | 09-07-1996 |
| CD30RD02 | | RFO 18 | 09-07-1996 |

Line Name : 037-20"-C-30

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD30SP08 US | | RFO 18 | 09-07-1996 |
| CD30FE01A | | RFO 13 | 02-12-1989 |
| | | RFO 25 | 10-08-2005 |
| CD30EL11 | | RFO 13 | 02-12-1989 |
| | | RFO 25 | 10-08-2005 |
| CD30SP12 | | RFO 13 | 02-12-1989 |
| | | RFO 25 | 10-08-2005 |
| CD30EL12 | | RFO 13 | 02-12-1989 |

Line Name : 038-16"-C-31

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD31EL06 | | RFO 18 | 09-07-1996 |

Line Name : 038-20"-C-31

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD31FE01A | | RFO 25 | 10-08-2005 |
| CD31EL04 | | RFO 25 | 10-08-2005 |
| CD31SP04 | | RFO 25 | 10-08-2005 |
| CD31RD01 | | RFO 18 | 09-07-1996 |

Line Name : 039-20"-C-32

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CD30SP05 | | RFO 24 | 04-03-2004 |
| CD32SP04 | | RFO 24 | 04-03-2004 |
| CD32EL02 | | RFO 24 | 04-03-2004 |
| CD32FE01 | | RFO 21 | 04-28-2001 |
| CD32FE01A | | RFO 21 | 04-28-2001 |
| CD32EL04 | | RFO 21 | 04-28-2001 |
| CD32SP02 | | RFO 21 | 04-28-2001 |
| CD32EL05 | | RFO 21 | 04-28-2001 |

Line Name : 043-10"-HD-18A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD18RD02 | | RFO 16 | 08-28-1993 |
| HD18SP02 | | RFO 16 | 08-28-1993 |

Line Name : 043-10"-HD-22A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD1ARD03 | | RFO 15 | 03-07-1992 |
| HD1ASP14 | | RFO 15 | 03-07-1992 |
| INLET E-2-1A | | RFO 15 | 03-07-1992 |

Line Name : 044-10"-HD-03A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD3AEL01 | | RFO 23 | 10-06-2002 |
| HD3ASP03 US | | RFO 23 | 10-06-2002 |

Line Name : 044-16"-HD-19A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD19RD02 | | RFO 16 | 08-28-1993 |
| HD19SP06 | | RFO 16 | 08-28-1993 |

Line Name : 044-16"-HD-23A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD3ARD03 | | RFO 14 | 09-01-1990 |
| (replacement) | HD3ASP06 | RFO 14 | 09-01-1990 |

Line Name : 045-14"-HD-05A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD5AVA01 | | RFO 14 | 09-01-1990 |

Line Name : 045-14"-HD-06A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD6AVA01 | | RFO 14 | 09-01-1990 |

Line Name : 045-18"-HD-20A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD20VA01B | | RFO 14 | 09-01-1990 |
| HD20RD01 | | RFO 14 | 09-01-1990 |
| HD20SP01 | | RFO 14 | 09-01-1990 |

Line Name : 045-20"-HD-24A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | HD5ARD03 | RFO 14 | 09-01-1990 |
| (replacement) | HD5ASP07 | RFO 14 | 09-01-1990 |

Line Name : 046-16"-HD-07A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD7AEL04 | | RFO 23 | 10-06-2002 |
| HD7ASP04 | | RFO 23 | 10-06-2002 |
| HD7AVA02 | | RFO 14 | 09-01-1990 |

Line Name : 046-20"-HD-25A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD25VA02B | | RFO 14 | 09-01-1990 |
| HD25RD01 | | RFO 14 | 09-01-1990 |
| HD25SP01 | | RFO 14 | 09-01-1990 |

Line Name : 050-06"-HD-01B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD1BEL03 | | RFO 23 | 10-06-2002 |
| HD1BSP05 | | RFO 23 | 10-06-2002 |

Line Name : 050-10"-HD-18B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD18RD05 | | RFO 16 | 08-28-1993 |
| HD18SP05 | | RFO 16 | 08-28-1993 |

Line Name : 050-10"-HD-22B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD1BRD03 | | RFO 16 | 08-28-1993 |
| HD1BSP10 | | RFO 16 | 08-28-1993 |

Line Name : 052-14"-HD-05B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD5BSP01 | | RFO 23 | 10-06-2002 |
| HD5BSP06 DS | | RFO 23 | 10-06-2002 |
| HD5BTE01 | | RFO 23 | 10-06-2002 |
| HD5BSP07 | | RFO 23 | 10-06-2002 |

Line Name : 057-06"-HD-11A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| OUTLET MS-1-1A | | RFO 14 | 09-01-1990 |
| HD11RD01A | | RFO 14 | 09-01-1990 |
| HD11SP01 | | RFO 14 | 09-01-1990 |
| HD11EL01 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| HD11SP03 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| HD11EL02 | | RFO 13 | 02-12-1989 |
| HD11SP05 DS | | RFO 13 | 02-12-1989 |
| HD11EL04 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| HD11EL05 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| HD11EL06 | | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| HD11SP06A | | RFO 13 | 02-12-1989 |
| HD11TE01 | | RFO 13 | 02-12-1989 |
| HD11SP06B | | RFO 13 | 02-12-1989 |

Line Name : 057-06"-HD-13A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD13EL01 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| HD13SP02 DS | | RFO 14 | 09-01-1990 |
| HD13RD01 | | RFO 14 | 09-01-1990 |
| | | RFO 17 | 03-18-1995 |

| | | | |
|---|---|---|---|
| HD13SP10 | | RFO 17 | 03-18-1995 |
| (replacement) | HD13SP10 | RFO 14 | 09-01-1990 |

Line Name : 057-06"-HD-16A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | HD16SP01 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16RD01 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16TE01 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP02 DS | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16EL01 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP03 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |

Line Name : 058-06"-HD-11B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD11RD03A | | RFO 15 | 03-07-1992 |
| HD11SP07 | | RFO 15 | 03-07-1992 |
| HD11RD03 | | RFO 15 | 03-07-1992 |

Line Name : 058-06"-HD-12B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD12EL06 | | RFO 13 | 02-12-1989 |
| HD12SP07 US | | RFO 13 | 02-12-1989 |

Line Name : 058-06"-HD-13B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD13SP04 DS | | RFO 13 | 02-12-1989 |
| HD13SP05 DS | | RFO 14 | 09-01-1990 |
| HD13RD02 | | RFO 14 | 09-01-1990 |
| (replacement) | HD13SP11 | RFO 14 | 09-01-1990 |

Line Name : 058-06"-HD-16B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | HD16SP04 | RFO 14 | 09-01-1990 |
| (replacement) | HD16RD02 | RFO 14 | 09-01-1990 |
| (replacement) | HD16TE02 | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP05 US | RFO 14 | 09-01-1990 |
| (replacement) | HD16EL02 | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP06 | RFO 14 | 09-01-1990 |

Line Name : 059-06"-HD-13C

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD13SP07 DS | | RFO 14 | 09-01-1990 |
| HD13RD03 | | RFO 14 | 09-01-1990 |
| (replacement) | HD13SP12 | RFO 14 | 09-01-1990 |

Line Name : 059-06"-HD-16C

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | HD16SP07 | RFO 14 | 09-01-1990 |
| (replacement) | HD16RD03 | RFO 14 | 09-01-1990 |
| (replacement) | HD16TE03 | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP08 US | RFO 14 | 09-01-1990 |
| (replacement) | HD16EL03 | RFO 13 | 02-12-1989 |
| | | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP09 | RFO 14 | 09-01-1990 |

Line Name : 060-06"-HD-12D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD12EL20 | | RFO 23 | 10-06-2002 |
| HD12SP20 | | RFO 23 | 10-06-2002 |
| | | RFO 17 | 03-18-1995 |
| HD12EL22 | | RFO 23 | 10-06-2002 |
| | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| HD12SP21 US | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |

Line Name : 060-06"-HD-13D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD13SP09 DS | | RFO 14 | 09-01-1990 |
| HD13RD04 | | RFO 14 | 09-01-1990 |
| (replacement) | HD13SP13 | RFO 14 | 09-01-1990 |

Line Name : 060-06"-HD-16D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | HD16SP10 | RFO 14 | 09-01-1990 |
| (replacement) | HD16RD04 | RFO 14 | 09-01-1990 |
| (replacement) | HD16TE04 | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP11 US | RFO 14 | 09-01-1990 |
| (replacement) | HD16EL04 | RFO 14 | 09-01-1990 |
| (replacement) | HD16SP12 | RFO 14 | 09-01-1990 |

Line Name : 061-06"-HD-12A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD12EL03 | | RFO 13 | 02-12-1989 |
| HD12SP04 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| HD12EL04 | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| HD12SP04A | | RFO 13 | 02-12-1989 |
| | | RFO 17 | 03-18-1995 |
| HD12VA01A | | RFO 17 | 03-18-1995 |

Line Name : 061-14"-HD-15B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD15RD03 | | RFO 14 | 09-01-1990 |
| HD15RD04 | | RFO 14 | 09-01-1990 |
| HD15TE02 | | RFO 14 | 09-01-1990 |
| HD15SP04 US | | RFO 14 | 09-01-1990 |
| HD15EL06 | | RFO 14 | 09-01-1990 |
| HD15SP05 | | RFO 14 | 09-01-1990 |

Line Name : 062-06"-HD-12D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| HD12SP23 | | RFO 17 | 03-18-1995 |
| HD12EL25 | | RFO 17 | 03-18-1995 |
| HD12VA04A | | RFO 17 | 03-18-1995 |

Line Name : 063-12"-ES-01A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| ES1ASP01 US | | RFO 18 | 09-07-1996 |
| | | RFO 24 | 04-03-2004 |
| ES1AEL01 | | RFO 18 | 09-07-1996 |
| ES1AEL06 | | RFO 13 | 02-12-1989 |
| ES1ASP08 DS | | RFO 15 | 03-07-1992 |
| ES1AEL08 | | RFO 15 | 03-07-1992 |
| | | RFO 19 | 03-21-1998 |
| ES1ASP09 | | RFO 15 | 03-07-1992 |
| | | RFO 19 | 03-21-1998 |
| ES1ARD01 | | RFO 15 | 03-07-1992 |
| ES1ASP10 | | RFO 15 | 03-07-1992 |

Line Name : 064-12"-ES-01B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| ES1BEL01 | | RFO 13 | 02-12-1989 |
| | | RFO 18 | 09-07-1996 |
| ES1BEL02 | | RFO 13 | 02-12-1989 |
| | | RFO 19 | 03-21-1998 |

Line Name : 065-10"-ES-02A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | ES2ASP01 | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| ES2ASP09 DS | | RFO 15 | 03-07-1992 |
| ES2AEL06 | | RFO 15 | 03-07-1992 |
| ES2ASP10 | | RFO 15 | 03-07-1992 |

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Line Name : 066-10"-ES-02B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | ES2BSP01 | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |

Line Name : 068-20"-ES-03B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| ES3BEL05 | | RFO 13 | 02-12-1989 |
| ES3BSP08 | | RFO 13 | 02-12-1989 |
| ES3BEL06 | | RFO 13 | 02-12-1989 |
| ES3BSP09 US | | RFO 13 | 02-12-1989 |

Line Name : 070-20"-ES-04B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | ES4BSP02 | RFO 15 | 03-07-1992 |
| ES4BSP11 | | RFO 15 | 03-07-1992 |
| ES4BEL08 | | RFO 15 | 03-07-1992 |
| ES4BSP12 | | RFO 15 | 03-07-1992 |
| ES4BSP13 | | RFO 15 | 03-07-1992 |
| ES4BEL09 | | RFO 15 | 03-07-1992 |
| ES4BSP14 | | RFO 15 | 03-07-1992 |

Line Name : 070-30"-ES-04B

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| ES4BTE02 | | RFO 15 | 03-07-1992 |

Line Name : 071-26"-ES-05D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | ES5DSP01 US | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |
| (replacement) | ES5DSP01 DS | RFO 15 | 03-07-1992 |
| | | RFO 16 | 08-28-1993 |

Line Name : 072-26"-ES-05E

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | ES5ESP01 US | RFO 15 | 03-07-1992 |
| (replacement) | INLET E-5-1B | RFO 13 | 02-12-1989 |

Line Name : 072-26"-ES-05F

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| (replacement) | INLET E-5-1B | RFO 13 | 02-12-1989 |

Line Name : 073-12"-ES-06

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| ES06EL01 | | RFO 16 | 08-28-1993 |
| ES06SP01 US | | RFO 16 | 08-28-1993 |
| ES06TE01 | | RFO 16 | 08-28-1993 |
| ES06SP03 | | RFO 16 | 08-28-1993 |
| ES06EL03 | | RFO 16 | 08-28-1993 |
| ES06SP04 US | | RFO 16 | 08-28-1993 |
| ES06EL06 | | RFO 15 | 03-07-1992 |
| ES06SP08 US | | RFO 15 | 03-07-1992 |
| ES06SP08 DS | | RFO 15 | 03-07-1992 |
| ES06EL07 | | RFO 15 | 03-07-1992 |
| ES06SP09 | | RFO 15 | 03-07-1992 |
| ES06EL08 | | RFO 15 | 03-07-1992 |

Line Name : 074-18"-MS-07A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| MS7ASP09 | | RFO 16 | 08-28-1993 |
| MS7AEL06 | | RFO 16 | 08-28-1993 |

Line Name : 080-18"-MS-01D

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|

| | | | |
|---|---|---|---|
| MS1DSP12 DS | | RFO 25 | 10-08-2005 |
| MS1DEL07 | | RFO 25 | 10-08-2005 |

Line Name : 086-04"-CUW-55

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CU55SP03 DS | | RFO 16 | 08-28-1993 |

Line Name : 086-04"-RCIC-08A

| Component Name | Previous Name | Period Name | Period Start Date |
|---|---|---|---|
| CU55SP05 DS | | RFO 16 | 08-28-1993 |
| CU55TE01 | | RFO 16 | 08-28-1993 |
| CU55SP04 US | | RFO 16 | 08-28-1993 |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 07-SEP-2006 Time: 09:15:46
Plant: Vermont Yankee
Unit:
DB Name: VY

CHECWORKS FAC Version 1.0F (Build 52)

DRAFT

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*** FAC Database: Plant Period Report ***
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| Period Name | Period Start Date | Period End Date | Period Type | Water Treatment Name | Power Level (%) | Operating Hours | Period Notes |
|---|---|---|---|---|---|---|---|
| Cycle 1<br>45.09 EFP Days | 09-20-1972 | 01-17-1973 | Operating | Normal 30 ppb | 100.00 | 1082.2 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 1 | 01-18-1973 | 02-28-1973 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 1A<br>128.59 EFP Days | 03-01-1973 | 09-29-1973 | Operating | Normal 30 ppb | 100.00 | 3086.2 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 1A | 09-30-1973 | 11-17-1973 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 2<br>225.85 EFP Days | 11-18-1973 | 10-12-1974 | Operating | Normal 30 ppb | 100.00 | 5420.4 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 2 | 10-13-1974 | 12-11-1974 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 3<br>193.52 EFP Days | 12-12-1974 | 08-07-1975 | Operating | Normal 30 ppb | 100.00 | 4644.5 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 3 | 08-08-1975 | 08-24-1975 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 3A<br>250.34 EFP Days | 08-25-1975 | 06-19-1976 | Operating | Normal 30 ppb | 100.00 | 6008.2 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 3A | 06-20-1976 | 08-06-1976 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 4<br>343.07 EFP Days | 08-07-1976 | 08-20-1977 | Operating | Normal 30 ppb | 100.00 | 8233.7 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 4 | 08-21-1977 | 10-04-1977 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 5<br>277.09 EFP Days | 10-05-1977 | 09-16-1978 | Operating | Normal 30 ppb | 100.00 | 6650.2 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 5 | 09-17-1978 | 10-09-1978 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 6<br>137.09 EFP Days | 10-10-1978 | 03-17-1979 | Operating | Normal 30 ppb | 100.00 | 3290.2 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 6 | 03-18-1979 | 04-02-1979 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 6A<br>155.61 EFP Days | 04-03-1979 | 09-22-1979 | Operating | Normal 30 ppb | 100.00 | 3734.6 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 6A | 09-23-1979 | 11-02-1979 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 7<br>298.91 EFP Days | 11-03-1979 | 09-27-1980 | Operating | Normal 30 ppb | 100.00 | 7173.8 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 7 | 09-28-1980 | 12-22-1980 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 8<br>275.61 EFP Days | 12-23-1980 | 10-16-1981 | Operating | Normal 30 ppb | 100.00 | 6614.6 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 8 | 10-17-1981 | 11-30-1981 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 9<br>416.39 EFP Days | 12-01-1981 | 03-05-1983 | Operating | Normal 30 ppb | 100.00 | 9993.4 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 9 | 03-06-1983 | 06-16-1983 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 10<br>341.71 EFP Days | 06-17-1983 | 06-15-1984 | Operating | Normal 30 ppb | 100.00 | 8201.0 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 10 | 06-16-1984 | 08-05-1984 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 11<br>366.61 EFP Days | 08-06-1984 | 09-20-1985 | Operating | Normal 30 ppb | 100.00 | 8798.6 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 11 | 09-21-1985 | 07-01-1986 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 12<br>379.87 EFP Days | 07-02-1986 | 08-07-1987 | Operating | Normal 30 ppb | 100.00 | 9116.9 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 12 | 08-08-1987 | 10-01-1987 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 13<br>455.31 EFP Days | 10-02-1987 | 02-11-1989 | Operating | Normal 30 ppb | 100.00 | 10927.4 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 13 | 02-12-1989 | 04-07-1989 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 14<br>484.94 EFP Days | 04-08-1989 | 08-31-1990 | Operating | Normal 30 ppb | 100.00 | 11638.6 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 14 | 09-01-1990 | 10-13-1990 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 15<br>470.70 EFP Days | 10-14-1990 | 03-06-1992 | Operating | Normal 30 ppb | 100.00 | 11296.8 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 15 | 03-07-1992 | 04-18-1992 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 16<br>473.31 EFP Days | 04-19-1992 | 08-27-1993 | Operating | Normal 30 ppb | 100.00 | 11359.4 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 16 | 08-28-1993 | 10-23-1993 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 17<br>479.66 EFP Days | 10-24-1993 | 03-17-1995 | Operating | 35 ppb | 100.00 | 11511.8 | Memo VY96-035.RPG Dated 5/2/96 |
| RFO 17 | 03-18-1995 | 05-01-1995 | Maintenance | ---- | ---- | ---- | Memo VY96-035.RPG Dated 5/2/96 |
| Cycle 18 | 05-02-1995 | 09-06-1996 | Operating | 45 ppb | 100.00 | 11570.0 | Operating Hours taken from "Nu |
| RFO 18 | 09-07-1996 | 10-31-1996 | Maintenance | ---- | ---- | ---- | |
| Cycle 19 | 11-01-1996 | 03-20-1998 | Operating | Normal 30 ppb | 100.00 | 11387.8 | Operating hours taken from VYI |
| RFO 19 | 03-21-1998 | 05-31-1998 | Maintenance | ---- | ---- | ---- | |
| Cycle 20 | 06-01-1998 | 10-29-1999 | Operating | 35 ppb | 100.00 | 11878.2 | Operating hours taken from VYI |
| RFO 20 | 10-30-1999 | 12-03-1999 | Maintenance | ---- | ---- | ---- | |
| CYCLE 21 | 12-04-1999 | 04-27-2001 | Operating | 35 ppb | 100.00 | 12000.0 | HRsestimated from VYAPF 0145.0 |
| RFO 21 | 04-28-2001 | 05-18-2001 | Maintenance | ---- | ---- | ---- | |
| CYCLE22 | 05-19-2001 | 05-11-2002 | Operating | Normal 30 ppb | 100.00 | 8300.0 | Actual run 22A VYAPF 0145..02 |
| RFO22A | 05-12-2002 | 05-20-2002 | Maintenance | ---- | ---- | ---- | |
| CYCLE 22B | 05-21-2002 | 10-05-2002 | Operating | 35 ppb | 100.00 | 3200.0 | HRS estimated from VYAPF 0145. |
| RFO 23 | 10-06-2002 | 10-25-2002 | Maintenance | ---- | ---- | ---- | |
| CYCLE 23 | 11-01-2002 | 04-02-2004 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 24 | 04-03-2004 | 05-03-2004 | Maintenance | ---- | ---- | ---- | |
| CYCLE 24 | 05-04-2004 | 10-07-2005 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 25 | 10-08-2005 | 11-02-2005 | Maintenance | ---- | ---- | ---- | |
| CYCLE 25 | 11-03-2005 | 03-09-2007 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 26 | 03-10-2007 | 04-04-2007 | Maintenance | ---- | ---- | ---- | |
| CYCLE 26 | 04-05-2007 | 10-24-2008 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 27 | 10-25-2008 | 11-19-2008 | Maintenance | ---- | ---- | ---- | |
| CYCLE 27 | 11-20-2008 | 03-19-2010 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 28 | 03-20-2010 | 04-14-2010 | Maintenance | ---- | ---- | ---- | |
| CYCLE 28 | 04-15-2010 | 10-07-2011 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |
| RFO 29 | 10-08-2011 | 11-02-2011 | Maintenance | ---- | ---- | ---- | |
| CYCLE 29 | 11-03-2011 | 04-03-2013 | Operating | 35ppb NM-HWC | 100.00 | 11500.0 | |

14

Company: Vermont Yankee Nuclear Power Corporation Report Date: 16-OCT-2006 Time: 15:01:36
Plant: Vermont Yankee
Unit:
DB Name: VY

CHECWORKS FAC Version 1.0F (Build 52)

*** FAC Database: Steam Cycle Report ***

| Description | Flow Rate (Mlbm/hr) | Quality (%) | Enthalpy (Btu/lb) | Temp. (F) | Pressure (psia) | Vent Rate (%) |
|---|---|---|---|---|---|---|
| ==>Power Level (%): 100.00 | | | | | | |
| Feed Water Heater 1 | ---- | ---- | ---- | 373.10 | ---- | 0.50 |
| Feed Water Heater 2 | ---- | ---- | ---- | 327.70 | ---- | 0.50 |
| Feed Water Heater 3 | ---- | ---- | ---- | 294.70 | ---- | 0.50 |
| Feed Water Heater 4 | ---- | ---- | ---- | 229.00 | ---- | 0.20 |
| Feed Water Heater 5 | ---- | ---- | ---- | 163.10 | ---- | 0.16 |
| Moisture Separator 1 | 0.7124 | 0.000 | 352.900 | 0.00 | 193.40 | ---- |
| HP Extraction Steam Line1 | 0.3853 | 0.000 | 1094.900 | 0.00 | 203.40 | ---- |
| LP Extraction Steam Line1 | 0.1545 | 0.000 | 1157.200 | 0.00 | 112.80 | ---- |
| LP Extraction Steam Line2 | 0.3766 | 0.000 | 1114.500 | 0.00 | 70.30 | ---- |
| LP Extraction Steam Line3 | 0.3714 | 0.000 | 993.600 | 0.00 | 23.60 | ---- |
| LP Extraction Steam Line4 | 0.3265 | 0.000 | 722.000 | 0.00 | 6.05 | ---- |

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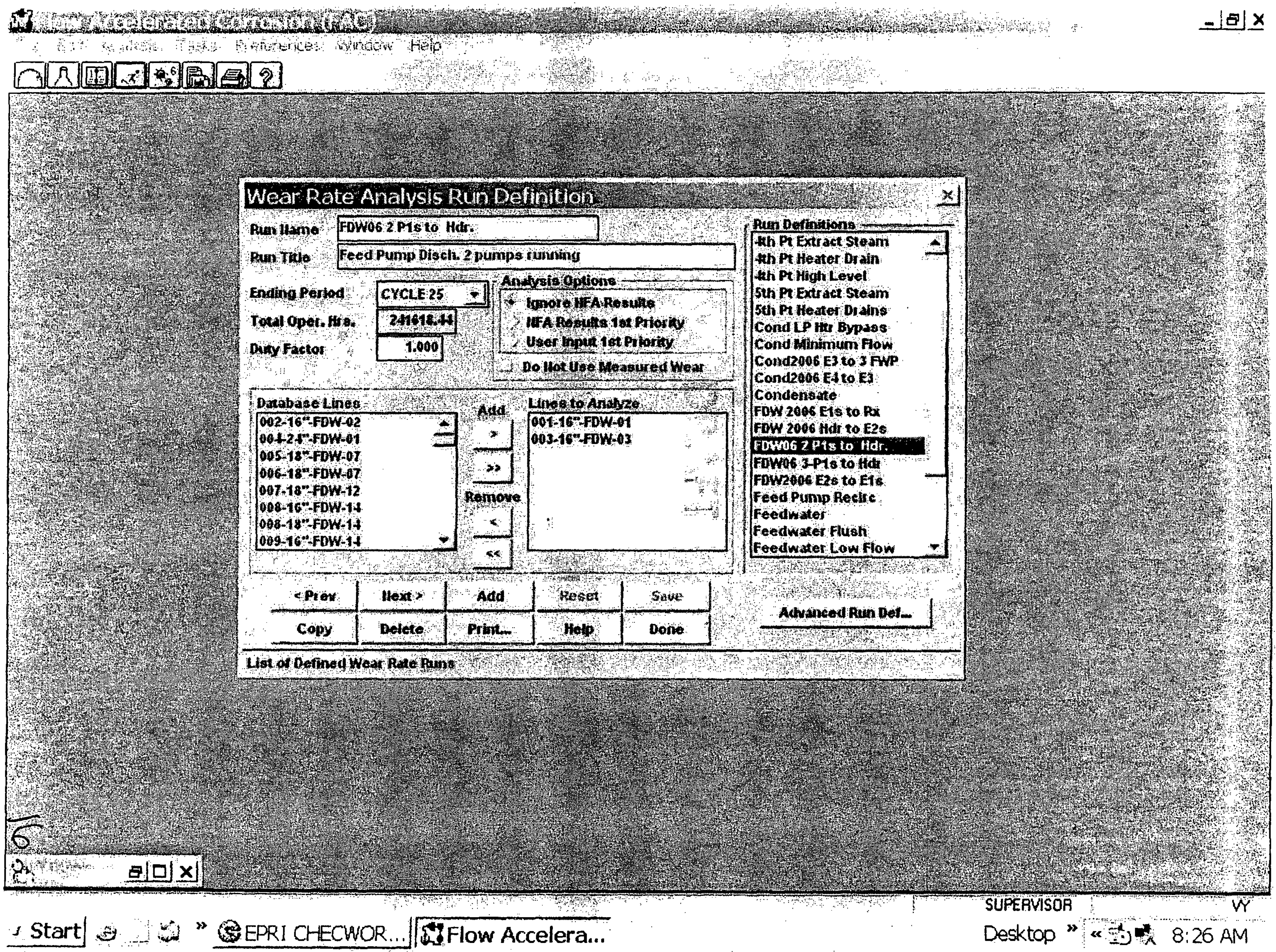
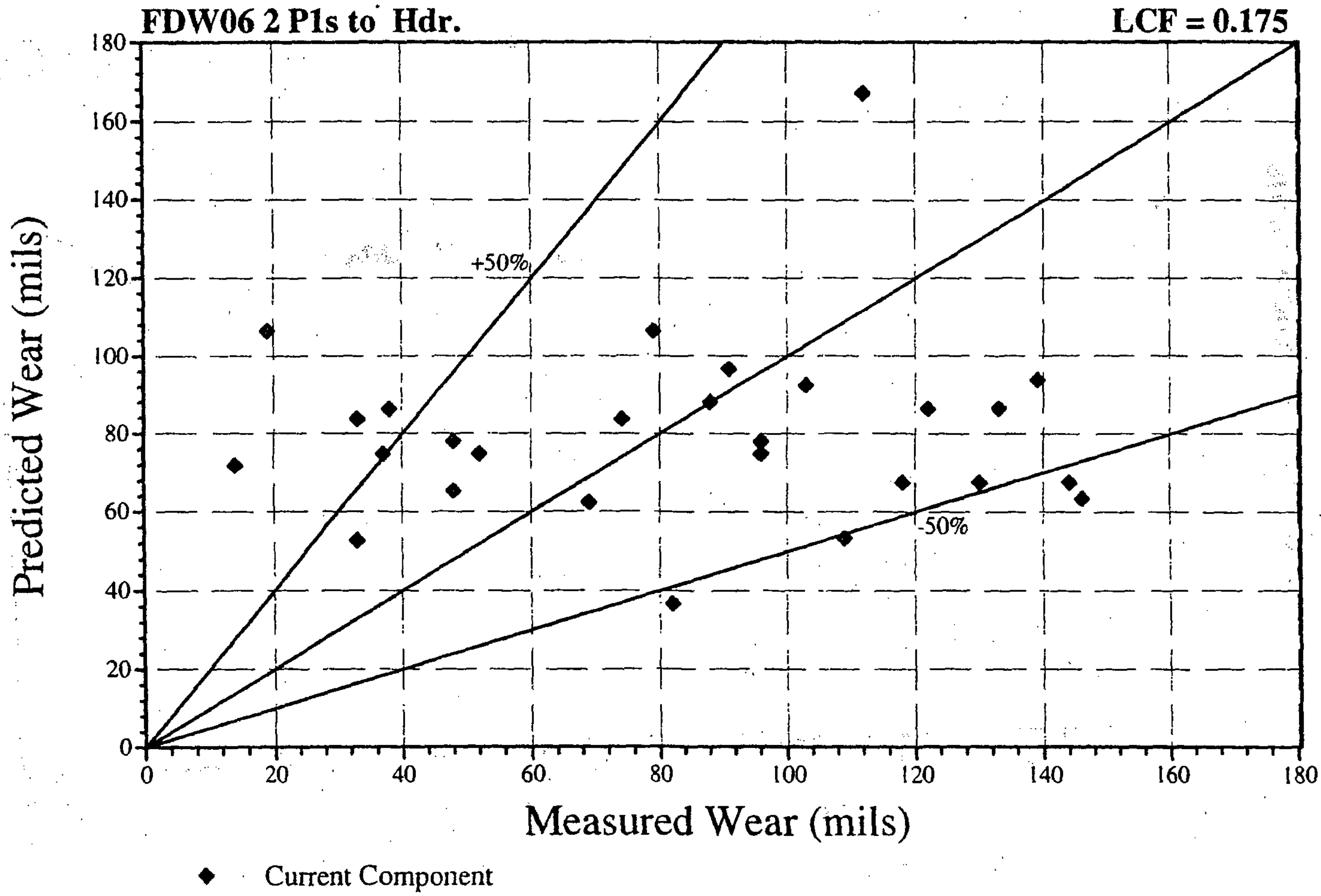


Wear Rate Analysis Run Definition
Run Name
FDW06 2 P1s to Hdr.
Run Title
Feed Pump Disch. 2 pumps running
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
002-16"-FDW-02
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
008-18"-FDW-14
009-16"-FDW-14
Add
Remove
Lines to Analyze
001-16"-FDW-01
003-16"-FDW-03
Run Definitions
4th Pt Extract Steam
4th Pt Heater Drain
4th Pt High Level
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Cond2006 E3 to 3 FWP
Cond2006 E4 to E3
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
6
SUPERVISOR
Start
EPRI CHECWOR...
Flow Accelera...
Desktop
8:26 AM

DRAFT

# Comparison of Wear Predictions

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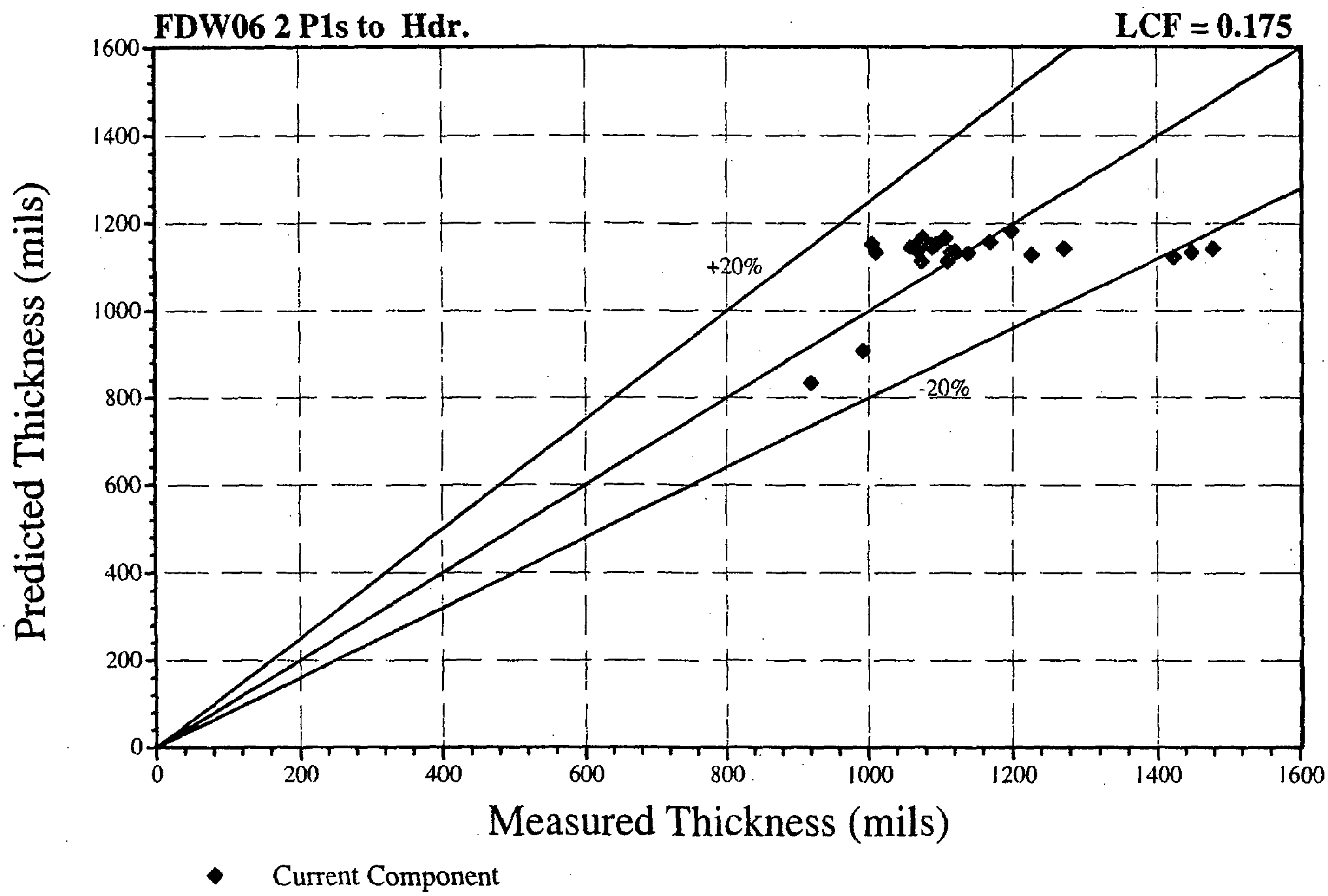
# Comparison of Thickness Predictions




18

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:17:42
Analysis Date: 28-SEP-2006 Time: 08:08:51
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: FDW06 2 Pis to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.175

Duty Factor (Global): 1.000
Exclude Measure Wear: No

===>Grouped by Line: 001-16"-FDW-01. No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | Tmeas (in)[4] | Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 31 | 7.524 | 5.712 | 1.000 | 0.792 | 0.769 | 0.769 | 36668 | ------ | --- | --- | --- | --- | 1.000 | -- | 0 | ----- |
| FD01RD01(L/E) | 18 | 3.370 | 2.559 | 1.219 | 1.024 | 0.964 | 0.964 | 204792 | ------ | --- | --- | --- | --- | 1.031 | MT | 218618 | ----- |
| FD01RD01(S/E) | 18 | 4.213 | 3.199 | 1.000 | 0.898 | 0.769 | 0.769 | 353382 | ------ | --- | --- | --- | --- | 0.906 | MT | 218618 | ----- |
| FD01EL01 | 4 | 4.157 | 3.156 | 1.219 | 1.066 | 0.964 | 0.964 | ------ | 281065 | 106.4 | 79.0 | 106.4 | 79.0 | 1.074 | MT | 218618 | 218618 |
| FD01TE05(U/S) | 15 | 3.370 | 2.559 | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 488964 | 86.2 | 122.0 | 86.2 | 122.0 | 1.114 | MT | 218618 | 218618 |
| FD01TE05(D.S) | 15 | 3.370 | 2.559 | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 132893 | 86.2 | 133.0 | 86.2 | 133.0 | 1.010 | MT | 218618 | 218618 |
| FD01SP01 | 58 | 2.471 | 1.876 | 1.219 | 1.151 | 0.964 | 0.964 | 870091 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL02 | 4 | 4.157 | 3.156 | 1.219 | 1.111 | 0.964 | 0.964 | ------ | 407759 | 88.0 | 88.0 | 88.0 | 88.0 | 1.138 | MT | 171740 | 171740 |
| FD01SP02 US | 54 | 3.595 | 2.729 | 1.219 | 1.096 | 0.964 | 0.964 | 422044 | ------ | --- | --- | --- | --- | 1.119 | MT | 171740 | ----- |
| FD01SP02 DS | 54 | 3.595 | 2.729 | 1.219 | 1.104 | 0.964 | 0.964 | ------ | 449132 | 83.5 | 74.0 | 83.5 | 74.0 | 1.120 | GW | 195618 | 195618 |
| FD01EL03 | 2 | 4.157 | 3.156 | 1.219 | 1.509 | 0.964 | 0.964 | 1511508 | ------ | --- | --- | --- | --- | 1.527 | MT | 195618 | ----- |
| FD01SP03 US | 52 | 2.808 | 2.132 | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 379381 | 65.3 | 48.0 | 65.3 | 48.0 | 1.069 | MT | 195618 | 195618 |
| FD01SP03 DS | 52 | 2.808 | 2.132 | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL04 | 2 | 4.157 | 3.156 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 381002 | 106.4 | 19.0 | 106.4 | 19.0 | 1.110 | MT | 218618 | 218618 |
| FD01SP04 US | 52 | 2.808 | 2.132 | 1.219 | 1.059 | 0.964 | 0.964 | ------ | 390040 | 71.9 | 14.0 | 71.9 | 14.0 | 1.065 | MT | 218618 | 218618 |
| FD01SP04 DS | 52 | 2.808 | 2.132 | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL05 | 2 | 4.157 | 3.156 | 1.219 | 1.104 | 0.964 | 0.964 | 388327 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 US | 52 | 2.808 | 2.132 | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 DS | 52 | 2.808 | 2.132 | 1.219 | 1.164 | 0.964 | 0.964 | 819621 | ------ | --- | --- | --- | --- | 1.204 | MT | 102975 | ----- |

===>Grouped by Line: 003-16"-FDW-03. No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | Tmeas (in)[4] | Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 31 | 7.524 | 5.712 | 1.000 | 0.879 | 0.769 | 0.769 | ------ | 168617 | 167.0 | 112.0 | 167.0 | 112.0 | 0.919 | MT | 183618 | 183618 |
| FD03RD01(L/E) | 18 | 3.370 | 2.559 | 1.219 | 1.040 | 0.964 | 0.964 | ------ | 258140 | 74.8 | 96.0 | 74.8 | 96.0 | 1.058 | MT | 183618 | 183618 |
| FD03RD01(S/E) | 18 | 4.213 | 3.199 | 1.000 | 0.969 | 0.769 | 0.769 | ------ | 549800 | 93.5 | 139.0 | 93.5 | 139.0 | 0.992 | MT | 183618 | 183618 |
| FD03EL01 | 4 | 4.157 | 3.156 | 1.219 | 1.204 | 0.964 | 0.964 | ------ | 663927 | 92.3 | 103.0 | 92.3 | 103.0 | 1.226 | MT | 183618 | 183618 |
| FD03TE01(U/S) | 15 | 3.370 | 2.559 | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 306073 | 74.8 | 37.0 | 74.8 | 37.0 | 1.072 | GW | 183618 | 183618 |
| FD03TE01(D/S) | 15 | 3.370 | 2.559 | 1.219 | 1.071 | 0.964 | 0.964 | ------ | 364277 | 74.8 | 52.0 | 74.8 | 52.0 | 1.089 | MT | 183618 | 183618 |
| FD03SP01 | 58 | 2.471 | 1.876 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 483714 | 63.2 | 146.0 | 63.2 | 146.0 | 1.073 | GW | 218618 | 218618 |
| FD03EL02 | 4 | 4.157 | 3.156 | 1.219 | 1.115 | 0.964 | 0.964 | 418812 | ------ | --- | --- | --- | --- | 1.152 | MT | 148782 | ----- |
| FD03SP02 US | 54 | 3.595 | 2.729 | 1.219 | 1.063 | 0.964 | 0.964 | ------ | 317199 | 67.4 | 118.0 | 67.4 | 118.0 | 1.095 | GW | 148782 | 148782 |
| FD03SP02 DS | 54 | 3.595 | 2.729 | 1.219 | 1.061 | 0.964 | 0.964 | ------ | 310375 | 53.3 | 109.0 | 53.3 | 109.0 | 1.107 | MT | 114614 | 114614 |
| FD03EL03 | 1 | 3.707 | 2.814 | 1.219 | 1.432 | 0.964 | 0.964 | ------ | 1454905 | 86.2 | 38.0 | 86.2 | 38.0 | 1.448 | MT | 195618 | 195618 |
| FD03SP03 | 51 | 2.471 | 1.876 | 1.219 | 1.166 | 0.964 | 0.964 | ------ | 943185 | 36.7 | 82.0 | 36.7 | 82.0 | 1.198 | MT | 114614 | 114614 |
| FD03EL04 | 4 | 4.157 | 3.156 | 1.219 | 1.405 | 0.964 | 0.964 | ------ | 1222802 | 96.6 | 91.0 | 96.6 | 91.0 | 1.423 | MT | 195618 | 195618 |
| FD03SP04 US | 54 | 3.595 | 2.729 | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 282223 | 83.5 | 33.0 | 83.5 | 33.0 | 1.068 | MT | 195618 | 195618 |
| FD03SP04 DS | 54 | 3.595 | 2.729 | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 297940 | 67.4 | 130.0 | 67.4 | 130.0 | 1.089 | MT | 148782 | 148782 |
| FD03EL05 | 2 | 4.157 | 3.156 | 1.219 | 1.234 | 0.964 | 0.964 | ------ | 749159 | 78.0 | 48.0 | 78.0 | 48.0 | 1.271 | MT | 148782 | 148782 |
| FD03SP05 | 52 | 2.808 | 2.132 | 1.219 | 1.051 | 0.964 | 0.964 | ------ | 356452 | 52.7 | 33.0 | 52.7 | 33.0 | 1.076 | MT | 148782 | 148782 |
| FD03EL06 | 4 | 4.157 | 3.156 | 1.219 | 1.441 | 0.964 | 0.964 | ------ | 1323795 | 78.0 | 96.0 | 78.0 | 96.0 | 1.478 | MT | 148782 | 148782 |
| FD03SP06 | 54 | 3.595 | 2.729 | 1.219 | 0.972 | 0.964 | 0.964 | ------ | 25109 | 67.4 | 144.0 | 67.4 | 144.0 | 1.004 | MT | 148782 | 148782 |
| FD03EL07 | 2 | 4.157 | 3.156 | 1.219 | 1.511 | 0.964 | 0.964 | 1516165 | ------ | --- | --- | --- | --- | 1.533 | MT | 183618 | ----- |
| FD03SP07 US | 52 | 2.808 | 2.132 | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 774123 | 62.4 | 69.0 | 62.4 | 69.0 | 1.168 | GW | 183618 | 183618 |
| FD03SP07 DS | 52 | 2.808 | 2.132 | 1.219 | 1.042 | 0.964 | 0.964 | 319761 | ------ | --- | --- | --- | --- | 1.074 | MT | 125911 | ----- |

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 08:17:38
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 08:08:51
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: FDW06 2 Pls to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.175

| Component Name | Total Lifetime Wear (mils) Prd.(1) | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.(1) | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)(3) | In-Service Cmp. Method (2) | In-Service Cmp. Time (hrs)(3) | In-Service Cmp. Thickness(mils)(4) Tp | In-Service Cmp. Thickness(mils)(4) Tm | Incremental Wear(mils)(5) PRWEAR | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | | |
| FD01EL01 | 106.4 | 79.0 | 106.4 | 79.0 | 1.074 | MT | 218618 | 1112.6 | 1074.0 | 8.3 | 218618 |
| FD01TE05(U/S) | 86.2 | 122.0 | 86.2 | 122.0 | 1.114 | MT | 218618 | 1132.8 | 1114.0 | 6.7 | 218618 |
| FD01TE05(D/S) | 86.2 | 133.0 | 86.2 | 133.0 | 1.010 | MT | 218618 | 1132.8 | 1010.0 | 6.7 | 218618 |
| FD01EL02 | 88.0 | 88.0 | 88.0 | 88.0 | 1.138 | MT | 171740 | 1131.0 | 1138.0 | 26.6 | 171740 |
| FD01SP02 DS | 83.5 | 74.0 | 83.5 | 74.0 | 1.120 | GW | 195618 | 1135.5 | 1120.0 | 15.6 | 195618 |
| FD01SP03 US | 65.3 | 48.0 | 65.3 | 48.0 | 1.069 | MT | 195618 | 1153.7 | 1069.0 | 12.2 | 195618 |
| FD01EL04 | 106.4 | 19.0 | 106.4 | 19.0 | 1.110 | MT | 218618 | 1112.6 | 1110.0 | 8.3 | 218618 |
| FD01SP04 US | 71.9 | 14.0 | 71.9 | 14.0 | 1.065 | MT | 218618 | 1147.1 | 1065.0 | 5.6 | 218618 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | | |
| OUTLET P-1-1C | 167.0 | 112.0 | 167.0 | 112.0 | 0.919 | MT | 183618 | 833.0 | 919.0 | 40.5 | 183618 |
| FD03RD01(L/E) | 74.8 | 96.0 | 74.8 | 96.0 | 1.058 | MT | 183618 | 1144.2 | 1058.0 | 18.1 | 183618 |
| FD03RD01(S/E) | 93.5 | 139.0 | 93.5 | 139.0 | 0.992 | MT | 183618 | 906.5 | 992.0 | 22.7 | 183618 |
| FD03EL01 | 92.3 | 103.0 | 92.3 | 103.0 | 1.226 | MT | 183618 | 1126.7 | 1226.0 | 22.4 | 183618 |
| FD03TE01(U/S) | 74.8 | 37.0 | 74.8 | 37.0 | 1.072 | GW | 183618 | 1144.2 | 1072.0 | 18.1 | 183618 |
| FD03TE01(D/S) | 74.8 | 52.0 | 74.8 | 52.0 | 1.089 | MT | 183618 | 1144.2 | 1089.0 | 18.1 | 183618 |
| FD03SP01 | 63.2 | 146.0 | 63.2 | 146.0 | 1.073 | GW | 218618 | 1155.8 | 1073.0 | 4.9 | 218618 |
| FD03SP02 US | 67.4 | 118.0 | 67.4 | 118.0 | 1.095 | GW | 148782 | 1151.6 | 1095.0 | 31.7 | 148782 |
| FD03SP02 DS | 53.3 | 109.0 | 53.3 | 109.0 | 1.107 | MT | 114614 | 1165.7 | 1107.0 | 45.8 | 114614 |
| FD03EL03 | 86.2 | 38.0 | 86.2 | 38.0 | 1.448 | MT | 195618 | 1132.8 | 1448.0 | 16.1 | 195618 |
| FD03SP03 | 36.7 | 82.0 | 36.7 | 82.0 | 1.198 | MT | 114614 | 1182.3 | 1198.0 | 31.5 | 114614 |
| FD03EL04 | 96.6 | 91.0 | 96.6 | 91.0 | 1.423 | MT | 195618 | 1122.4 | 1423.0 | 18.0 | 195618 |
| FD03SP04 US | 83.5 | 33.0 | 83.5 | 33.0 | 1.068 | MT | 195618 | 1135.5 | 1068.0 | 15.6 | 195618 |
| FD03SP04 DS | 67.4 | 130.0 | 67.4 | 130.0 | 1.089 | MT | 148782 | 1151.6 | 1089.0 | 31.7 | 148782 |
| FD03EL05 | 78.0 | 48.0 | 78.0 | 48.0 | 1.271 | MT | 148782 | 1141.0 | 1271.0 | 36.7 | 148782 |
| FD03SP05 | 52.7 | 33.0 | 52.7 | 33.0 | 1.076 | MT | 148782 | 1166.3 | 1076.0 | 24.8 | 148782 |
| FD03EL06 | 78.0 | 96.0 | 78.0 | 96.0 | 1.478 | MT | 148782 | 1141.0 | 1478.0 | 36.7 | 148782 |
| FD03SP06 | 67.4 | 144.0 | 67.4 | 144.0 | 1.004 | MT | 148782 | 1151.6 | 1004.0 | 31.7 | 148782 |
| FD03SP07 US | 62.4 | 69.0 | 62.4 | 69.0 | 1.168 | GW | 183618 | 1156.6 | 1168.0 | 15.1 | 183618 |

Notes:
(1) Predictions are for the time of last inspection (last known meas. wear).
(2) GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
(3) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
(4) These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
(5) PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 08:17:33
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 08:08:51
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW06 2 Pls to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA
Exclude Measure Wear: No
Line Correction Factor: 0.175

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD03EL03 | 1 | 3.707 | ------ | 1454905 |
| FD03EL04 | 4 | 4.157 | ------ | 1222802 |
| FD01RD01(S/E) | 18 | 4.213 | 353382 | ------ |
| FD01SP02 US | 54 | 3.595 | 422044 | ------ |
| OUTLET P-1-1C | 31 | 7.524 | ------ | 168617 |
| OUTLET P-1-1A | 31 | 7.524 | 36668 | ------ |
| FD03SP06 | 54 | 3.595 | ------ | 25109 |
| FD03RD01(S/E) | 18 | 4.213 | ------ | 549800 |
| FD01TE05(D/S) | 15 | 3.370 | ------ | 132893 |
| FD01EL01 | 4 | 4.157 | ------ | 281065 |
| FD01RD01(L/E) | 18 | 3.370 | 204792 | ------ |
| FD01EL03 | 2 | 4.157 | 1511508 | ------ |
| FD03RD01(L/E) | 18 | 3.370 | ------ | 258140 |
| FD03EL02 | 4 | 4.157 | 418812 | ------ |
| FD01EL02 | 4 | 4.157 | ------ | 407759 |
| FD03SP04 US | 54 | 3.595 | ------ | 282223 |
| FD03EL07 | 2 | 4.157 | 1516165 | ------ |
| FD03SP04 DS | 54 | 3.595 | ------ | 297940 |
| FD03EL05 | 2 | 4.157 | ------ | 749159 |
| FD03TE01(U/S) | 15 | 3.370 | ------ | 306073 |
| FD03EL01 | 4 | 4.157 | ------ | 663927 |
| FD03SP02 DS | 54 | 3.595 | ------ | 310375 |
| FD03SP02 US | 54 | 3.595 | ------ | 317199 |
| FD01EL05 | 2 | 4.157 | 388327 | ------ |
| FD03SP07 DS | 52 | 2.808 | 319761 | ------ |
| FD01EL04 | 2 | 4.157 | ------ | 381002 |
| FD03EL06 | 4 | 4.157 | ------ | 1323795 |
| FD03SP05 | 52 | 2.808 | ------ | 356452 |
| FD03TE01(D/S) | 15 | 3.370 | ------ | 364277 |
| FD01SP03 US | 52 | 2.808 | ------ | 379381 |
| FD01SP02 DS | 54 | 3.595 | ------ | 449132 |
| FD01SP04 US | 52 | 2.808 | ------ | 390040 |
| FD01TE05(U/S) | 15 | 3.370 | ------ | 488964 |
| FD03SP01 | 58 | 2.471 | ------ | 483714 |
| FD01SP04 DS | 52 | 2.808 | 727489 | ------ |
| FD01SP05 US | 52 | 2.808 | 727489 | ------ |
| FD01SP03 DS | 52 | 2.808 | 727489 | ------ |
| FD03SP07 US | 52 | 2.808 | ------ | 774123 |
| FD01SP05 DS | 52 | 2.808 | 819621 | ------ |
| FD01SP01 | 58 | 2.471 | 870091 | ------ |
| FD03SP03 | 51 | 2.471 | ------ | 943185 |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 08:17:28
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 08:08:51
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: FDW06 2 Pls to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.175

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | |
| OUTLET P-1-1A | 1.000 | 0.792 | 0.769 | 0.769 | 36668 | ------ | 241618 |
| FD01RD01(L/E) | 1.219 | 1.024 | 0.964 | 0.964 | 204792 | ------ | 241618 |
| FD01RD01(S/E) | 1.000 | 0.898 | 0.769 | 0.769 | 353382 | ------ | 241618 |
| FD01EL01 | 1.219 | 1.066 | 0.964 | 0.964 | ------ | 281065 | 241618 |
| FD01TE05(U/S) | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 488964 | 241618 |
| FD01TE05(D/S) | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 132893 | 241618 |
| FD01SP01 | 1.219 | 1.151 | 0.964 | 0.964 | 870091 | ------ | 241618 |
| FD01EL02 | 1.219 | 1.111 | 0.964 | 0.964 | ------ | 407759 | 241618 |
| FD01SP02 US | 1.219 | 1.096 | 0.964 | 0.964 | 432044 | ------ | 241618 |
| FD01SP02 DS | 1.219 | 1.104 | 0.964 | 0.964 | ------ | 449132 | 241618 |
| FD01EL03 | 1.219 | 1.509 | 0.964 | 0.964 | 1511508 | ------ | 241618 |
| FD01SP03 US | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 379381 | 241618 |
| FD01SP03 DS | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | 241618 |
| FD01EL04 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 381002 | 241618 |
| FD01SP04 US | 1.219 | 1.059 | 0.964 | 0.964 | ------ | 390040 | 241618 |
| FD01SP04 DS | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | 241618 |
| FD01EL05 | 1.219 | 1.104 | 0.964 | 0.964 | 388327 | ------ | 241618 |
| FD01SP05 US | 1.219 | 1.142 | 0.964 | 0.964 | 727489 | ------ | 241618 |
| FD01SP05 DS | 1.219 | 1.164 | 0.964 | 0.964 | 819621 | ------ | 241618 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | |
| OUTLET P-1-1C | 1.000 | 0.879 | 0.769 | 0.769 | ------ | 168617 | 241618 |
| FD03RD01(L/E) | 1.219 | 1.040 | 0.964 | 0.964 | ------ | 258140 | 241618 |
| FD03RD01(S/E) | 1.000 | 0.969 | 0.769 | 0.769 | ------ | 549800 | 241618 |
| FD03EL01 | 1.219 | 1.204 | 0.964 | 0.964 | ------ | 663927 | 241618 |
| FD03TE01(U/S) | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 306073 | 241618 |
| FD03TE01(D/S) | 1.219 | 1.071 | 0.964 | 0.964 | ------ | 364277 | 241618 |
| FD03SP01 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 483714 | 241618 |
| FD03EL02 | 1.219 | 1.115 | 0.964 | 0.964 | 418812 | ------ | 241618 |
| FD03SP02 US | 1.219 | 1.063 | 0.964 | 0.964 | ------ | 317199 | 241618 |
| FD03SP02 DS | 1.219 | 1.061 | 0.964 | 0.964 | ------ | 310375 | 241618 |
| FD03EL03 | 1.219 | 1.432 | 0.964 | 0.964 | ------ | 1454905 | 241618 |
| FD03SP03 | 1.219 | 1.166 | 0.964 | 0.964 | ------ | 943185 | 241618 |
| FD03EL04 | 1.219 | 1.405 | 0.964 | 0.964 | ------ | 1222802 | 241618 |
| FD03SP04 US | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 282223 | 241618 |
| FD03SP04 DS | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 297940 | 241618 |
| FD03EL05 | 1.219 | 1.234 | 0.964 | 0.964 | ------ | 749159 | 241618 |
| FD03SP05 | 1.219 | 1.051 | 0.964 | 0.964 | ------ | 356452 | 241618 |
| FD03EL06 | 1.219 | 1.441 | 0.964 | 0.964 | ------ | 1323795 | 241618 |
| FD03SP06 | 1.219 | 0.972 | 0.964 | 0.964 | ------ | 25109 | 241618 |
| FD03EL07 | 1.219 | 1.511 | 0.964 | 0.964 | 1516165 | ------ | 241618 |
| FD03SP07 US | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 774123 | 241618 |
| FD03SP07 DS | 1.219 | 1.042 | 0.964 | 0.964 | 319761 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

22

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 28-SEP-2006 Time: 08:17:24
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006 Time: 08:08:51
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW06 2 Pls to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.175

| Component Name | Geom. Code | No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | |
| OUTLET P-1-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 79 |
| FD01TE05(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 121 |
| FD01TE05(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 133 |
| FD01SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 88 |
| FD01SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 73 |
| FD01EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 48 |
| FD01SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 19 |
| FD01SP04 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 14 |
| FD01SP04 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | |
| OUTLET P-1-1C | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 112 |
| FD03RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 96 |
| FD03RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 139 |
| FD03EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 103 |
| FD03TE01(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 37 |
| FD03TE01(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 52 |
| FD03SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 146 |
| FD03EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 117 |
| FD03SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 109 |
| FD03EL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 38 |
| FD03SP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 82 |
| FD03EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 91 |
| FD03SP04 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 33 |
| FD03SP04 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 129 |
| FD03EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 48 |
| FD03SP05 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 33 |
| FD03EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 96 |
| FD03SP06 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 144 |
| FD03EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP07 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 69 |
| FD03SP07 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:17:11
Analysis Date: 28-SEP-2006 Time: 08:08:51
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

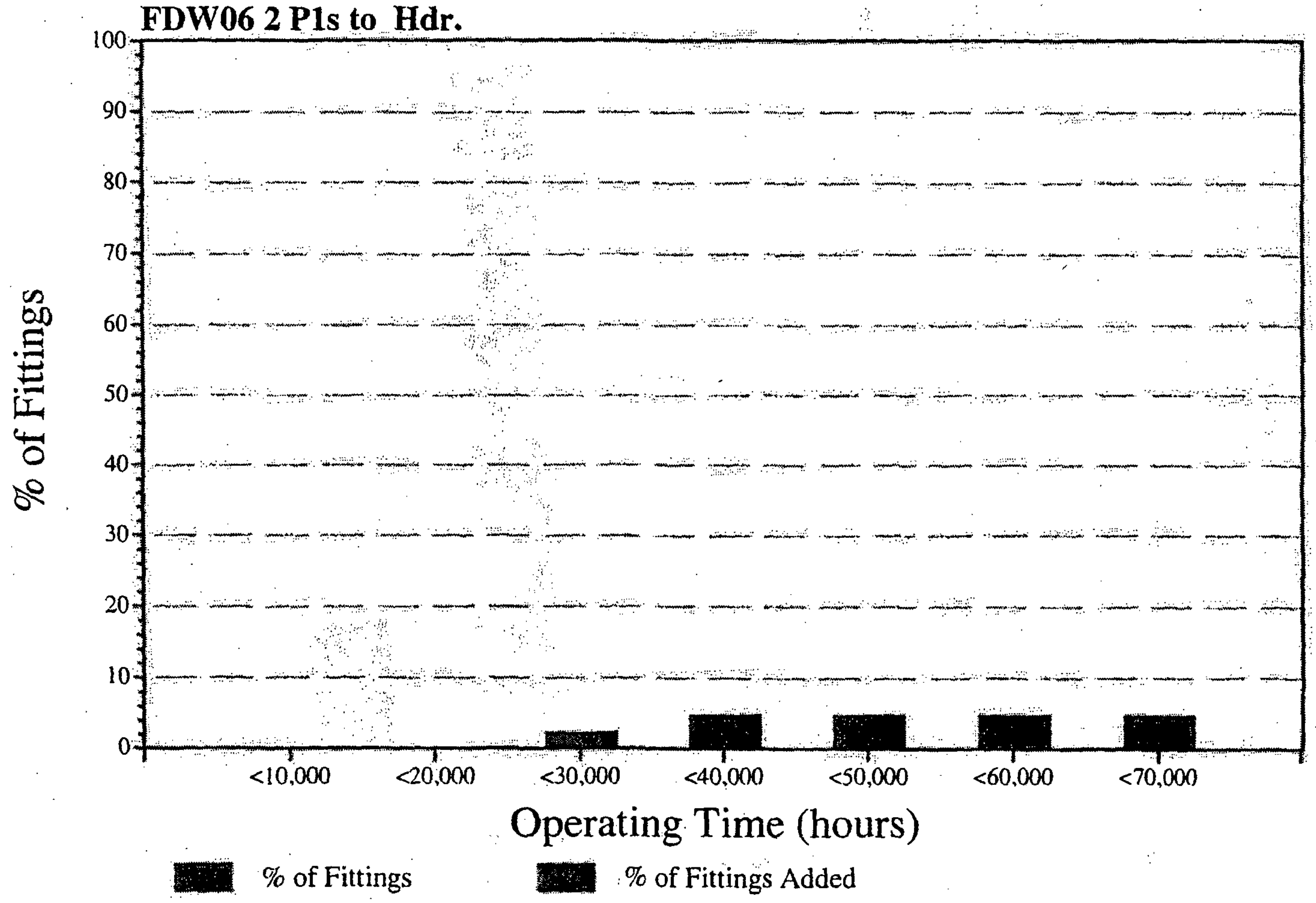
Run Name: FDW06 2 Pls to Hdr.
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.175

Duty Factor (Global): 1.000
Exclude Measure Wear: No

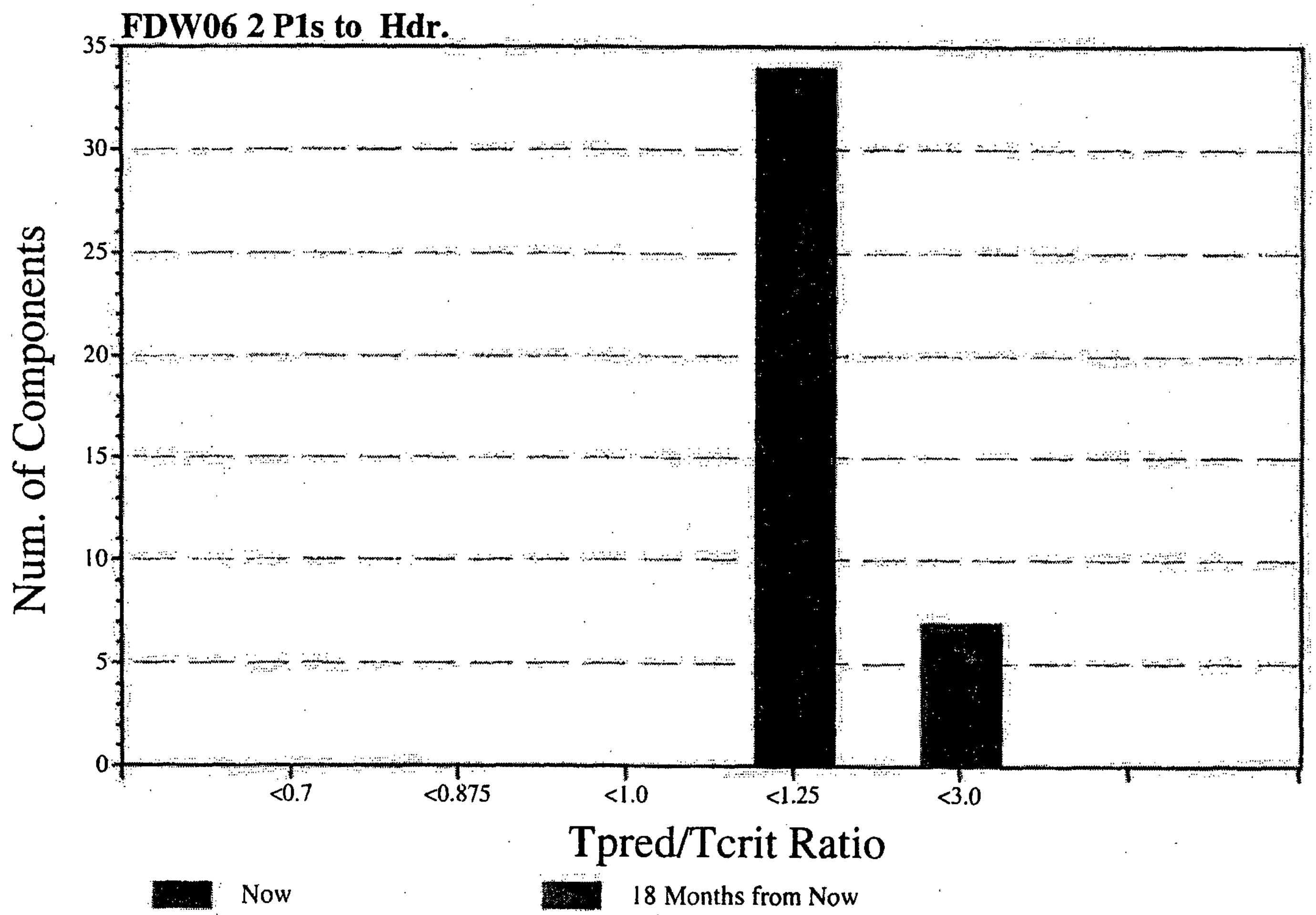
| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | |
| OUTLET P-1-1A | 31 | 7.524 | 5.712 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01RD01(L/E) | 18 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01RD01(S/E) | 18 | 4.213 | 3.199 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01EL01 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(U/S) | 15 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(D/S) | 15 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP01 | 58 | 2.471 | 1.876 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL02 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 US | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 DS | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL03 | 2 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 US | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 DS | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL04 | 2 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 US | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 DS | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL05 | 2 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 US | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 DS | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | |
| OUTLET P-1-1C | 31 | 7.524 | 5.712 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03RD01(L/E) | 18 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03RD01(S/E) | 18 | 4.213 | 3.199 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03EL01 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(U/S) | 15 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(D/S) | 15 | 3.370 | 2.559 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP01 | 58 | 2.471 | 1.876 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL02 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 US | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 DS | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL03 | 1 | 3.707 | 2.814 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP03 | 51 | 2.471 | 1.876 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL04 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 US | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 DS | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL05 | 2 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP05 | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL06 | 4 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP06 | 54 | 3.595 | 2.729 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL07 | 2 | 4.157 | 3.156 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 US | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 DS | 52 | 2.808 | 2.132 | 296.9 | 15.456 | 0.000 | 16.000 |

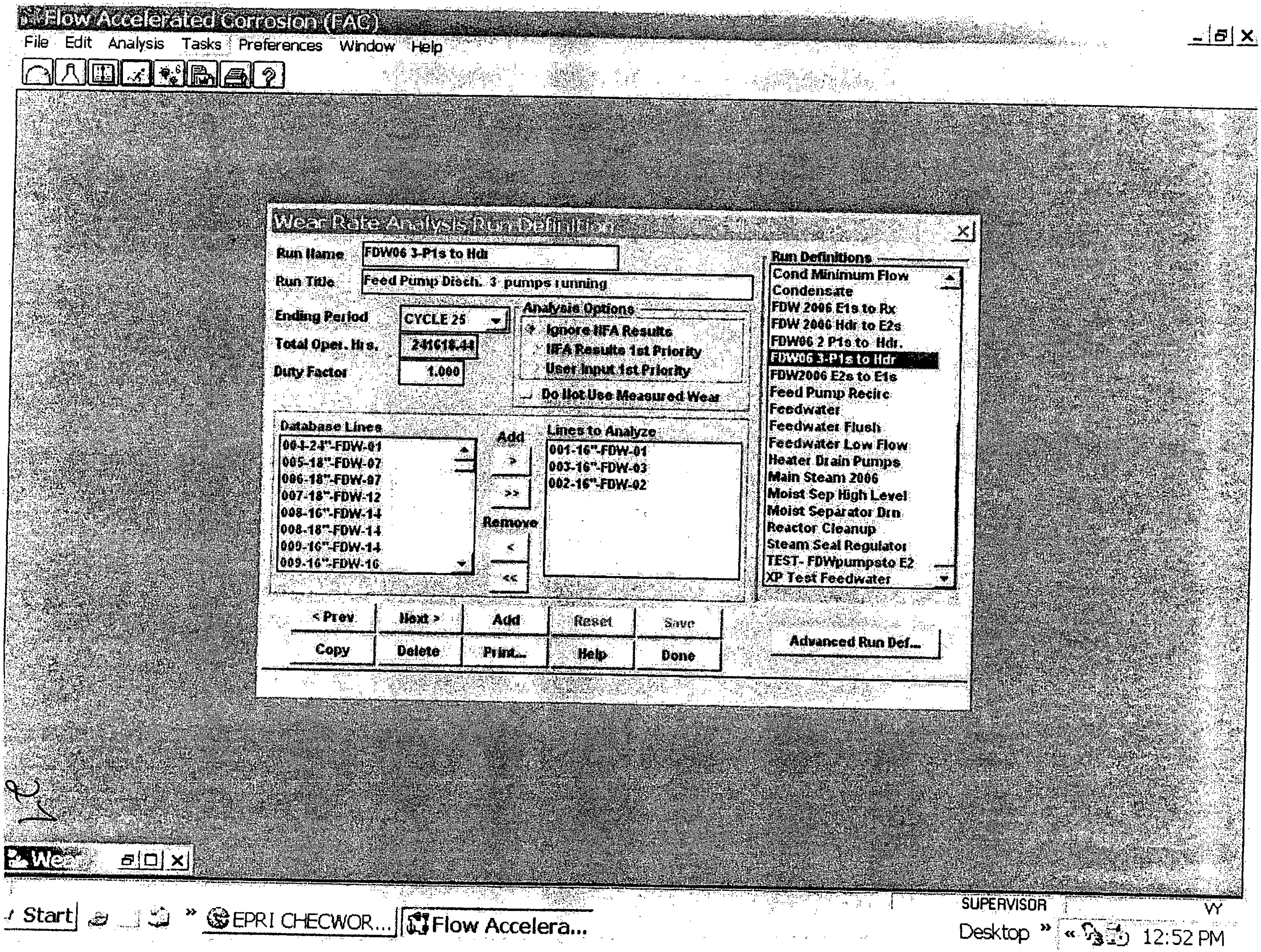
DRAFT

# Cumulative % of Comp. Time to Tcrit

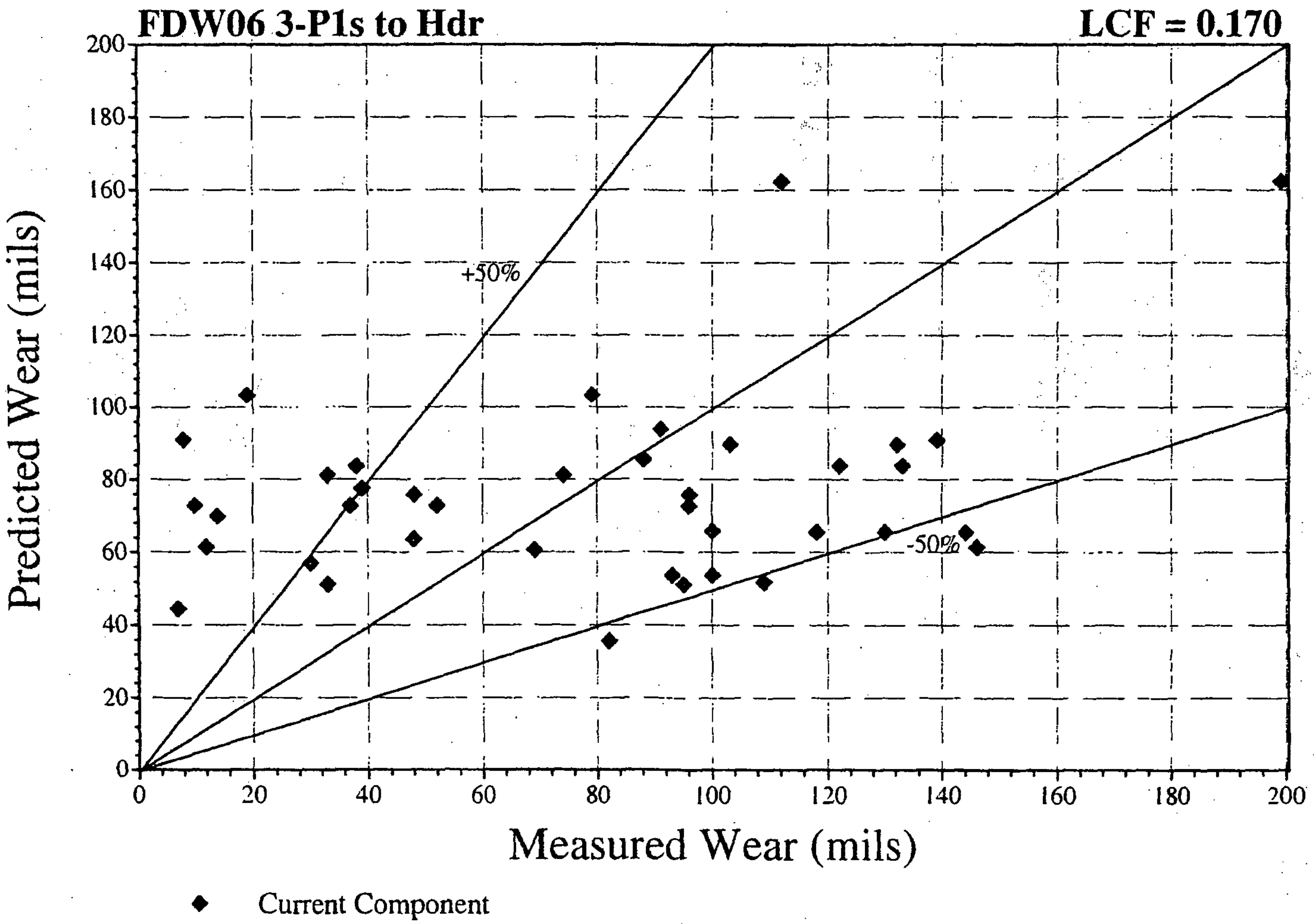


# Tpred/Tcrit Ratio Plot

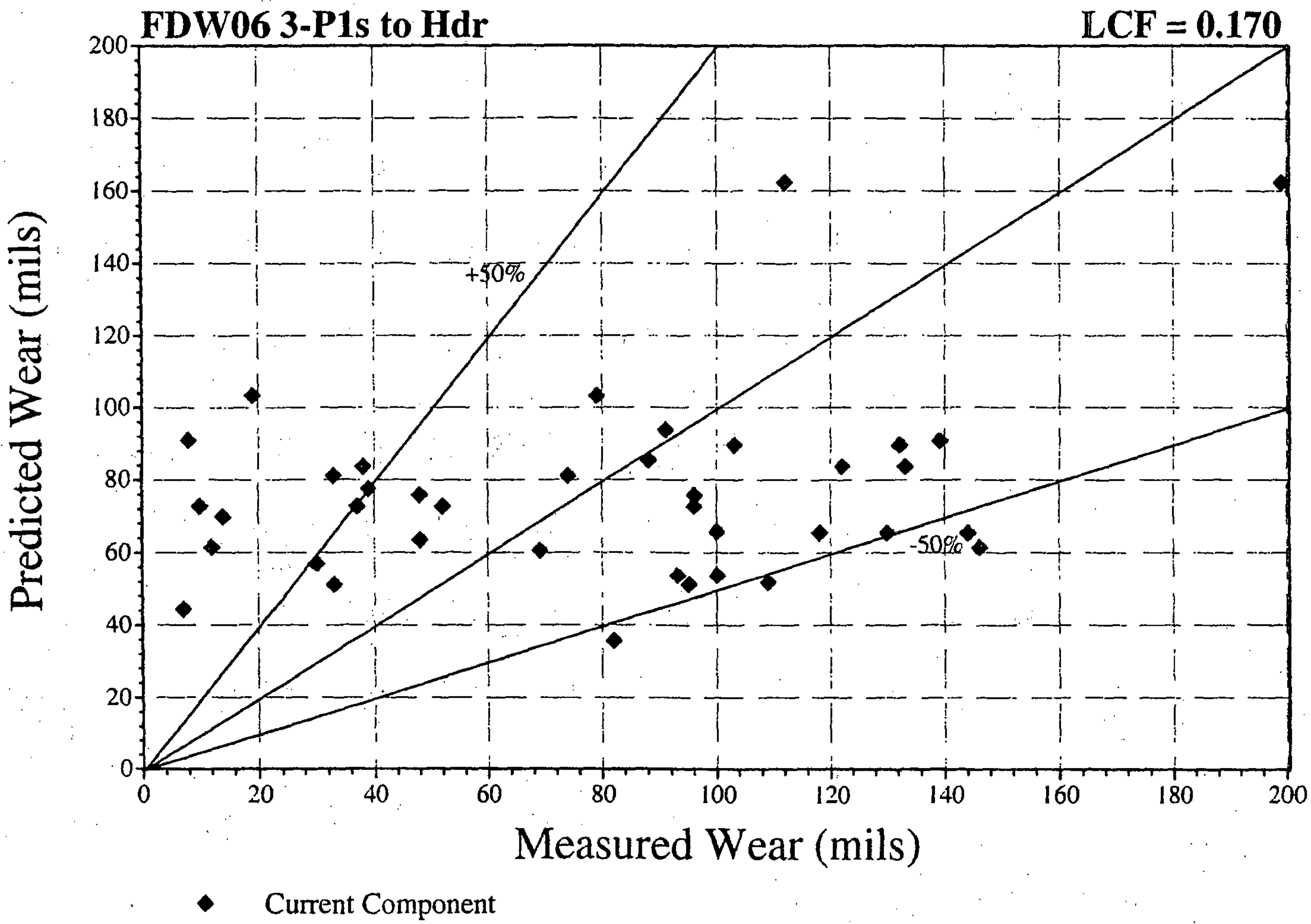



Flow Accelerated Corrosion (FAC)
File Edit Analysis Tasks Preferences Window Help
Wear Rate Analysis Run Definition
Run Name
FDW06 3-P1s to Hdr
Run Title
Feed Pump Disch. 3 pumps running
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
008-18"-FDW-14
009-16"-FDW-14
009-16"-FDW-16
Add
Remove
Lines to Analyze
001-16"-FDW-01
003-16"-FDW-03
002-16"-FDW-02
Run Definitions
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
Moist Sep High Level
Moist Separator Drn
Reactor Cleanup
Steam Seal Regulator
TEST- FDWpumpsto E2
XP Test Feedwater
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
Wea
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
VY
Desktop
12:52 PM

# Comparison of Wear Predictions



# Comparison of Wear Predictions



Company: Vermont Yankee Nuclear Power Corporation Report Date: 27-SEP-2006 Time: 12:47:05
Plant: Vermont Yankee Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit: CHECWORKS FAC Version 1.0F (Build 52)
Db Name: VY

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

*** Wear Rate Analysis: Combined Summary Report ***

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

Run Name: FDW06 3-P1s to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
NFA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.170

===>Grouped by Line: 001-16"-FDW-01, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 31 | 7.306 | 5.547 | 1.000 | 0.798 | 0.769 | 0.769 | 47266 | ------ | --- | --- | --- | --- | 1.000 | -- | 0 | ----- |
| FD01RD01(L/E) | 18 | 3.272 | 2.484 | 1.219 | 1.024 | 0.964 | 0.964 | 211594 | ------ | --- | --- | --- | --- | 1.031 | MT | 218618 | ----- |
| FD01RD01(S/E) | 18 | 4.091 | 3.106 | 1.000 | 0.898 | 0.769 | 0.769 | 364620 | ------ | --- | --- | --- | --- | 0.906 | MT | 218618 | ----- |
| FD01EL01 | 4 | 4.036 | 3.064 | 1.219 | 1.066 | 0.964 | 0.964 | ------ | 290144 | 103.3 | 79.0 | 103.3 | 79.0 | 1.074 | MT | 218618 | 218618 |
| FD01TE05(U/S) | 15 | 3.272 | 2.484 | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 504251 | 83.7 | 122.0 | 83.7 | 122.0 | 1.114 | MT | 218618 | 218618 |
| FD01TE05(D/S) | 15 | 3.272 | 2.484 | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 137548 | 83.7 | 133.0 | 83.7 | 133.0 | 1.010 | MT | 218618 | 218618 |
| FD01SP01 | 58 | 2.400 | 1.822 | 1.219 | 1.153 | 0.964 | 0.964 | 905575 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL02 | 4 | 4.036 | 3.064 | 1.219 | 1.112 | 0.964 | 0.964 | ------ | 422143 | 85.4 | 88.0 | 85.4 | 88.0 | 1.138 | MT | 171740 | 171740 |
| FD01SP02 US | 54 | 3.491 | 2.650 | 1.219 | 1.097 | 0.964 | 0.964 | 436854 | ------ | --- | --- | --- | --- | 1.119 | MT | 171740 | ----- |
| FD01SP02 DS | 54 | 3.491 | 2.650 | 1.219 | 1.105 | 0.964 | 0.964 | ------ | 464038 | 81.1 | 74.0 | 81.1 | 74.0 | 1.120 | GW | 195618 | 195618 |
| FD01EL03 | 2 | 4.036 | 3.064 | 1.219 | 1.509 | 0.964 | 0.964 | 1558136 | ------ | --- | --- | --- | --- | 1.527 | MT | 195618 | ----- |
| FD01SP03 US | 52 | 2.727 | 2.070 | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 392205 | 63.4 | 48.0 | 63.4 | 48.0 | 1.069 | MT | 195618 | 195618 |
| FD01SP03 DS | 52 | 2.727 | 2.070 | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL04 | 2 | 4.036 | 3.064 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 393065 | 103.3 | 19.0 | 103.3 | 19.0 | 1.110 | MT | 218618 | 218618 |
| FD01SP04 US | 52 | 2.727 | 2.070 | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 402373 | 69.8 | 14.0 | 69.8 | 14.0 | 1.065 | MT | 218618 | 218618 |
| FD01SP04 DS | 52 | 2.727 | 2.070 | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL05 | 2 | 4.036 | 3.064 | 1.219 | 1.108 | 0.964 | 0.964 | 409425 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 US | 52 | 2.727 | 2.070 | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 DS | 52 | 2.727 | 2.070 | 1.219 | 1.165 | 0.964 | 0.964 | 849006 | ------ | --- | --- | --- | --- | 1.204 | MT | 102975 | ----- |

===>Grouped by Line: 003-16"-FDW-03, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 31 | 7.306 | 5.547 | 1.000 | 0.880 | 0.769 | 0.769 | ------ | 175505 | 162.2 | 112.0 | 162.2 | 112.0 | 0.919 | MT | 183618 | 183618 |
| FD03RD01(L/E) | 18 | 3.272 | 2.484 | 1.219 | 1.040 | 0.964 | 0.964 | ------ | 267702 | 72.7 | 96.0 | 72.7 | 96.0 | 1.058 | MT | 183618 | 183618 |
| FD03RD01(S/E) | 18 | 4.091 | 3.106 | 1.000 | 0.970 | 0.769 | 0.769 | ------ | 568071 | 90.8 | 139.0 | 90.8 | 139.0 | 0.992 | MT | 183618 | 183618 |
| FD03EL01 | 4 | 4.036 | 3.064 | 1.219 | 1.204 | 0.964 | 0.964 | ------ | 685605 | 89.6 | 103.0 | 89.6 | 103.0 | 1.226 | MT | 183618 | 183618 |
| FD03TE01(U/S) | 15 | 3.272 | 2.484 | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 317066 | 72.7 | 37.0 | 72.7 | 37.0 | 1.072 | GW | 183618 | 183618 |
| FD03TE01(D/S) | 15 | 3.272 | 2.484 | 1.219 | 1.071 | 0.964 | 0.964 | ------ | 377008 | 72.7 | 52.0 | 72.7 | 52.0 | 1.069 | MT | 183618 | 183618 |
| FD03SP01 | 58 | 2.400 | 1.822 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 498844 | 61.4 | 146.0 | 61.4 | 146.0 | 1.073 | GW | 218618 | 218618 |
| FD03EL02 | 4 | 4.036 | 3.064 | 1.219 | 1.116 | 0.964 | 0.964 | 434357 | ------ | --- | --- | --- | --- | 1.152 | MT | 148782 | ----- |
| FD03SP02 US | 54 | 3.491 | 2.650 | 1.219 | 1.064 | 0.964 | 0.964 | ------ | 329709 | 65.5 | 118.0 | 65.5 | 118.0 | 1.095 | GW | 148782 | 148782 |
| FD03SP02 DS | 54 | 3.491 | 2.650 | 1.219 | 1.062 | 0.964 | 0.964 | ------ | 324035 | 51.8 | 109.0 | 51.8 | 109.0 | 1.107 | MT | 114614 | 114614 |
| FD03EL03 | 1 | 3.600 | 2.733 | 1.219 | 1.432 | 0.964 | 0.964 | ------ | 1499843 | 83.7 | 38.0 | 83.7 | 38.0 | 1.448 | MT | 195618 | 195618 |
| FD03SP03 | 51 | 2.400 | 1.822 | 1.219 | 1.167 | 0.964 | 0.964 | ------ | 975741 | 35.6 | 82.0 | 35.6 | 82.0 | 1.198 | MT | 114614 | 114614 |
| FD03EL04 | 4 | 4.036 | 3.064 | 1.219 | 1.405 | 0.964 | 0.964 | ------ | 1260810 | 93.8 | 91.0 | 93.8 | 91.0 | 1.423 | MT | 195618 | 195618 |
| FD03SP04 US | 54 | 3.491 | 2.650 | 1.219 | 1.053 | 0.964 | 0.964 | ------ | 292146 | 81.1 | 33.0 | 81.1 | 33.0 | 1.068 | MT | 195618 | 195618 |
| FD03SP04 DS | 54 | 3.491 | 2.650 | 1.219 | 1.058 | 0.964 | 0.964 | ------ | 309875 | 65.5 | 130.0 | 65.5 | 130.0 | 1.089 | MT | 148782 | 148782 |
| FD03EL05 | 2 | 4.036 | 3.064 | 1.219 | 1.235 | 0.964 | 0.964 | ------ | 774567 | 75.7 | 48.0 | 75.7 | 48.0 | 1.271 | MT | 148782 | 148782 |
| FD03SP05 | 52 | 2.727 | 2.070 | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 370134 | 51.2 | 33.0 | 51.2 | 33.0 | 1.076 | MT | 148782 | 148782 |
| FD03EL06 | 4 | 4.036 | 3.064 | 1.219 | 1.442 | 0.964 | 0.964 | ------ | 1366361 | 75.7 | 96.0 | 75.7 | 96.0 | 1.478 | MT | 148782 | 148782 |
| FD03SP06 | 54 | 3.491 | 2.650 | 1.219 | 0.973 | 0.964 | 0.964 | ------ | 28898 | 65.5 | 144.0 | 65.5 | 144.0 | 1.004 | MT | 148782 | 148782 |
| FD03EL07 | 2 | 4.036 | 3.064 | 1.219 | 1.511 | 0.964 | 0.964 | 1563290 | ------ | --- | --- | --- | --- | 1.533 | MT | 183618 | ----- |
| FD03SP07 US | 52 | 2.727 | 2.070 | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 799092 | 60.5 | 69.0 | 60.5 | 69.0 | 1.168 | GW | 183618 | 183618 |
| FD03SP07 DS | 52 | 2.727 | 2.070 | 1.219 | 1.043 | 0.964 | 0.964 | 333198 | ------ | --- | --- | --- | --- | 1.074 | MT | 125911 | ----- |

===>Grouped by Line: 002-16"-FDW-02, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1B | 31 | 7.306 | 5.547 | 1.000 | 0.830 | 0.769 | 0.769 | ------ | 96538 | 162.2 | 199.0 | 162.2 | 199.0 | 0.869 | MT | 183618 | 183618 |
| FD02RD01(L/E) | 18 | 3.272 | 2.484 | 1.219 | 1.019 | 0.964 | 0.964 | ------ | 193964 | 72.7 | 10.0 | 72.7 | 10.0 | 1.026 | MT | 218618 | 183618 |
| FD02RD01(S/E) | 18 | 4.091 | 3.106 | 1.000 | 1.044 | 0.769 | 0.769 | ------ | 776381 | 90.8 | 8.0 | 90.8 | 8.0 | 1.052 | MT | 218618 | 183618 |
| FD02EL01 | 4 | 4.036 | 3.064 | 1.219 | 1.179 | 0.964 | 0.964 | 613201 | ------ | --- | --- | --- | --- | 1.187 | MT | 218618 | ----- |
| FD02TE01(U/S) | 15 | 3.272 | 2.484 | 1.219 | 1.079 | 0.964 | 0.964 | ------ | 405523 | 61.4 | 12.0 | 61.4 | 12.0 | 1.086 | MT | 218618 | 148782 |
| FD02TE01(D/S) | 15 | 3.272 | 2.484 | 1.219 | 0.979 | 0.964 | 0.964 | ------ | 52925 | 61.4 | 12.0 | 61.4 | 12.0 | 0.986 | MT | 218618 | 148782 |
| FD02SP01 | 58 | 2.400 | 1.822 | 1.219 | 1.153 | 0.964 | 0.964 | 905575 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD02EL02 | 4 | 4.036 | 3.064 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 393996 | 89.6 | 132.0 | 89.6 | 132.0 | 1.124 | MT | 183618 | 183618 |
| FD02SP02 US | 54 | 3.491 | 2.650 | 1.219 | 1.046 | 0.964 | 0.964 | ------ | 270230 | 77.5 | 39.0 | 77.5 | 39.0 | 1.065 | MT | 183618 | 183618 |
| FD02SP02 DS | 54 | 3.491 | 2.650 | 1.219 | 1.026 | 0.964 | 0.964 | ------ | 202063 | 56.9 | 30.0 | 56.9 | 30.0 | 1.065 | MT | 125911 | 125911 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD02EL03 | 2 | 4.036 | 3.064 | 1.219 | 1.402 | 0.964 | 0.964 | ------ | 1252120 | 65.8 | 100.0 | 65.8 | 100.0 | 1.148 | MT | 125911 | 125911 |
| FD02SP03 US | 52 | 2.727 | 2.070 | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 405128 | 44.4 | 7.0 | 44.4 | 7.0 | 1.091 | MT | 125911 | 125911 |
| FD02SP03 DS | 52 | 2.727 | 2.070 | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD02EL04 | 2 | 4.036 | 3.064 | 1.219 | 1.108 | 0.964 | 0.964 | 409425 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD02SP04 US | 52 | 2.727 | 2.070 | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD02SP04 DS | 52 | 2.727 | 2.070 | 1.219 | 1.139 | 0.964 | 0.964 | ------ | 740592 | 53.7 | 100.0 | 53.7 | 100.0 | 1.161 | GW | 160352 | 160352 |
| FD02EL05 | 2 | 4.036 | 3.064 | 1.219 | 1.387 | 0.964 | 0.964 | 1208492 | ------ | --- | --- | --- | --- | 1.419 | MT | 160353 | ----- |
| FD02SP05 US | 52 | 2.727 | 2.070 | 1.219 | 1.162 | 0.964 | 0.964 | ------ | 837909 | 53.7 | 93.0 | 53.7 | 93.0 | 1.184 | GW | 160353 | 160352 |
| FD02SP05 DS | 52 | 2.727 | 2.070 | 1.219 | 1.044 | 0.964 | 0.964 | ------ | 336284 | 51.2 | 95.0 | 51.2 | 95.0 | 1.068 | MT | 148782 | 148782 |

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US - Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

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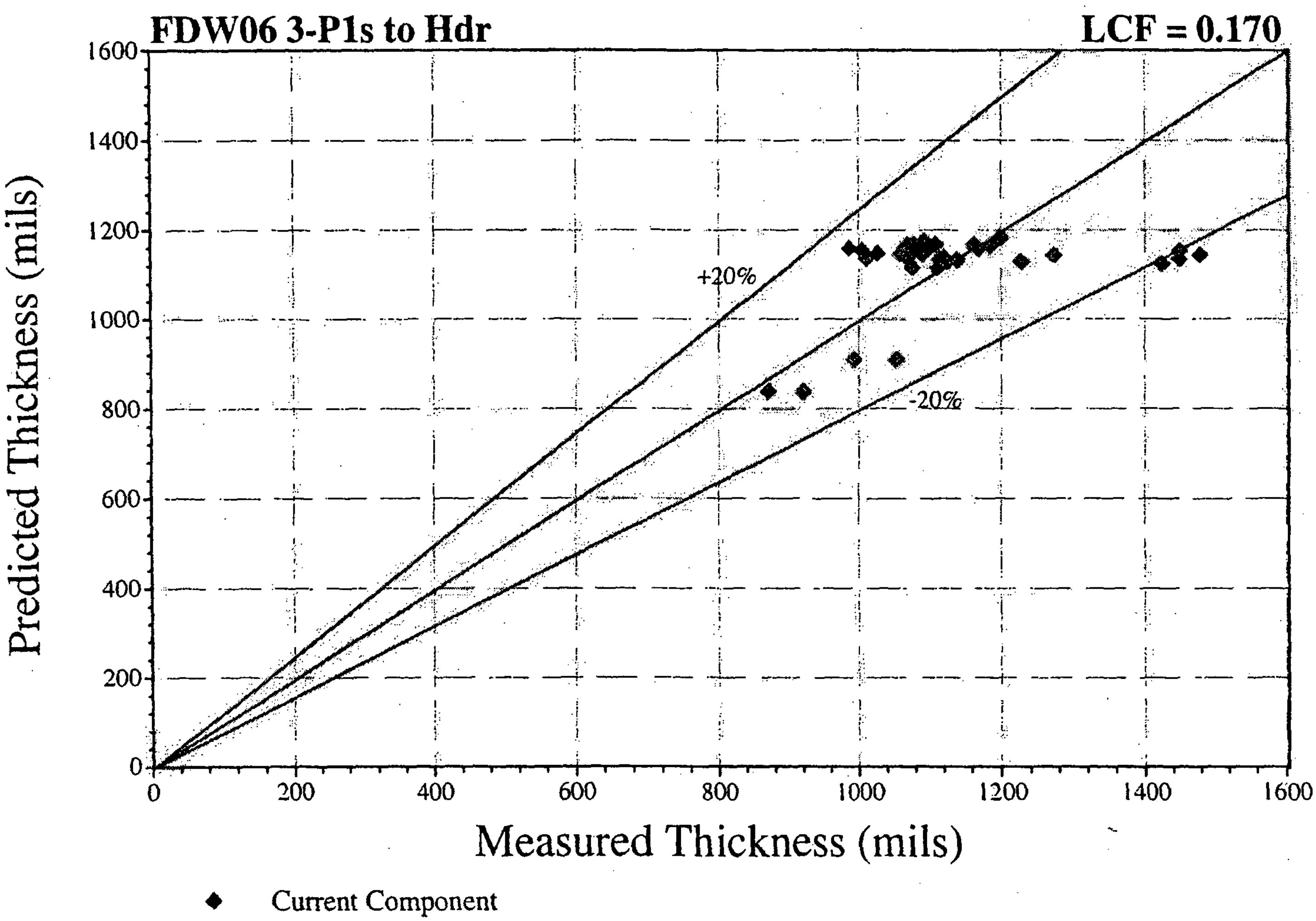
# Comparison of Thickness Predictions

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Company: Vermont Yankee Nuclear Power Corporation  Report Date: 27-SEP-2006 Time: 12:46:47
Plant: Vermont Yankee  Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: FDW06 3-P1s to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.170

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | Method [2] | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | Tm | Incremental Wear (mils)[5] PRWEAR | Time (hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | | |
| FD01EL01 | 103.3 | 79.0 | 103.3 | 79.0 | 1.074 | MT | 218618 | 1115.7 | 1074.0 | 8.0 | 218618 |
| FD01TE05(U/S) | 83.7 | 122.0 | 83.7 | 122.0 | 1.114 | MT | 218618 | 1135.3 | 1114.0 | 6.5 | 218618 |
| FD01TE05(D/S) | 83.7 | 133.0 | 83.7 | 133.0 | 1.010 | MT | 218618 | 1135.3 | 1010.0 | 6.5 | 218618 |
| FD01EL02 | 85.4 | 88.0 | 85.4 | 88.0 | 1.138 | MT | 171740 | 1133.6 | 1138.0 | 25.9 | 171740 |
| FD01SP02 DS | 81.1 | 74.0 | 81.1 | 74.0 | 1.120 | GW | 195618 | 1137.9 | 1120.0 | 15.2 | 195618 |
| FD01SP03 US | 63.4 | 48.0 | 63.4 | 48.0 | 1.069 | MT | 195618 | 1155.6 | 1069.0 | 11.8 | 195618 |
| FD01EL04 | 103.3 | 19.0 | 103.3 | 19.0 | 1.110 | MT | 218618 | 1115.7 | 1110.0 | 8.0 | 218618 |
| FD01SP04 US | 69.8 | 14.0 | 69.8 | 14.0 | 1.065 | MT | 218618 | 1149.2 | 1065.0 | 5.4 | 218618 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | | |
| OUTLET P-1-1C | 162.2 | 112.0 | 162.2 | 112.0 | 0.919 | MT | 183618 | 837.8 | 919.0 | 39.3 | 183618 |
| FD03RD01(L/E) | 72.7 | 96.0 | 72.7 | 96.0 | 1.058 | MT | 183618 | 1146.3 | 1058.0 | 17.6 | 183618 |
| FD03RD01(S/E) | 90.8 | 139.0 | 90.8 | 139.0 | 0.992 | MT | 183618 | 909.2 | 992.0 | 22.0 | 183618 |
| FD03EL01 | 89.6 | 103.0 | 89.6 | 103.0 | 1.226 | MT | 183618 | 1129.4 | 1226.0 | 21.7 | 183618 |
| FD03TE01(U/S) | 72.7 | 37.0 | 72.7 | 37.0 | 1.072 | GW | 183618 | 1146.3 | 1072.0 | 17.6 | 183618 |
| FD03TE01(D/S) | 72.7 | 52.0 | 72.7 | 52.0 | 1.089 | MT | 183618 | 1146.3 | 1089.0 | 17.6 | 183618 |
| FD03SP01 | 61.4 | 146.0 | 61.4 | 146.0 | 1.073 | GW | 218618 | 1157.6 | 1073.0 | 4.8 | 218618 |
| FD03SP02 US | 65.5 | 118.0 | 65.5 | 118.0 | 1.095 | GW | 148782 | 1153.5 | 1095.0 | 30.8 | 148782 |
| FD03SP02 DS | 51.8 | 109.0 | 51.8 | 109.0 | 1.107 | MT | 114614 | 1167.2 | 1107.0 | 44.5 | 114614 |
| FD03EL03 | 83.7 | 38.0 | 83.7 | 38.0 | 1.448 | MT | 195618 | 1135.3 | 1448.0 | 15.6 | 195618 |
| FD03SP03 | 35.6 | 82.0 | 35.6 | 82.0 | 1.198 | MT | 114614 | 1183.4 | 1198.0 | 30.6 | 114614 |
| FD03EL04 | 93.8 | 91.0 | 93.8 | 91.0 | 1.423 | MT | 195618 | 1125.2 | 1423.0 | 17.5 | 195618 |
| FD03SP04 US | 81.1 | 33.0 | 81.1 | 33.0 | 1.068 | MT | 195618 | 1137.9 | 1068.0 | 15.2 | 195618 |
| FD03SP04 DS | 65.5 | 130.0 | 65.5 | 130.0 | 1.089 | MT | 148782 | 1153.5 | 1089.0 | 30.8 | 148782 |
| FD03EL05 | 75.7 | 48.0 | 75.7 | 48.0 | 1.271 | MT | 148782 | 1143.3 | 1271.0 | 35.6 | 148782 |
| FD03SP05 | 51.2 | 33.0 | 51.2 | 33.0 | 1.076 | MT | 148782 | 1167.8 | 1076.0 | 24.1 | 148782 |
| FD03EL06 | 75.7 | 96.0 | 75.7 | 96.0 | 1.478 | MT | 148782 | 1143.3 | 1478.0 | 35.6 | 148782 |
| FD03SP06 | 65.5 | 144.0 | 65.5 | 144.0 | 1.004 | MT | 148782 | 1153.5 | 1004.0 | 30.8 | 148782 |
| FD03SP07 US | 60.5 | 69.0 | 60.5 | 69.0 | 1.168 | GW | 183618 | 1158.5 | 1168.0 | 14.7 | 183618 |
| ===>Grouped by Line: 002-16"-FDW-02, No Sorting. | | | | | | | | | | | |
| OUTLET P-1-1B | 162.2 | 199.0 | 162.2 | 199.0 | 0.869 | MT | 183618 | 837.8 | 869.0 | 39.3 | 183618 |
| FD02RD01(L/E) | 72.7 | 10.0 | 72.7 | 10.0 | 1.026 | MT | 218618 | 1146.3 | 1026.0 | 6.5 | 183618 |
| FD02RD01(S/E) | 90.8 | 8.0 | 90.8 | 8.0 | 1.052 | MT | 218618 | 909.2 | 1052.0 | 8.2 | 183618 |
| FD02TE01(U/S) | 61.4 | 12.0 | 61.4 | 12.0 | 1.086 | MT | 218618 | 1157.6 | 1086.0 | 6.5 | 148782 |
| FD02TE01(D/S) | 61.4 | 12.0 | 61.4 | 12.0 | 0.986 | MT | 218618 | 1157.6 | 986.0 | 6.5 | 148782 |
| FD02EL02 | 89.6 | 132.0 | 89.6 | 132.0 | 1.124 | MT | 183618 | 1129.4 | 1124.0 | 21.7 | 183618 |
| FD02SP02 US | 77.5 | 39.0 | 77.5 | 39.0 | 1.065 | MT | 183618 | 1141.5 | 1065.0 | 18.8 | 183618 |
| FD02SP02 DS | 56.9 | 30.0 | 56.9 | 30.0 | 1.065 | MT | 125911 | 1162.1 | 1065.0 | 39.4 | 125911 |
| FD02EL03 | 65.8 | 100.0 | 65.8 | 100.0 | 1.448 | MT | 125911 | 1153.2 | 1448.0 | 45.6 | 125911 |
| FD02SP03 US | 44.4 | 7.0 | 44.4 | 7.0 | 1.091 | MT | 125911 | 1174.6 | 1091.0 | 30.8 | 125911 |
| FD02SP04 DS | 53.7 | 100.0 | 53.7 | 100.0 | 1.161 | GW | 160352 | 1165.3 | 1161.0 | 21.5 | 160352 |
| FD02SP05 US | 53.7 | 93.0 | 53.7 | 93.0 | 1.184 | GW | 160352 | 1165.3 | 1184.0 | 21.5 | 160352 |
| FD02SP05 DS | 51.2 | 95.0 | 51.2 | 95.0 | 1.068 | MT | 148782 | 1167.8 | 1068.0 | 24.1 | 148782 |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 27-SEP-2006 Time: 12:46:28
Plant: Vermont Yankee  Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW06 3-P1s to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.176
Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD03EL03 | 1 | 3.600 | ------ | 1499843 |
| FD03EL04 | 4 | 4.036 | ------ | 1260810 |
| FD02RD01(S/E) | 18 | 4.091 | ------ | 776381 |
| FD02SP02 US | 54 | 3.491 | ------ | 270230 |
| OUTLET P-1-1C | 31 | 7.306 | ------ | 175505 |
| OUTLET P-1-1A | 31 | 7.306 | 47266 | ------ |
| FD03SP06 | 54 | 3.491 | ------ | 28898 |
| OUTLET P-1-1B | 31 | 7.306 | ------ | 96538 |
| FD02TE01(D/S) | 15 | 3.272 | ------ | 52925 |
| FD03RD01(S/E) | 18 | 4.091 | ------ | 568071 |
| FD01TE05(D/S) | 15 | 3.272 | ------ | 137548 |
| FD01RD01(S/E) | 18 | 4.091 | 364620 | ------ |
| FD01EL01 | 4 | 4.036 | ------ | 290144 |
| FD02RD01(L/E) | 18 | 3.272 | ------ | 193964 |
| FD02SP02 DS | 54 | 3.491 | ------ | 202067 |
| FD02EL05 | 2 | 4.036 | 1208492 | ------ |
| FD01RD01(L/E) | 18 | 3.272 | 211594 | ------ |
| FD02EL04 | 2 | 4.036 | 409425 | ------ |
| FD03RD01(L/E) | 18 | 3.272 | ------ | 267702 |
| FD01EL02 | 4 | 4.036 | ------ | 422143 |
| FD03EL07 | 2 | 4.036 | 1563290 | ------ |
| FD03EL05 | 2 | 4.036 | ------ | 774567 |
| FD03SP04 US | 54 | 3.491 | ------ | 292146 |
| FD01EL03 | 2 | 4.036 | 1558136 | ------ |
| FD03SP04 DS | 54 | 3.491 | ------ | 309875 |
| FD02EL01 | 4 | 4.036 | 613201 | ------ |
| FD03TE01(U/S) | 15 | 3.272 | ------ | 317066 |
| FD03EL01 | 4 | 4.036 | ------ | 685605 |
| FD03SP02 DS | 54 | 3.491 | ------ | 324035 |
| FD01EL05 | 2 | 4.036 | 409425 | ------ |
| FD03SP02 US | 54 | 3.491 | ------ | 329709 |
| FD02EL02 | 4 | 4.036 | ------ | 393996 |
| FD03SP07 DS | 52 | 2.727 | 333198 | ------ |
| FD03EL02 | 4 | 4.036 | 434357 | ------ |
| FD02SP05 DS | 52 | 2.727 | ------ | 336284 |
| FD03EL06 | 4 | 4.036 | ------ | 1366361 |
| FD02EL03 | 2 | 4.036 | ------ | 1252120 |
| FD03SP05 | 52 | 2.727 | ------ | 370134 |
| FD01EL04 | 2 | 4.036 | ------ | 393065 |
| FD03TE01(D/S) | 15 | 3.272 | ------ | 377008 |
| FD01SP03 US | 52 | 2.727 | ------ | 392205 |
| FD01SP02 DS | 54 | 3.491 | ------ | 464038 |
| FD01SP04 US | 52 | 2.727 | ------ | 402373 |
| FD01SP02 US | 54 | 3.491 | 436854 | ------ |
| FD02SP03 US | 52 | 2.727 | ------ | 405128 |
| FD02TE01(U/S) | 15 | 3.272 | ------ | 405523 |
| FD03SP01 | 58 | 2.400 | ------ | 498844 |
| FD01TE05(U/S) | 15 | 3.272 | ------ | 504251 |
| FD02SP04 DS | 52 | 2.727 | ------ | 740592 |
| FD01SP05 US | 52 | 2.727 | 758714 | ------ |
| FD02SP04 US | 52 | 2.727 | 758714 | ------ |
| FD01SP03 DS | 52 | 2.727 | 758714 | ------ |
| FD01SP04 DS | 52 | 2.727 | 758714 | ------ |
| FD02SP03 DS | 52 | 2.727 | 758714 | ------ |
| FD03SP07 US | 52 | 2.727 | ------ | 799092 |
| FD01SP05 DS | 52 | 2.727 | 849006 | ------ |
| FD02SP05 US | 52 | 2.727 | ------ | 837909 |
| FD01SP01 | 58 | 2.400 | 905575 | ------ |
| FD02SP01 | 58 | 2.400 | 905575 | ------ |
| FD03SP03 | 51 | 2.400 | ------ | 975741 |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 27-SEP-2006 Time: 12:45:35
Plant: Vermont Yankee Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: FDW06 3-Pls to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.170

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Thickness (in) Init. | Prd.(1) | Thoop | Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | |
| OUTLET P-1-1A | 1.000 | 0.798 | 0.769 | 0.769 | 47266 | ------ | 241618 |
| FD01RD01(L/E) | 1.219 | 1.024 | 0.964 | 0.964 | 211594 | ------ | 241618 |
| FD01RD01(S/E) | 1.000 | 0.898 | 0.769 | 0.769 | 364620 | ------ | 241618 |
| FD01EL01 | 1.219 | 1.066 | 0.964 | 0.964 | ------ | 290144 | 241618 |
| FD01TE05(U/S) | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 504251 | 241618 |
| FD01TE05(D/S) | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 137548 | 241618 |
| FD01SP01 | 1.219 | 1.153 | 0.964 | 0.964 | 905575 | ------ | 241618 |
| FD01EL02 | 1.219 | 1.112 | 0.964 | 0.964 | ------ | 422143 | 241618 |
| FD01SP02 US | 1.219 | 1.097 | 0.964 | 0.964 | 436854 | ------ | 241618 |
| FD01SP02 DS | 1.219 | 1.105 | 0.964 | 0.964 | ------ | 464038 | 241618 |
| FD01EL03 | 1.219 | 1.509 | 0.964 | 0.964 | 1558136 | ------ | 241618 |
| FD01SP03 US | 1.219 | 1.057 | 0.964 | 0.964 | ------ | 392205 | 241618 |
| FD01SP03 DS | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | 241618 |
| FD01EL04 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 393065 | 241618 |
| FD01SP04 US | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 402373 | 241618 |
| FD01SP04 DS | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | 241618 |
| FD01EL05 | 1.219 | 1.108 | 0.964 | 0.964 | 409425 | ------ | 241618 |
| FD01SP05 US | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | 241618 |
| FD01SP05 DS | 1.219 | 1.165 | 0.964 | 0.964 | 849006 | ------ | 241618 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | |
| OUTLET P-1-1C | 1.000 | 0.880 | 0.769 | 0.769 | ------ | 175505 | 241618 |
| FD03RD01(L/E) | 1.219 | 1.040 | 0.964 | 0.964 | ------ | 267702 | 241618 |
| FD03RD01(S/E) | 1.000 | 0.970 | 0.769 | 0.769 | ------ | 568071 | 241618 |
| FD03EL01 | 1.219 | 1.204 | 0.964 | 0.964 | ------ | 685605 | 241618 |
| FD03TE01(U/S) | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 317066 | 241618 |
| FD03TE01(D/S) | 1.219 | 1.071 | 0.964 | 0.964 | ------ | 377008 | 241618 |
| FD03SP01 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 498844 | 241618 |
| FD03EL02 | 1.219 | 1.116 | 0.964 | 0.964 | 434357 | ------ | 241618 |
| FD03SP02 US | 1.219 | 1.064 | 0.964 | 0.964 | ------ | 329709 | 241618 |
| FD03SP02 DS | 1.219 | 1.062 | 0.964 | 0.964 | ------ | 324035 | 241618 |
| FD03EL03 | 1.219 | 1.432 | 0.964 | 0.964 | ------ | 1499843 | 241618 |
| FD03SP03 | 1.219 | 1.167 | 0.964 | 0.964 | ------ | 975741 | 241618 |
| FD03EL04 | 1.219 | 1.405 | 0.964 | 0.964 | ------ | 1260810 | 241618 |
| FD03SP04 US | 1.219 | 1.053 | 0.964 | 0.964 | ------ | 292146 | 241618 |
| FD03SP04 DS | 1.219 | 1.058 | 0.964 | 0.964 | ------ | 309875 | 241618 |
| FD03EL05 | 1.219 | 1.235 | 0.964 | 0.964 | ------ | 774567 | 241618 |
| FD03SP05 | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 370134 | 241618 |
| FD03EL06 | 1.219 | 1.442 | 0.964 | 0.964 | ------ | 1366361 | 241618 |
| FD03SP06 | 1.219 | 0.973 | 0.964 | 0.964 | ------ | 28898 | 241618 |
| FD03EL07 | 1.219 | 1.511 | 0.964 | 0.964 | 1563290 | ------ | 241618 |
| FD03SP07 US | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 799092 | 241618 |
| FD03SP07 DS | 1.219 | 1.043 | 0.964 | 0.964 | 333198 | ------ | 241618 |
| ===>Grouped by Line: 002-16"-FDW-02, No Sorting. | | | | | | | |
| OUTLET P-1-1B | 1.000 | 0.830 | 0.769 | 0.769 | ------ | 96538 | 241618 |
| FD02RD01(L/E) | 1.219 | 1.019 | 0.964 | 0.964 | ------ | 193964 | 241618 |
| FD02RD01(S/E) | 1.000 | 1.044 | 0.769 | 0.769 | ------ | 776381 | 241618 |
| FD02EL01 | 1.219 | 1.179 | 0.964 | 0.964 | 613201 | ------ | 241618 |
| FD02TE01(U/S) | 1.219 | 1.079 | 0.964 | 0.964 | ------ | 405523 | 241618 |
| FD02TE01(D/S) | 1.219 | 0.979 | 0.964 | 0.964 | ------ | 52925 | 241618 |
| FD02SP01 | 1.219 | 1.153 | 0.964 | 0.964 | 905575 | ------ | 241618 |
| FD02EL02 | 1.219 | 1.102 | 0.964 | 0.964 | ------ | 393996 | 241618 |
| FD02SP02 US | 1.219 | 1.046 | 0.964 | 0.964 | ------ | 270230 | 241618 |
| FD02SP02 DS | 1.219 | 1.036 | 0.964 | 0.964 | ------ | 202067 | 241618 |
| FD02EL03 | 1.219 | 1.402 | 0.964 | 0.964 | ------ | 1252120 | 241618 |
| FD02SP03 US | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 405128 | 241618 |
| FD02SP03 DS | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | 241618 |
| FD02EL04 | 1.219 | 1.108 | 0.964 | 0.964 | 409425 | ------ | 241618 |
| FD02SP04 US | 1.219 | 1.144 | 0.964 | 0.964 | 758714 | ------ | 241618 |
| FD02SP04 DS | 1.219 | 1.139 | 0.964 | 0.964 | ------ | 740592 | 241618 |
| FD02EL05 | 1.219 | 1.387 | 0.964 | 0.964 | 1208492 | ------ | 241618 |
| FD02SP05 US | 1.219 | 1.162 | 0.964 | 0.964 | ------ | 837909 | 241618 |
| FD02SP05 DS | 1.219 | 1.044 | 0.964 | 0.964 | ------ | 336284 | 241618 |

Note:
(1) Predictions are based on last Tmeas to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 27-SEP-2006 Time: 12:44:53
Plant: Vermont Yankee Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW06 3-P1s to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore MFA Exclude Measure Wear: No
Line Correction Factor: 0.170

===>Grouped by Line: 001-16"-FDW-01, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 79 |
| FD01TE05(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 121 |
| FD01TE05(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 133 |
| FD01SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 88 |
| FD01SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 73 |
| FD01EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 48 |
| FD01SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 19 |
| FD01SP04 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 14 |
| FD01SP04 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 003-16"-FDW-03, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 112 |
| FD03RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 96 |
| FD03RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 139 |
| FD03EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 103 |
| FD03TE01(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 37 |
| FD03TE01(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 52 |
| FD03SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 146 |
| FD03EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 117 |
| FD03SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 109 |
| FD03EL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 38 |
| FD03SP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 82 |
| FD03EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 91 |
| FD03SP04 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 33 |
| FD03SP04 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 129 |
| FD03EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 48 |
| FD03SP05 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 33 |
| FD03EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 96 |
| FD03SP06 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 144 |
| FD03EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP07 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 69 |
| FD03SP07 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 002-16"-FDW-02, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET P-1-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 198 |
| FD02RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 10 |
| FD02RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 8 |
| FD02EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD02TE01(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 12 |
| FD02TE01(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 12 |
| FD02SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD02EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 132 |
| FD02SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 39 |
| FD02SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 125911 | ----- | | 30 |
| FD02EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 125911 | ----- | | 100 |
| FD02SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 125911 | ----- | | 6 |
| FD02SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD02EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD02SP04 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD02SP04 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 100 |
| FD02EL05 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD02SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 93 |
| FD02SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 95 |

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 27-SEP-2006 Time: [illegible]:43:44
Plant: Vermont Yankee  Analysis Date: 27-SEP-2006 Time: 12:40:33
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: FDW06 3-Pls to Hdr
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.170

===>Grouped by Line: 001-16"-FDW-01, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 31 | 7.306 | 5.547 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01RD01(L/E) | 18 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01RD01(S/E) | 18 | 4.091 | 3.106 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01EL01 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(U/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(D/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP01 | 58 | 2.400 | 1.822 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL02 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 US | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 DS | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL03 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL04 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL05 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |

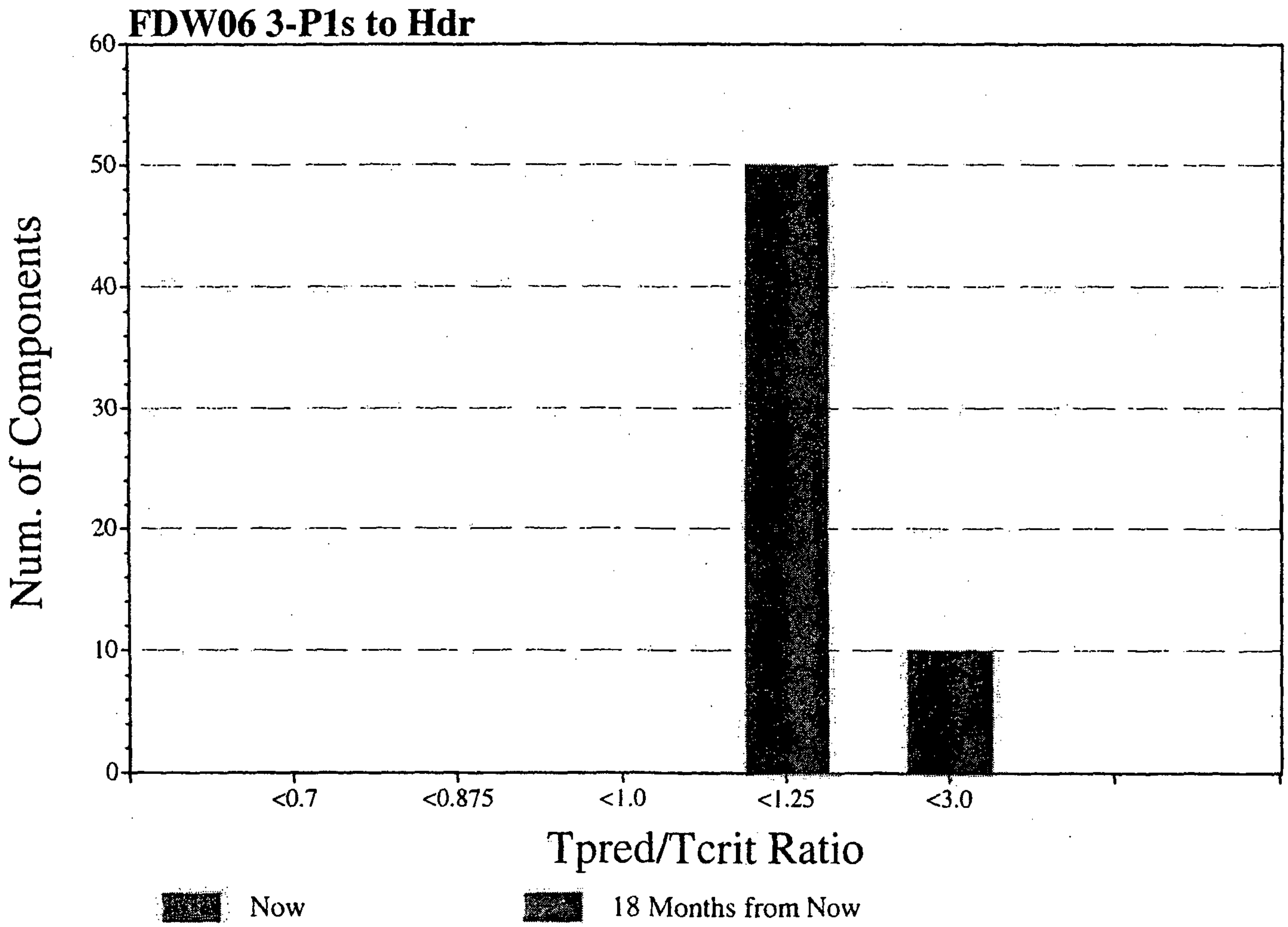
===>Grouped by Line: 003-16"-FDW-03, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 31 | 7.306 | 5.547 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03RD01(L/E) | 18 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03RD01(S/E) | 18 | 4.091 | 3.106 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03EL01 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(U/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(D/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP01 | 58 | 2.400 | 1.822 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL02 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 US | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 DS | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL03 | 1 | 3.600 | 2.733 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP03 | 51 | 2.400 | 1.822 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL04 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 US | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 DS | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL05 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP05 | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL06 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP06 | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL07 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |

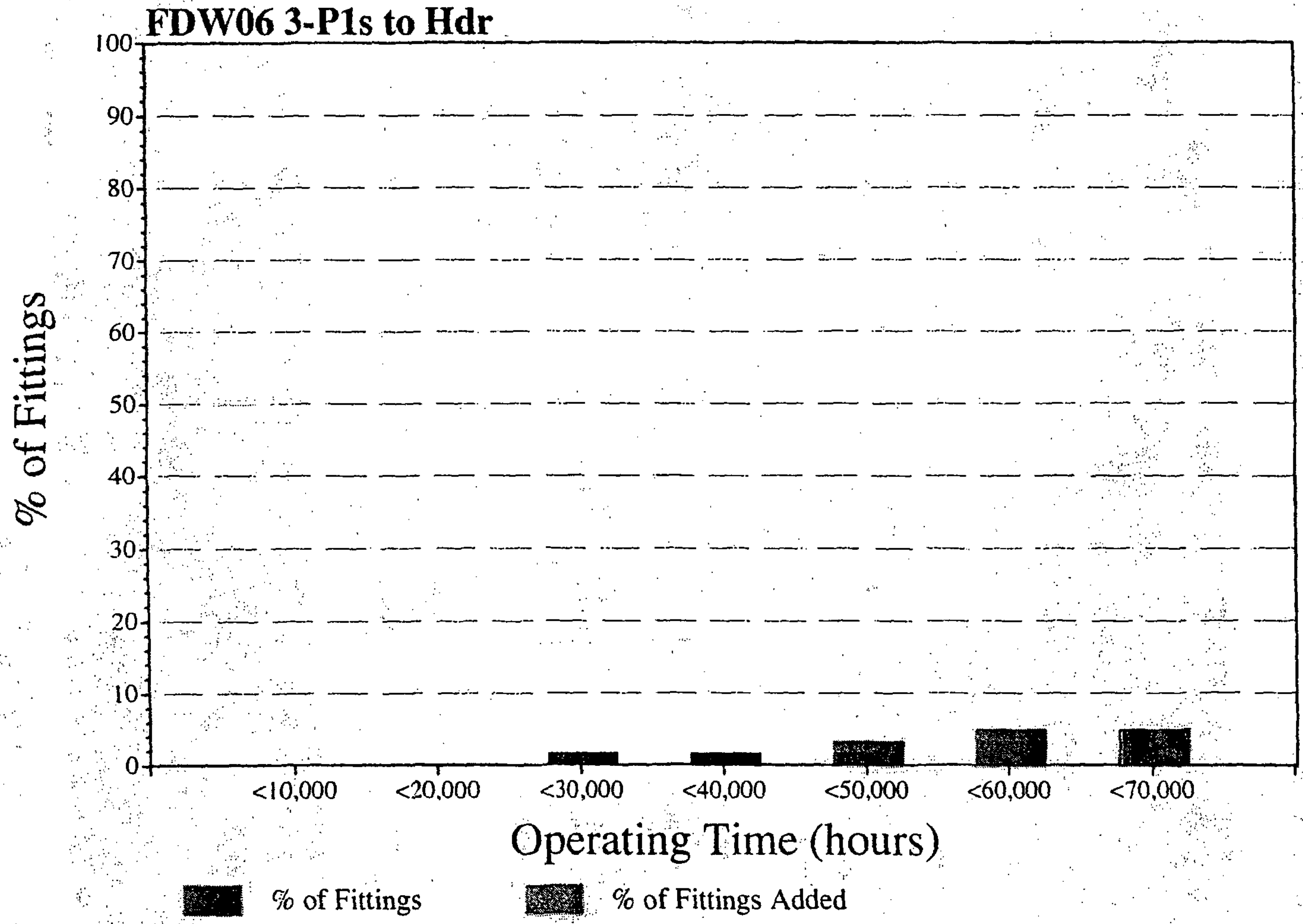
===>Grouped by Line: 002-16"-FDW-02, No Sorting.

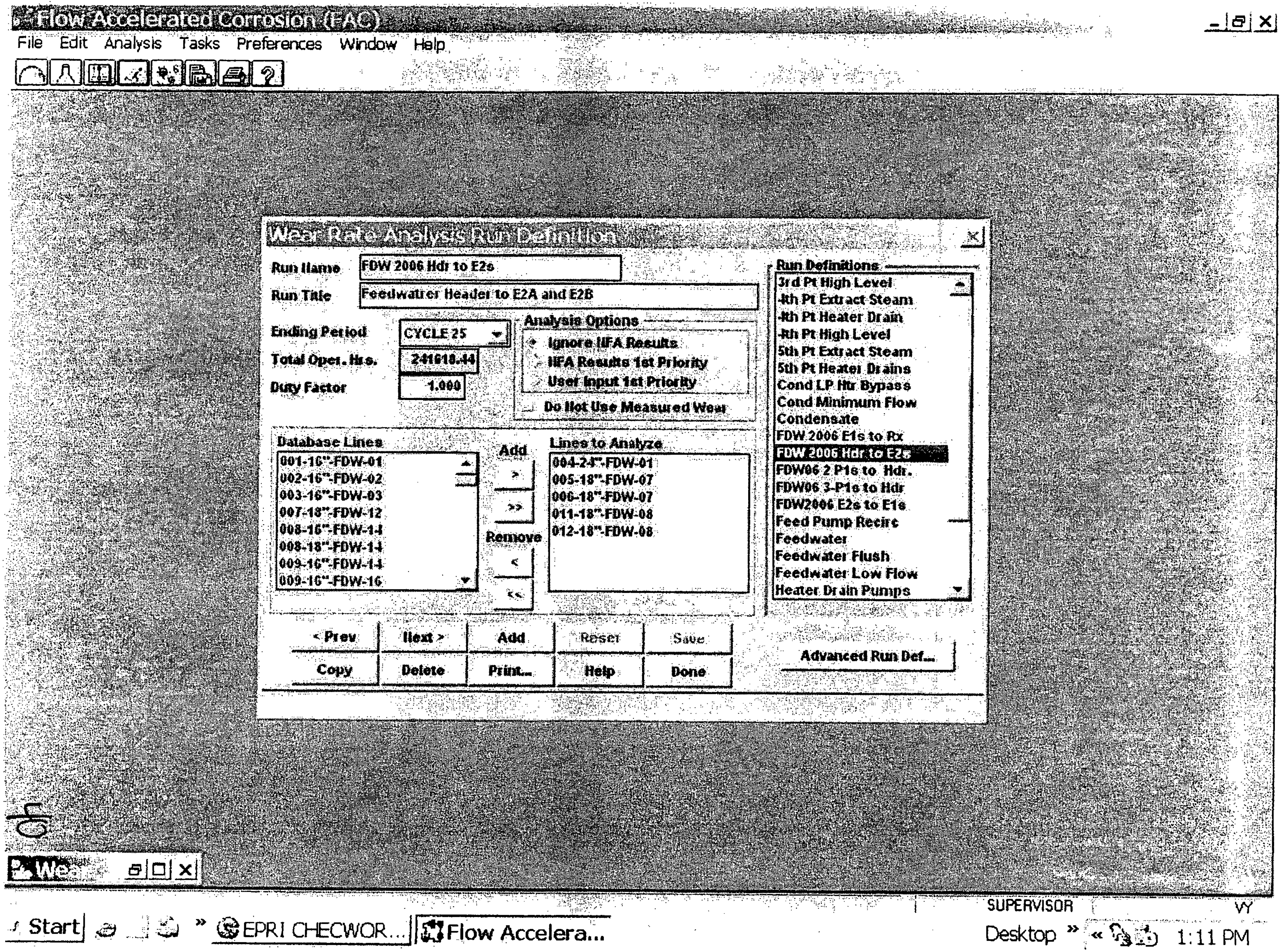
| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1B | 31 | 7.306 | 5.547 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD02RD01(L/E) | 18 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02RD01(S/E) | 18 | 4.091 | 3.106 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD02EL01 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02TE01(U/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02TE01(D/S) | 15 | 3.272 | 2.484 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP01 | 58 | 2.400 | 1.822 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02EL02 | 4 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP02 US | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP02 DS | 54 | 3.491 | 2.650 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02EL03 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP03 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP03 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02EL04 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP04 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP04 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02EL05 | 2 | 4.036 | 3.064 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP05 US | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD02SP05 DS | 52 | 2.727 | 2.070 | 296.9 | 15.456 | 0.000 | 16.000 |

# Tpred/Tcrit Ratio Plot

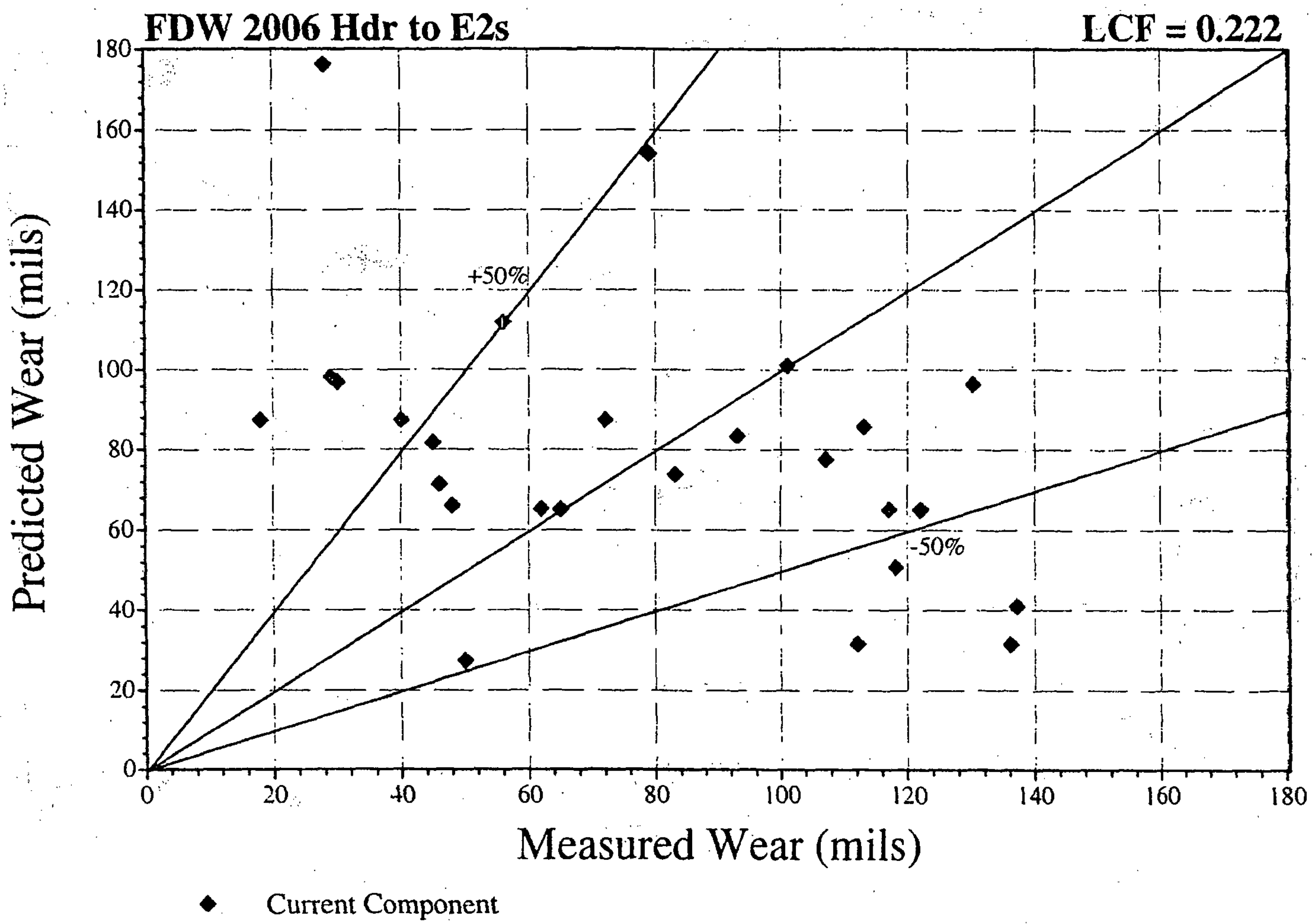


# Cumulative % of Comp. Time to Tcrit

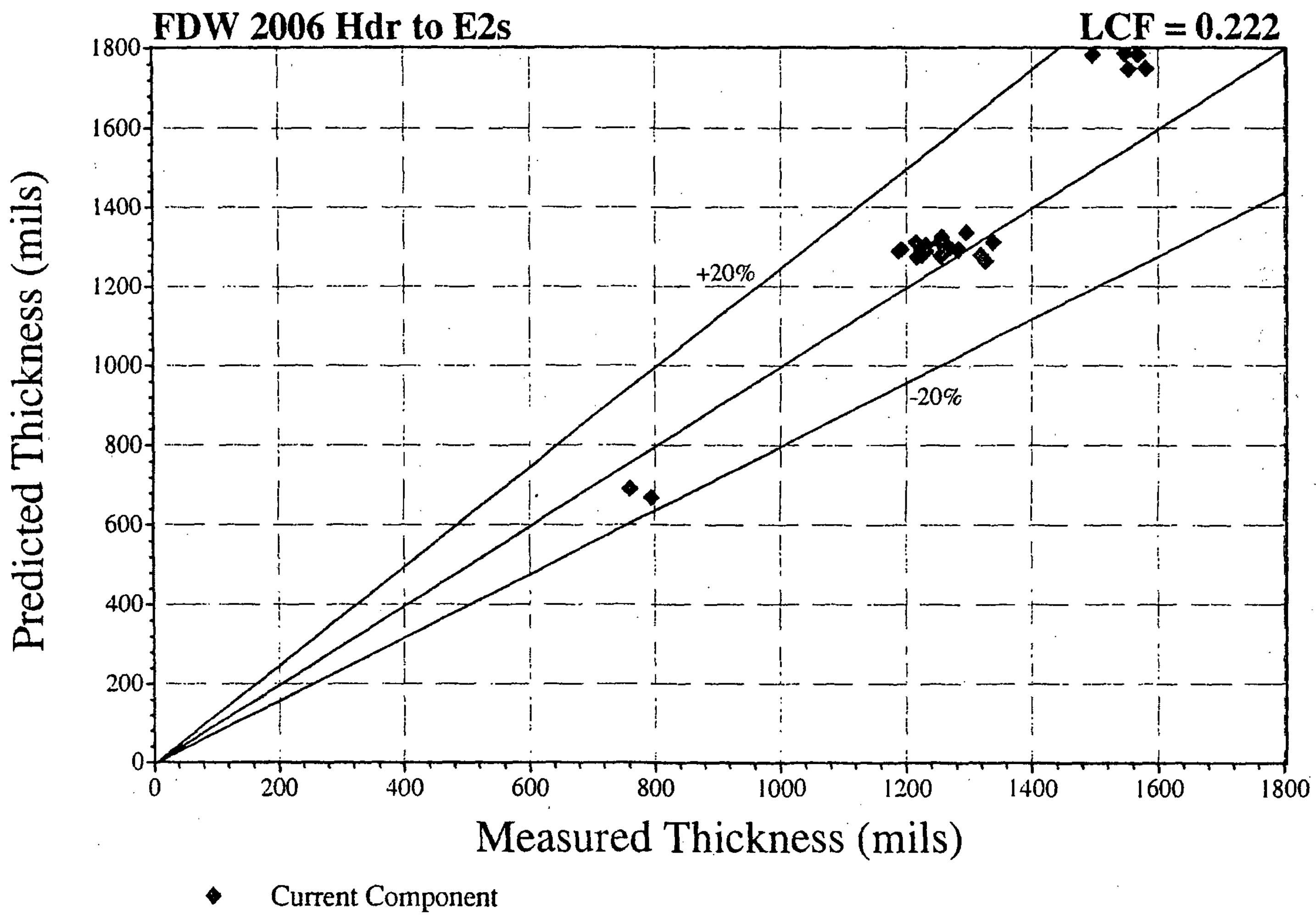



Flow Accelerated Corrosion (FAC)
File Edit Analysis Tasks Preferences Window Help
Wear Rate Analysis Run Definition
Run Name FDW 2006 Hdr to E2s
Run Title Feedwatrer Header to E2A and E2B
Ending Period CYCLE 25
Total Oper. Hrs. 241618.44
Duty Factor 1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
007-18"-FDW-12
008-16"-FDW-14
008-18"-FDW-14
009-16"-FDW-14
009-16"-FDW-16
Add
Remove
Lines to Analyze
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
011-18"-FDW-08
012-18"-FDW-08
Run Definitions
3rd Pt High Level
4th Pt Extract Steam
4th Pt Heater Drain
4th Pt High Level
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
VY
Desktop
1:11 PM

# Comparison of Wear Predictions



# Comparison of Thickness Predictions



Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
FB Name: VY

Report Date: 28-SEP-2006 Time: 10:33:51
Analysis Date: 28-SEP-2006 Time: 10:16:08
CHECWORKS FAC Version 1.0F (Build 52)

## *** Wear Rate Analysis: Combined Summary Report ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NFA Data Option: Ignore NFA
Line Correction Factor: 0.222

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | | | | | | | | | | | |
| FD01TE01(U/S) | 12 | 5.135 | 3.898 | 1.812 | 1.912 | 1.447 | 1.447 | 1045746 | ------ | --- | --- | --- | --- | 1.970 | MT | 125911 | ----- |
| FD01TE01(D/S) | 12 | 3.440 | 2.612 | 1.812 | 2.039 | 1.447 | 1.447 | 1987315 | ------ | --- | --- | --- | --- | 2.078 | MT | 125911 | ----- |
| FD01TE01(BR.) | 12 | 4.842 | 3.676 | 1.219 | 1.085 | 0.964 | 0.964 | 288256 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP06 DS | 62 | 1.678 | 1.274 | 1.812 | 1.552 | 1.447 | 1.447 | 724603 | ------ | --- | --- | --- | --- | 1.576 | MT | 102975 | ----- |
| FD01SP06 US | 62 | 1.678 | 1.274 | 1.812 | 1.480 | 1.447 | 1.447 | ------ | 230341 | 31.5 | 112.0 | 31.5 | 112.0 | 1.495 | MT | 148782 | 148782 |
| FD01TE02(U/S) | 12 | 5.135 | 3.898 | 1.812 | 1.662 | 1.447 | 1.447 | 483184 | ------ | --- | --- | --- | --- | 1.707 | MT | 148782 | ----- |
| FD01TE02(D/S) | 12 | 3.440 | 2.612 | 1.812 | 1.648 | 1.447 | 1.447 | 674066 | ------ | --- | --- | --- | --- | 1.678 | MT | 148782 | ----- |
| FD01TE02(BR.) | 12 | 4.842 | 3.676 | 1.219 | 1.664 | 0.964 | 0.964 | 1667572 | ------ | --- | --- | --- | --- | 1.707 | MT | 148782 | ----- |
| FD01SP07 US | 62 | 1.678 | 1.274 | 1.812 | 1.551 | 1.447 | 1.447 | ------ | 718560 | 31.5 | 136.0 | 31.5 | 136.0 | 1.566 | MT | 148782 | 148782 |
| FD01SP07 DS | 62 | 1.678 | 1.274 | 1.812 | 1.766 | 1.447 | 1.447 | 2193656 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01EL06 | 2 | 3.104 | 2.357 | 1.812 | 1.726 | 1.447 | 1.447 | 1039532 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP08 | 52 | 2.098 | 1.592 | 1.812 | 1.754 | 1.447 | 1.447 | 1691273 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01EL07 | 4 | 3.104 | 2.357 | 1.812 | 1.726 | 1.447 | 1.447 | 1039532 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP09 | 54 | 2.685 | 2.038 | 1.812 | 1.738 | 1.447 | 1.447 | 1251687 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01TE03(U/S) | 15 | 2.517 | 1.911 | 1.812 | 1.743 | 1.447 | 1.447 | 1356350 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01TE03(D/S) | 15 | 2.517 | 1.911 | 1.812 | 1.743 | 1.447 | 1.447 | 1356350 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP10 US | 65 | 1.678 | 1.274 | 1.812 | 1.766 | 1.447 | 1.447 | 2193656 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP10 DS | 65 | 1.678 | 1.274 | 1.812 | 1.526 | 1.447 | 1.447 | ------ | 545683 | 27.3 | 50.0 | 27.3 | 50.0 | 1.545 | MT | 125911 | 125911 |
| FD01TE04(U/S) | 12 | 5.135 | 3.898 | 1.812 | 2.750 | 1.447 | 1.447 | 2928970 | ------ | --- | --- | --- | --- | 2.808 | US | 125911 | ----- |
| FD01TE04(D/S) | 12 | 3.440 | 2.612 | 1.812 | 2.714 | 1.447 | 1.447 | 4251470 | ------ | --- | --- | --- | --- | 2.753 | US | 125911 | ----- |
| FD01TE04(BR.) | 12 | 4.842 | 3.676 | 1.219 | 1.085 | 0.964 | 0.964 | 288256 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL08 | 4 | 3.104 | 2.357 | 1.812 | 1.890 | 1.447 | 1.447 | 1647550 | ------ | --- | --- | --- | --- | 1.925 | US | 125911 | ----- |
| FD01SP11 | 54 | 2.685 | 2.038 | 1.812 | 1.543 | 1.447 | 1.447 | ------ | 413748 | 66.0 | 48.0 | 66.0 | 48.0 | 1.551 | MT | 207118 | 207118 |
| ===>Grouped by Line: 005-18"-FDW-07, No Sorting. | | | | | | | | | | | | | | | | | |
| FD07RD01(L/E) | 7 | 2.937 | 2.229 | 1.812 | 1.601 | 1.447 | 1.447 | 606823 | ------ | --- | --- | --- | --- | 1.643 | MT | 102975 | ----- |
| FD07RD01(S/E) | 7 | 3.932 | 2.985 | 1.375 | 1.247 | 1.085 | 1.085 | 475121 | ------ | --- | --- | --- | --- | 1.303 | MT | 102975 | ----- |
| FD07EL01 | 4 | 4.547 | 3.452 | 1.375 | 1.192 | 1.085 | 1.085 | ------ | 270300 | 100.9 | 101.0 | 100.9 | 101.0 | 1.216 | MT | 183618 | 183618 |
| FD07SP01 US | 54 | 3.932 | 2.985 | 1.375 | 1.210 | 1.085 | 1.085 | ------ | 366253 | 87.3 | 40.0 | 87.3 | 40.0 | 1.231 | MT | 183618 | 183618 |
| FD07SP01 DS | 54 | 3.932 | 2.985 | 1.375 | 1.237 | 1.085 | 1.085 | ------ | 445944 | 77.5 | 107.0 | 77.5 | 107.0 | 1.268 | GW | 160352 | 160352 |
| FD07EL02 | 2 | 4.547 | 3.452 | 1.375 | 1.292 | 1.085 | 1.085 | 525658 | ------ | --- | --- | --- | --- | 1.328 | MT | 160352 | ----- |
| FD07SP02 US | 52 | 3.072 | 2.332 | 1.375 | 1.201 | 1.085 | 1.085 | 434772 | ------ | --- | --- | --- | --- | 1.225 | MT | 160352 | ----- |
| FD07SP02 DS | 52 | 3.072 | 2.332 | 1.375 | 1.134 | 1.085 | 1.085 | 183485 | ------ | --- | --- | --- | --- | 1.140 | MT | 218618 | ----- |
| FD07EL03 | 2 | 4.547 | 3.452 | 1.375 | 1.312 | 1.085 | 1.085 | 575868 | ------ | --- | --- | --- | --- | 1.321 | US | 218618 | ----- |
| FD07RD02(L/E) | 7 | 4.301 | 3.265 | 1.375 | 1.235 | 1.085 | 1.085 | 402605 | ------ | --- | --- | --- | --- | 1.269 | US | 160352 | ----- |
| FD07RD02(S/E) | 7 | 7.568 | 5.746 | 0.844 | 0.709 | 0.648 | 0.648 | 93498 | ------ | --- | --- | --- | --- | 0.769 | MT | 160352 | ----- |
| FD07RD03(L/E) | 18 | 3.686 | 2.799 | 1.375 | 1.207 | 1.085 | 1.085 | ------ | 381770 | 85.7 | 113.0 | 85.7 | 113.0 | 1.223 | MT | 195618 | 195618 |
| FD07RD03(S/E) | 18 | 6.622 | 5.028 | 0.844 | 0.731 | 0.648 | 0.648 | ------ | 145051 | 153.9 | 79.0 | 153.9 | 79.0 | 0.760 | MT | 195618 | 195618 |
| FD07SP03 | 68 | 3.072 | 2.332 | 1.375 | 1.218 | 1.085 | 1.085 | ------ | 498190 | 71.4 | 46.0 | 71.4 | 46.0 | 1.231 | MT | 195618 | 195618 |
| FD07EL04 | 2 | 4.547 | 3.452 | 1.375 | 1.289 | 1.085 | 1.085 | ------ | 517283 | 96.3 | 130.0 | 96.3 | 130.0 | 1.318 | MT | 171740 | 171740 |
| FD07SP04 | 52 | 3.072 | 2.332 | 1.375 | 1.194 | 1.085 | 1.085 | ------ | 410460 | 65.0 | 117.0 | 65.0 | 117.0 | 1.214 | MT | 171740 | 171740 |
| FD07EL05 | 4 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP05 | 54 | 3.932 | 2.985 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP06 | 9 | 1.582 | 1.201 | 1.375 | 1.331 | 1.085 | 1.085 | 1796562 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL06 | 2 | 4.547 | 3.452 | 1.375 | 1.201 | 1.085 | 1.085 | 293952 | ------ | --- | --- | --- | --- | 1.230 | GW | 171740 | ----- |
| FD07SP07 | 52 | 3.072 | 2.332 | 1.375 | 1.318 | 1.085 | 1.085 | ------ | 876207 | 65.0 | 65.0 | 65.0 | 65.0 | 1.338 | GW | 171740 | 171740 |
| FD07EL07 | 2 | 4.547 | 3.452 | 1.375 | 1.159 | 1.085 | 1.085 | 187362 | ------ | --- | --- | --- | --- | 1.188 | MT | 171740 | ----- |
| FD07SP08 US | 52 | 3.072 | 2.332 | 1.375 | 1.233 | 1.085 | 1.085 | ------ | 556945 | 65.0 | 122.0 | 65.0 | 122.0 | 1.253 | MT | 171740 | 171740 |
| FD07SP08 DS | 52 | 3.072 | 2.332 | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL08 | 1 | 4.055 | 3.079 | 1.375 | 1.263 | 1.085 | 1.085 | 506853 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP09 | 51 | 2.703 | 2.052 | 1.375 | 1.232 | 1.085 | 1.085 | ------ | 627973 | 50.7 | 118.0 | 50.7 | 118.0 | 1.256 | MT | 148782 | 148782 |
| FD07EL09 | 4 | 4.547 | 3.452 | 1.375 | 1.195 | 1.085 | 1.085 | 278831 | ------ | --- | --- | --- | --- | 1.235 | MT | 148782 | ----- |
| FD07SP10 US | 54 | 3.932 | 2.985 | 1.375 | 1.186 | 1.085 | 1.085 | ------ | 297220 | 73.8 | 83.0 | 73.8 | 83.0 | 1.221 | MT | 148782 | 148782 |
| ===>Grouped by Line: 006-18"-FDW-07, No Sorting. | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 54 | 3.932 | 2.985 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07TE01(U/S) | 15 | 3.686 | 2.799 | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07TE01(D/S) | 15 | 3.686 | 2.799 | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL10 | 4 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP11 | 54 | 3.932 | 2.985 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL11 | 2 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL12 | 4 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| INLET E 2-1A | 30 | 4.915 | 3.732 | 1.375 | 1.239 | 1.085 | 1.085 | 362458 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 7 | 2.937 | 2.229 | 1.812 | 1.569 | 1.447 | 1.447 | ------ | 481418 | 65.2 | 62.0 | 55.2 | 62.0 | 1.578 | MT | 207118 | 183618 |
| FD08RD01(S/E) | 7 | 3.932 | 2.985 | 1.375 | 1.166 | 1.085 | 1.085 | ------ | 237140 | 87.3 | 18.0 | 87.3 | 18.0 | 1.187 | MT | 183618 | 183618 |
| FD08EL01 | 4 | 4.547 | 3.452 | 1.375 | 1.312 | 1.085 | 1.085 | ------ | 577058 | 111.8 | 56.0 | 111.8 | 56.0 | 1.326 | MT | 207118 | 207118 |
| FD08SP01 US | 54 | 3.932 | 2.985 | 1.375 | 1.212 | 1.085 | 1.085 | ------ | 373305 | 96.7 | 30.0 | 96.7 | 30.0 | 1.224 | MT | 207118 | 207118 |
| FD08SP01 DS | 54 | 3.932 | 2.985 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL02 | 2 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08RD02(L/E) | 7 | 4.301 | 3.265 | 1.375 | 1.194 | 1.085 | 1.085 | 292532 | ------ | --- | --- | --- | --- | 1.232 | MT | 148782 | ----- |
| FD08RD02(S/E) | 7 | 7.568 | 5.746 | 0.844 | 1.337 | 0.648 | 0.648 | 1050805 | ------ | --- | --- | --- | --- | 1.404 | MT | 148782 | ----- |
| FD08RD03(L/E) | 18 | 3.686 | 2.799 | 1.375 | 1.250 | 1.085 | 1.085 | ------ | 517393 | 98.0 | 29.0 | 98.0 | 29.0 | 1.254 | MT | 230118 | 230118 |
| FD08RD03(S/E) | 18 | 6.622 | 5.028 | 0.844 | 0.787 | 0.648 | 0.648 | ------ | 242886 | 176.1 | 28.0 | 176.1 | 28.0 | 0.794 | MT | 230118 | 230118 |
| FD08SP02 | 68 | 3.072 | 2.332 | 1.375 | 1.188 | 1.085 | 1.085 | ------ | 386542 | 81.7 | 45.0 | 81.7 | 45.0 | 1.191 | MT | 230118 | 230118 |
| FD08EL03 | 2 | 4.547 | 3.452 | 1.375 | 1.319 | 1.085 | 1.085 | 594251 | ------ | --- | --- | --- | --- | 1.384 | MT | 102975 | ----- |
| FD08SP03 US | 52 | 3.072 | 2.332 | 1.375 | 1.251 | 1.085 | 1.085 | ------ | 624167 | 40.9 | 137.0 | 40.9 | 137.0 | 1.295 | MT | 102975 | 102975 |
| FD08SP03 DS | 52 | 3.072 | 2.332 | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL04 | 4 | 4.547 | 3.452 | 1.375 | 1.280 | 1.085 | 1.085 | 493632 | ------ | --- | --- | --- | --- | 1.304 | GW | 183618 | ----- |
| FD08SP04 | 54 | 3.932 | 2.985 | 1.375 | 1.202 | 1.085 | 1.085 | ------ | 342778 | 87.3 | 72.0 | 87.3 | 72.0 | 1.223 | MT | 183618 | 183618 |
| FD08EL05 | 2 | 4.547 | 3.452 | 1.375 | 1.301 | 1.085 | 1.085 | 546927 | ------ | --- | --- | --- | --- | 1.325 | MT | 183618 | ----- |
| FD08SP05 US | 52 | 3.072 | 2.332 | 1.375 | 1.164 | 1.085 | 1.085 | 298389 | ------ | --- | --- | --- | --- | 1.181 | MT | 183618 | ----- |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD08SP05 US | 52 | 3.072 | 2.332 | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08TE01(U/S) | 15 | 3.686 | 2.799 | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08TE01(D/S) | 15 | 3.686 | 2.799 | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL06 | 4 | 4.547 | 3.452 | 1.375 | 1.299 | 1.085 | 1.085 | 542662 | ------ | --- | --- | --- | --- | 1.328 | MT | 171740 | ----- |
| FD08SP06 US | 54 | 3.932 | 2.985 | 1.375 | 1.257 | 1.085 | 1.085 | ------ | 504029 | 83.3 | 93.0 | 83.3 | 93.0 | 1.282 | GW | 171740 | 171740 |
| FD08SP06 DS | 54 | 3.932 | 2.985 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL07 | 2 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL08 | 4 | 4.547 | 3.452 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| INLET E-2-1B | 30 | 4.915 | 3.732 | 1.375 | 1.239 | 1.085 | 1.085 | 362458 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

Notes:

[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006 Time: 10:30:35
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006 Time: 10:16:08
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
WPA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.222

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | |
| FD01TE01(U/S) | 12 | 5.135 | 3.898 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE01(D/S) | 12 | 3.440 | 2.612 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE01(BR.) | 12 | 4.842 | 3.676 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP06 DS | 62 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP06 US | 62 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE02(U/S) | 12 | 5.135 | 3.898 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE02(D/S) | 12 | 3.440 | 2.612 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE02(BR.) | 12 | 4.842 | 3.676 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP07 US | 62 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP07 DS | 62 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01EL06 | 2 | 3.104 | 2.357 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP08 | 52 | 2.098 | 1.592 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01EL07 | 4 | 3.104 | 2.357 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP09 | 54 | 2.685 | 2.038 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE03(U/S) | 15 | 2.517 | 1.911 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE03(D/S) | 15 | 2.517 | 1.911 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP10 US | 65 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP10 DS | 65 | 1.678 | 1.274 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE04(U/S) | 12 | 5.135 | 3.898 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE04(D/S) | 12 | 3.440 | 2.612 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE04(BR.) | 12 | 4.842 | 3.676 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL08 | 4 | 3.104 | 2.357 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP11 | 54 | 2.685 | 2.038 | 296.9 | 6.847 | 0.000 | 24.000 |
| ===>Grouped by Line: 005-18"-FDW-07, No Sorting. | | | | | | | |
| FD07RD01(L/E) | 7 | 2.937 | 2.229 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD07RD01(S/E) | 7 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL01 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP01 US | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP01 DS | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL02 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP02 US | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP02 DS | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL03 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07RD02(L/E) | 7 | 4.301 | 3.265 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07RD02(S/E) | 7 | 7.568 | 5.746 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD07RD03(L/E) | 18 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07RD03(S/E) | 18 | 6.622 | 5.028 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD07SP03 | 68 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL04 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP04 | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL05 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP05 | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP06 | 9 | 1.582 | 1.201 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL06 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP07 | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL07 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP08 US | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP08 DS | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL08 | 1 | 4.055 | 3.079 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP09 | 51 | 2.703 | 2.052 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL09 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP10 US | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| ===>Grouped by Line: 006-18"-FDW-07, No Sorting. | | | | | | | |
| FD07SP10 DS | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07TE01(U/S) | 15 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07TE01(D/S) | 15 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL10 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP11 | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL11 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL12 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| INLET E-2-1A | 30 | 4.915 | 3.732 | 296.9 | 12.224 | 0.000 | 18.000 |
| ===>Grouped by Line: 011-18"-FDW-08, No Sorting. | | | | | | | |
| FD08RD01(L/E) | 7 | 2.937 | 2.229 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD08RD01(S/E) | 7 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL01 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP01 US | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP01 DS | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL02 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD02(L/E) | 7 | 4.301 | 3.265 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD02(S/E) | 7 | 7.568 | 5.746 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD08RD03(L/E) | 18 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD03(S/E) | 18 | 6.622 | 5.028 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD08SP02 | 68 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL03 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP03 US | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP03 DS | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FDORELO4 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORSP04 | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORELO5 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORSP05 US | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |

===-Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FDORSP05 DS | 52 | 3.072 | 2.332 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORTE01(U/S) | 15 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORTE01(D/S) | 15 | 3.686 | 2.799 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDOREL06 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORSP06 US | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDORSP06 DS | 54 | 3.932 | 2.985 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDOREL07 | 2 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| FDOREL08 | 4 | 4.547 | 3.452 | 296.9 | 12.224 | 0.000 | 18.000 |
| INLET E-2-1B | 30 | 4.915 | 3.732 | 296.9 | 12.224 | 0.000 | 18.000 |

Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006 Time: 10:30:41
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006 Time: 10:16:08
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.222

===>Grouped by Line: 004-24"-FDW-01, No Sorting.

| Component Name | Geom. Code | No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD01TE01(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE01(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE01(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP06 DS | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP06 US | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 112 |
| FD01TE02(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE02(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE02(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP07 US | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 136 |
| FD01SP07 DS | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL07 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP09 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE03(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE03(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP10 US | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP10 DS | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 125911 | ----- | | 50 |
| FD01TE04(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE04(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE04(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL08 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | | 48 |

===>Grouped by Line: 005-18"-FDW-07, No Sorting.

| Component Name | Geom. Code | No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD07RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 100 |
| FD07SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 40 |
| FD07SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 107 |
| FD07EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD03(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 113 |
| FD07RD03(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 79 |
| FD07SP03 | 68 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 46 |
| FD07EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 130 |
| FD07SP04 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 117 |
| FD07EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP05 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP06 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP07 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 65 |
| FD07EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP08 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 122 |
| FD07SP08 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL08 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP09 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 118 |
| FD07EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP10 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 83 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| Component Name | Geom. Code | No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL10 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL11 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL12 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| INLET E-2-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| Component Name | Geom. Code | No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 62 |
| FD08RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 18 |
| FD08EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | | 55 |
| FD08SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | | 29 |
| FD08SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD08EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD08RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD08RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD08RD03(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 29 |
| FD08RD03(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 27 |
| FD08SP02 | 68 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 45 |
| FD08EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD08SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 117 |
| FD08SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD08EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP04 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | 72 |
| FD08EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD08SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP06 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 93 |
| FD08SP06 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL08 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET E-2-1B | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 28-SEP-2006 Time: 10:10:45
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006 Time: 10:16:08
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.222

===>Grouped by Line: 004-24"-FDW-01, No Sorting.

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| FD01TE01(U/S) | 1.812 | 1.912 | 1.447 | 1.447 | 1045746 | ------ | 241618 |
| FD01TE01(D/S) | 1.812 | 2.039 | 1.447 | 1.447 | 1987315 | ------ | 241618 |
| FD01TE01(BR.) | 1.219 | 1.085 | 0.964 | 0.964 | 288256 | ------ | 241618 |
| FD01SP06 DS | 1.812 | 1.552 | 1.447 | 1.447 | 724603 | ------ | 241618 |
| FD01SP06 US | 1.812 | 1.480 | 1.447 | 1.447 | ------ | 230341 | 241618 |
| FD01TE02(U/S) | 1.812 | 1.662 | 1.447 | 1.447 | 483184 | ------ | 241618 |
| FD01TE02(D/S) | 1.812 | 1.648 | 1.447 | 1.447 | 674066 | ------ | 241618 |
| FD01TE02(BR.) | 1.219 | 1.664 | 0.964 | 0.964 | 1667572 | ------ | 241618 |
| FD01SP07 US | 1.812 | 1.551 | 1.447 | 1.447 | ------ | 718560 | 241618 |
| FD01SP07 DS | 1.812 | 1.766 | 1.447 | 1.447 | 2193656 | ------ | 241618 |
| FD01EL06 | 1.812 | 1.726 | 1.447 | 1.447 | 1039532 | ------ | 241618 |
| FD01SP08 | 1.812 | 1.754 | 1.447 | 1.447 | 1691273 | ------ | 241618 |
| FD01EL07 | 1.812 | 1.726 | 1.447 | 1.447 | 1039532 | ------ | 241618 |
| FD01SP09 | 1.812 | 1.738 | 1.447 | 1.447 | 1251687 | ------ | 241618 |
| FD01TE03(U/S) | 1.812 | 1.743 | 1.447 | 1.447 | 1356350 | ------ | 241618 |
| FD01TE03(D/S) | 1.812 | 1.743 | 1.447 | 1.447 | 1356350 | ------ | 241618 |
| FD01SP10 US | 1.812 | 1.766 | 1.447 | 1.447 | 2193656 | ------ | 241618 |
| FD01SP10 DS | 1.812 | 1.526 | 1.447 | 1.447 | ------ | 545683 | 241618 |
| FD01TE04(U/S) | 1.812 | 2.750 | 1.447 | 1.447 | 2928970 | ------ | 241618 |
| FD01TE04(D/S) | 1.812 | 2.714 | 1.447 | 1.447 | 4251470 | ------ | 241618 |
| FD01TE04(BR.) | 1.219 | 1.085 | 0.964 | 0.964 | 288256 | ------ | 241618 |
| FD01EL08 | 1.812 | 1.890 | 1.447 | 1.447 | 1647550 | ------ | 241618 |
| FD01SP11 | 1.812 | 1.543 | 1.447 | 1.447 | ------ | 413748 | 241618 |

===>Grouped by Line: 005-18"-FDW-07, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07RD01(L/E) | 1.812 | 1.601 | 1.447 | 1.447 | 606823 | ------ | 241618 |
| FD07RD01(S/E) | 1.375 | 1.247 | 1.085 | 1.085 | 475131 | ------ | 241618 |
| FD07EL01 | 1.375 | 1.192 | 1.085 | 1.085 | ------ | 270300 | 241618 |
| FD07SP01 US | 1.375 | 1.210 | 1.085 | 1.085 | ------ | 366253 | 241618 |
| FD07SP01 DS | 1.375 | 1.237 | 1.085 | 1.085 | ------ | 445944 | 241618 |
| FD07EL02 | 1.375 | 1.292 | 1.085 | 1.085 | 525658 | ------ | 241618 |
| FD07SP02 US | 1.375 | 1.201 | 1.085 | 1.085 | 434772 | ------ | 241618 |
| FD07SP02 DS | 1.375 | 1.134 | 1.085 | 1.085 | 183485 | ------ | 241618 |
| FD07EL03 | 1.375 | 1.312 | 1.085 | 1.085 | 575868 | ------ | 241618 |
| FD07RD02(L/E) | 1.375 | 1.235 | 1.085 | 1.085 | 402605 | ------ | 241618 |
| FD07RD02(S/E) | 0.844 | 0.709 | 0.648 | 0.648 | 93498 | ------ | 241618 |
| FD07RD03(L/E) | 1.375 | 1.207 | 1.085 | 1.085 | ------ | 381770 | 241618 |
| FD07RD03(S/E) | 0.844 | 0.731 | 0.648 | 0.648 | ------ | 145051 | 241618 |
| FD07SP03 | 1.375 | 1.218 | 1.085 | 1.085 | ------ | 498190 | 241618 |
| FD07EL04 | 1.375 | 1.289 | 1.085 | 1.085 | ------ | 517283 | 241618 |
| FD07SP04 | 1.375 | 1.194 | 1.085 | 1.085 | ------ | 410460 | 241618 |
| FD07EL05 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| FD07SP05 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | 241618 |
| FD07SP06 | 1.375 | 1.331 | 1.085 | 1.085 | 1796562 | ------ | 241618 |
| FD07EL06 | 1.375 | 1.201 | 1.085 | 1.085 | 293952 | ------ | 241618 |
| FD07SP07 | 1.375 | 1.318 | 1.085 | 1.085 | ------ | 876207 | 241618 |
| FD07EL07 | 1.375 | 1.159 | 1.085 | 1.085 | 187362 | ------ | 241618 |
| FD07SP08 US | 1.375 | 1.233 | 1.085 | 1.085 | ------ | 556945 | 241618 |
| FD07SP08 DS | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | 241618 |
| FD07EL08 | 1.375 | 1.263 | 1.085 | 1.085 | 506853 | ------ | 241618 |
| FD07SP09 | 1.375 | 1.232 | 1.085 | 1.085 | ------ | 627973 | 241618 |
| FD07EL09 | 1.375 | 1.195 | 1.085 | 1.085 | 278831 | ------ | 241618 |
| FD07SP10 US | 1.375 | 1.186 | 1.085 | 1.085 | ------ | 297220 | 241618 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | 241618 |
| FD07TE01(U/S) | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | 241618 |
| FD07TE01(D/S) | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | 241618 |
| FD07EL10 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| FD07SP11 | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | 241618 |
| FD07EL11 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| FD07EL12 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| INLET E-2-1A | 1.375 | 1.239 | 1.085 | 1.085 | 362458 | ------ | 241618 |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 1.812 | 1.569 | 1.447 | 1.447 | ------ | 481418 | 241618 |
| FD08RD01(S/E) | 1.375 | 1.166 | 1.085 | 1.085 | ------ | 237140 | 241618 |
| FD08EL01 | 1.375 | 1.312 | 1.085 | 1.085 | ------ | 577058 | 241618 |
| FD08SP01 US | 1.375 | 1.212 | 1.085 | 1.085 | ------ | 373305 | 241618 |
| FD08SP01 DS | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | 241618 |
| FD08EL02 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| FD08RD02(L/E) | 1.375 | 1.194 | 1.085 | 1.085 | 292532 | ------ | 241618 |
| FD08RD02(S/E) | 0.844 | 1.337 | 0.648 | 0.648 | 1050805 | ------ | 241618 |
| FD08RD03(L/E) | 1.375 | 1.250 | 1.085 | 1.085 | ------ | 517393 | 241618 |
| FD08RD03(S/E) | 0.844 | 0.787 | 0.648 | 0.648 | ------ | 242986 | 241618 |
| FD08SP02 | 1.375 | 1.288 | 1.085 | 1.085 | ------ | 386542 | 241618 |
| FD08EL03 | 1.375 | 1.319 | 1.085 | 1.085 | 594251 | ------ | 241618 |
| FD08SP03 US | 1.375 | 1.251 | 1.085 | 1.085 | ------ | 623167 | 241618 |
| FD08SP03 DS | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | 241618 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08EL04 | 1.375 | 1.290 | 1.085 | 1.085 | 403632 | ------ | 241618 |
| FD08SP04 | 1.375 | 1.202 | 1.085 | 1.085 | ------ | 342778 | 241618 |
| FD08EL05 | 1.375 | 1.301 | 1.085 | 1.085 | 546927 | ------ | 241618 |
| FD08SP05 US | 1.375 | 1.164 | 1.085 | 1.085 | 228389 | ------ | 241618 |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08SP05 DS | 1.375 | 1.290 | 1.085 | 1.085 | 770890 | ------ | 241618 |
| FD08TE01(U/S) | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | 241618 |
| FD08TE01(D/S) | 1.375 | 1.273 | 1.085 | 1.085 | 589364 | ------ | 241618 |
| FD08EL06 | 1.375 | 1.299 | 1.085 | 1.085 | 542662 | ------ | 241618 |
| FD08SP06 US | 1.375 | 1.257 | 1.085 | 1.085 | ------ | 504029 | 241618 |
| FD08SP06 DS | 1.375 | 1.267 | 1.085 | 1.085 | 532638 | ------ | 241618 |
| FD08EL07 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| FD08EL08 | 1.375 | 1.250 | 1.085 | 1.085 | 417651 | ------ | 241618 |
| INLET E-2-1B | 1.375 | 1.239 | 1.085 | 1.085 | 362458 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

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Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 10:30:49
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 10:16:08
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.222
Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD07EL08 | 1 | 4.055 | 506853 | ------ |
| FD07EL07 | 2 | 4.547 | 187362 | ------ |
| FD08RD02(S/E) | 7 | 7.568 | 1050805 | ------ |
| FD07SP10 DS | 54 | 3.932 | 532638 | ------ |
| FD01TE02(U/S) | 12 | 5.135 | 483184 | ------ |
| FD07RD02(S/E) | 7 | 7.568 | 93498 | ------ |
| FD07RD03(S/E) | 18 | 6.622 | ------ | 145051 |
| FD08RD03(S/E) | 18 | 6.622 | ------ | 242886 |
| FD07SP02 DS | 52 | 3.072 | 183485 | ------ |
| FD01TE01(U/S) | 12 | 5.135 | 1045746 | ------ |
| FD01SP06 US | 62 | 1.678 | ------ | 230341 |
| FD01TE04(U/S) | 12 | 5.135 | 2928970 | ------ |
| FD08RD01(S/E) | 7 | 3.932 | ------ | 237140 |
| INLET E-2-1A | 30 | 4.915 | 362458 | ------ |
| FD07EL01 | 4 | 4.547 | ------ | 270300 |
| INLET E-2-1B | 30 | 4.915 | 362458 | ------ |
| FD07EL09 | 4 | 4.547 | 278831 | ------ |
| FD01TE01(BR.) | 12 | 4.842 | 288256 | ------ |
| FD01TE04(BR.) | 12 | 4.842 | 288256 | ------ |
| FD01TE02(BR.) | 12 | 4.842 | 1667573 | ------ |
| FD08RD02(L/E) | 7 | 4.301 | 292532 | ------ |
| FD07EL06 | 2 | 4.547 | 293952 | ------ |
| FD07SP10 US | 54 | 3.932 | ------ | 297220 |
| FD08EL04 | 4 | 4.547 | 493632 | ------ |
| FD08SP05 US | 52 | 3.072 | 298389 | ------ |
| FD07EL11 | 2 | 4.547 | 417651 | ------ |
| FD08SP04 | 54 | 3.932 | ------ | 342778 |
| FD07EL04 | 2 | 4.547 | ------ | 517283 |
| FD08EL06 | 4 | 4.547 | 542662 | ------ |
| FD07EL02 | 2 | 4.547 | 525658 | ------ |
| FD07SP01 US | 54 | 3.932 | ------ | 366253 |
| FD08EL07 | 2 | 4.547 | 417651 | ------ |
| FD08SP01 US | 54 | 3.932 | ------ | 373305 |
| FD07EL03 | 2 | 4.547 | 575868 | ------ |
| FD07RD03(L/E) | 18 | 3.686 | ------ | 381770 |
| FD07EL10 | 4 | 4.547 | 417651 | ------ |
| FD08SP02 | 68 | 3.072 | ------ | 386542 |
| FD07RD02(L/E) | 7 | 4.301 | 402605 | ------ |
| FD07EL12 | 4 | 4.547 | 417651 | ------ |
| FD07SP04 | 52 | 3.072 | ------ | 410460 |
| FD07EL05 | 4 | 4.547 | 417651 | ------ |
| FD01SP11 | 54 | 2.685 | ------ | 413748 |
| FD08EL03 | 2 | 4.547 | 594251 | ------ |
| FD08EL02 | 2 | 4.547 | 417651 | ------ |
| FD08EL08 | 4 | 4.547 | 417651 | ------ |
| FD08EL01 | 4 | 4.547 | ------ | 577058 |
| FD08EL05 | 2 | 4.547 | 546927 | ------ |
| FD07SP02 US | 52 | 3.072 | 434772 | ------ |
| FD07SP01 DS | 54 | 3.932 | ------ | 445944 |
| FD07RD01(S/E) | 7 | 3.932 | 475121 | ------ |
| FD07SP11 | 54 | 3.932 | 532638 | ------ |
| FD08RD01(L/E) | 7 | 2.937 | ------ | 481418 |
| FD07SP03 | 68 | 3.072 | ------ | 498190 |
| FD08SP06 US | 54 | 3.932 | ------ | 504029 |
| FD08RD03(L/E) | 18 | 3.686 | ------ | 517393 |
| FD07SP05 | 54 | 3.932 | 532638 | ------ |
| FD08SP01 DS | 54 | 3.932 | 532638 | ------ |
| FD08SP06 DS | 54 | 3.932 | 532638 | ------ |
| FD08TE01(D/S) | 15 | 3.686 | 589364 | ------ |
| FD07TE01(U/S) | 15 | 3.686 | 589364 | ------ |
| FD01SP10 DS | 65 | 1.678 | ------ | 545683 |
| FD07TE01(D/S) | 15 | 3.686 | 589364 | ------ |
| FD08TE01(U/S) | 15 | 3.686 | 589364 | ------ |
| FD07SP08 US | 52 | 3.072 | ------ | 556945 |
| FD01TE01(D/S) | 12 | 3.440 | 1987315 | ------ |
| FD01TE04(D/S) | 12 | 3.440 | 4251470 | ------ |
| FD01TE02(D/S) | 12 | 3.440 | 674066 | ------ |
| FD01EL07 | 4 | 3.104 | 1039532 | ------ |
| FD01EL08 | 4 | 3.104 | 1647550 | ------ |
| FD01EL06 | 2 | 3.104 | 1039532 | ------ |
| FD08SP05 DS | 52 | 3.072 | 770890 | ------ |
| FD07RD01(L/E) | 7 | 2.937 | 606823 | ------ |
| FD08SP03 DS | 52 | 3.072 | 770890 | ------ |
| FD08SP03 US | 52 | 3.072 | ------ | 624167 |
| FD07SP09 | 51 | 2.703 | ------ | 627973 |
| FD01SP07 US | 62 | 1.678 | ------ | 718560 |
| FD07SP07 | 52 | 3.072 | ------ | 876207 |
| FD01SP05 DS | 62 | 1.678 | 724603 | ------ |
| FD07SP08 DS | 52 | 3.072 | 770890 | ------ |
| FD01SP09 | 54 | 2.685 | 1251687 | ------ |
| FD01TE03(U/S) | 15 | 2.517 | 1356350 | ------ |
| FD01TE03(D/S) | 15 | 2.517 | 1356350 | ------ |
| FD01SP08 | 52 | 2.098 | 1691271 | ------ |
| FD01SP06 | 9 | 1.582 | 1796562 | ------ |
| FD01SP07 DS | 62 | 1.678 | 2133656 | ------ |

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| | | | | |
|---|---|---|---|---|
| FD01SP10 US | 65 | 1.678 | 2193656 | ------ |

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Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 10:30:53
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 10:15:08
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

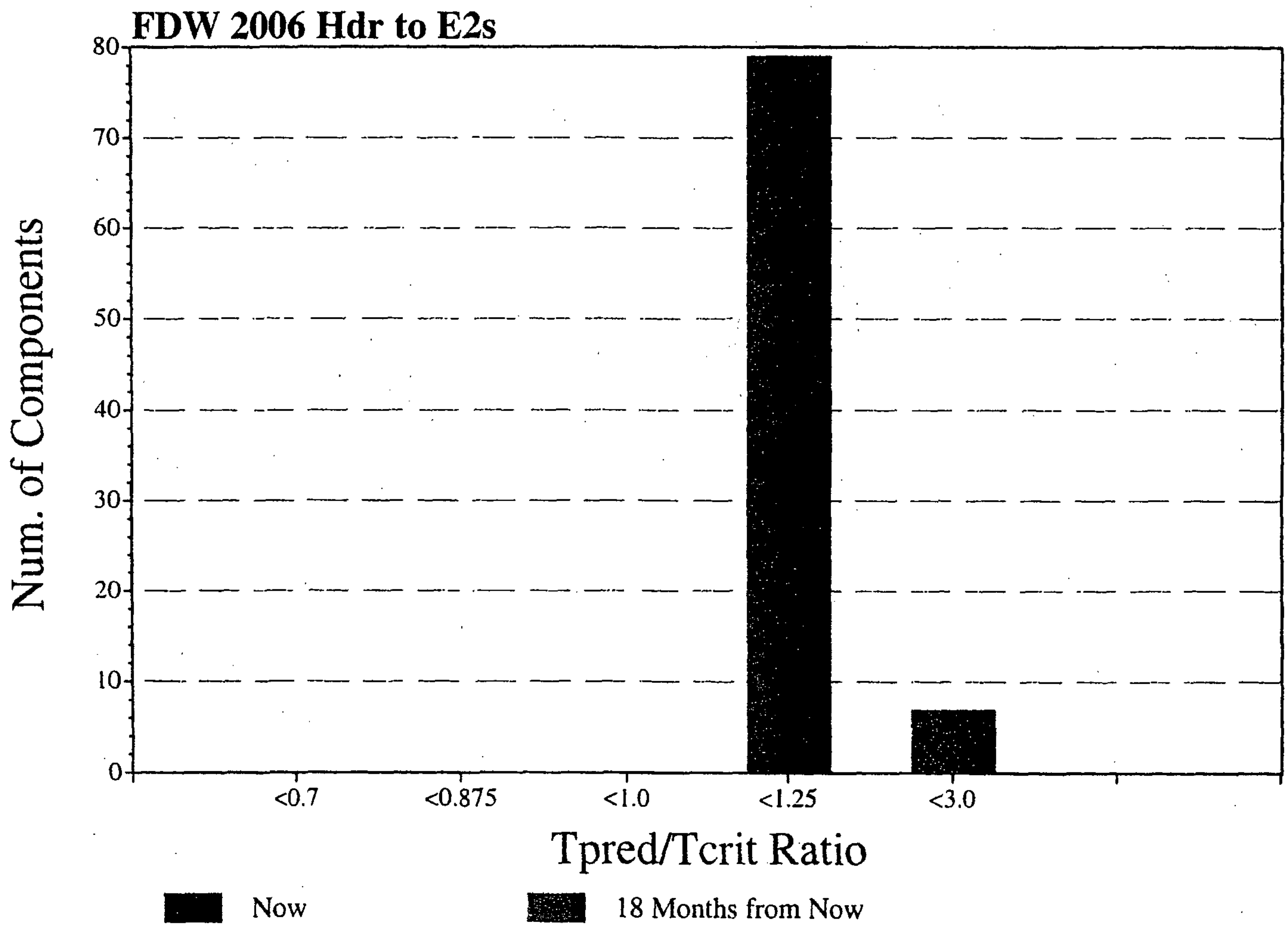
*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: FDW 2006 Hdr to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.222

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | Method [2] | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | Tm | Incremental Wear (mils)[5] PRWEAR | Time (hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | | | | | |
| FD01SP06 US | 31.5 | 112.0 | 31.5 | 112.0 | 1.495 | MT | 148782 | 1780.5 | 1495.0 | 14.8 | 148782 |
| FD01SP07 US | 31.5 | 136.0 | 31.5 | 136.0 | 1.566 | MT | 148782 | 1780.5 | 1566.0 | 14.8 | 148782 |
| FD01SP10 DS | 27.3 | 50.0 | 27.3 | 50.0 | 1.545 | MT | 135911 | 1784.7 | 1545.0 | 18.9 | 135911 |
| FD01SP11 | 66.0 | 48.0 | 66.0 | 48.0 | 1.551 | MT | 207118 | 1746.0 | 1551.0 | 8.0 | 207118 |
| ===>Grouped by Line: 005-18"-FDW-07, No Sorting. | | | | | | | | | | | |
| FD07EL01 | 100.9 | 101.0 | 100.9 | 101.0 | 1.216 | MT | 183618 | 1274.1 | 1216.0 | 24.5 | 183618 |
| FD07SP01 US | 87.3 | 40.0 | 87.3 | 40.0 | 1.231 | MT | 183618 | 1287.7 | 1231.0 | 21.2 | 183618 |
| FD07SP01 DS | 77.5 | 107.0 | 77.5 | 107.0 | 1.268 | GW | 160352 | 1297.5 | 1268.0 | 31.0 | 160352 |
| FD07RD03(L/E) | 85.7 | 113.0 | 85.7 | 113.0 | 1.223 | MT | 195618 | 1289.3 | 1223.0 | 16.0 | 195618 |
| FD07RD03(S/E) | 153.9 | 79.0 | 153.9 | 79.0 | 0.760 | MT | 195618 | 690.1 | 760.0 | 28.7 | 195618 |
| FD07SP03 | 71.4 | 46.0 | 71.4 | 46.0 | 1.231 | MT | 195618 | 1303.6 | 1231.0 | 13.3 | 195618 |
| FD07EL04 | 96.3 | 130.0 | 96.3 | 130.0 | 1.318 | MT | 171740 | 1278.7 | 1318.0 | 29.1 | 171740 |
| FD07SP04 | 65.0 | 117.0 | 65.0 | 117.0 | 1.214 | MT | 171740 | 1310.0 | 1214.0 | 19.7 | 171740 |
| FD07SP07 | 65.0 | 65.0 | 65.0 | 65.0 | 1.338 | GW | 171740 | 1310.0 | 1338.0 | 19.7 | 171740 |
| FD07SP08 US | 65.0 | 122.0 | 65.0 | 122.0 | 1.253 | MT | 171740 | 1310.0 | 1253.0 | 19.7 | 171740 |
| FD07SP09 | 50.7 | 118.0 | 50.7 | 118.0 | 1.256 | MT | 148782 | 1324.3 | 1256.0 | 23.8 | 148782 |
| FD07SP10 US | 73.8 | 83.0 | 73.8 | 83.0 | 1.221 | MT | 148782 | 1301.2 | 1221.0 | 34.7 | 148782 |
| ===>Grouped by Line: 006-18"-FDW-07, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 011-18"-FDW-08, No Sorting. | | | | | | | | | | | |
| FD08RD01(L/E) | 65.2 | 62.0 | 65.2 | 62.0 | 1.578 | MT | 207118 | 1746.8 | 1578.0 | 8.8 | 183618 |
| FD08RD01(S/E) | 87.3 | 18.0 | 87.3 | 18.0 | 1.187 | MT | 183618 | 1287.7 | 1187.0 | 21.2 | 183618 |
| FD08EL01 | 111.8 | 56.0 | 111.8 | 56.0 | 1.326 | MT | 207118 | 1263.2 | 1326.0 | 13.6 | 207118 |
| FD08SP01 US | 96.7 | 30.0 | 96.7 | 30.0 | 1.224 | MT | 207118 | 1278.3 | 1224.0 | 11.8 | 207118 |
| FD08RD03(L/E) | 98.0 | 29.0 | 98.0 | 29.0 | 1.254 | MT | 230118 | 1277.0 | 1254.0 | 3.7 | 230118 |
| FD08RD03(S/E) | 176.1 | 28.0 | 176.1 | 28.0 | 0.794 | MT | 230118 | 667.9 | 794.0 | 6.6 | 230118 |
| FD08SP02 | 81.7 | 45.0 | 81.7 | 45.0 | 1.191 | MT | 230118 | 1293.3 | 1191.0 | 3.1 | 230118 |
| FD08SP03 US | 40.9 | 137.0 | 40.9 | 137.0 | 1.295 | MT | 102975 | 1334.1 | 1295.0 | 43.8 | 102975 |
| FD08SP04 | 87.3 | 72.0 | 87.3 | 72.0 | 1.223 | MT | 183618 | 1287.7 | 1223.0 | 21.2 | 183618 |
| ===>Grouped by Line: 012-18"-FDW-08, No Sorting. | | | | | | | | | | | |
| FD08SP06 US | 83.3 | 93.0 | 83.3 | 93.0 | 1.282 | GW | 171740 | 1291.7 | 1282.0 | 25.2 | 171740 |

Notes:
(1) Predictions are for the time of last inspection (last known meas. wear).
(2) GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
(3) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
(4) These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
(5) PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

# Tpred/Tcrit Ratio Plot

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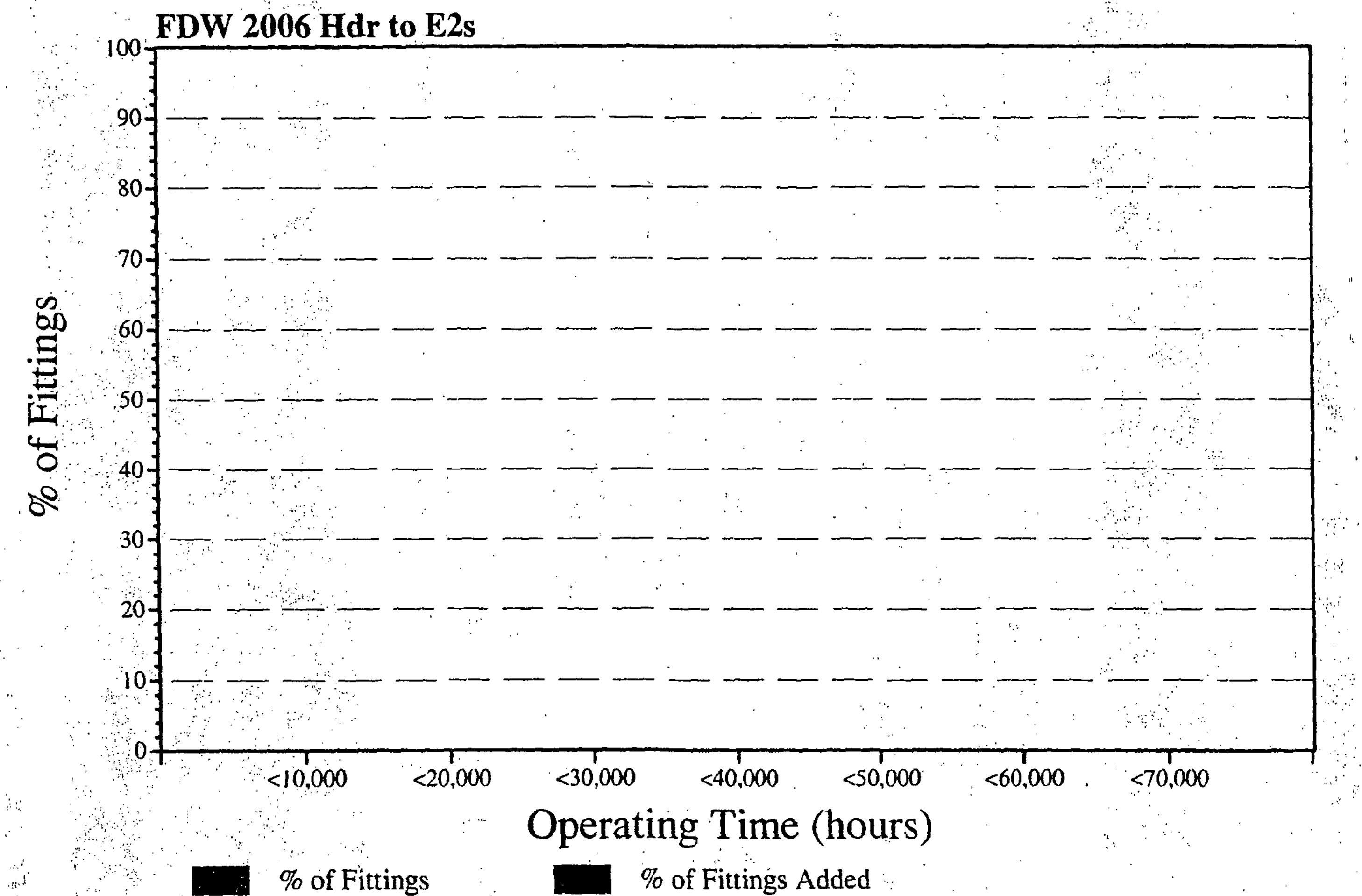
# Cumulative % of Comp. Time to Tcrit

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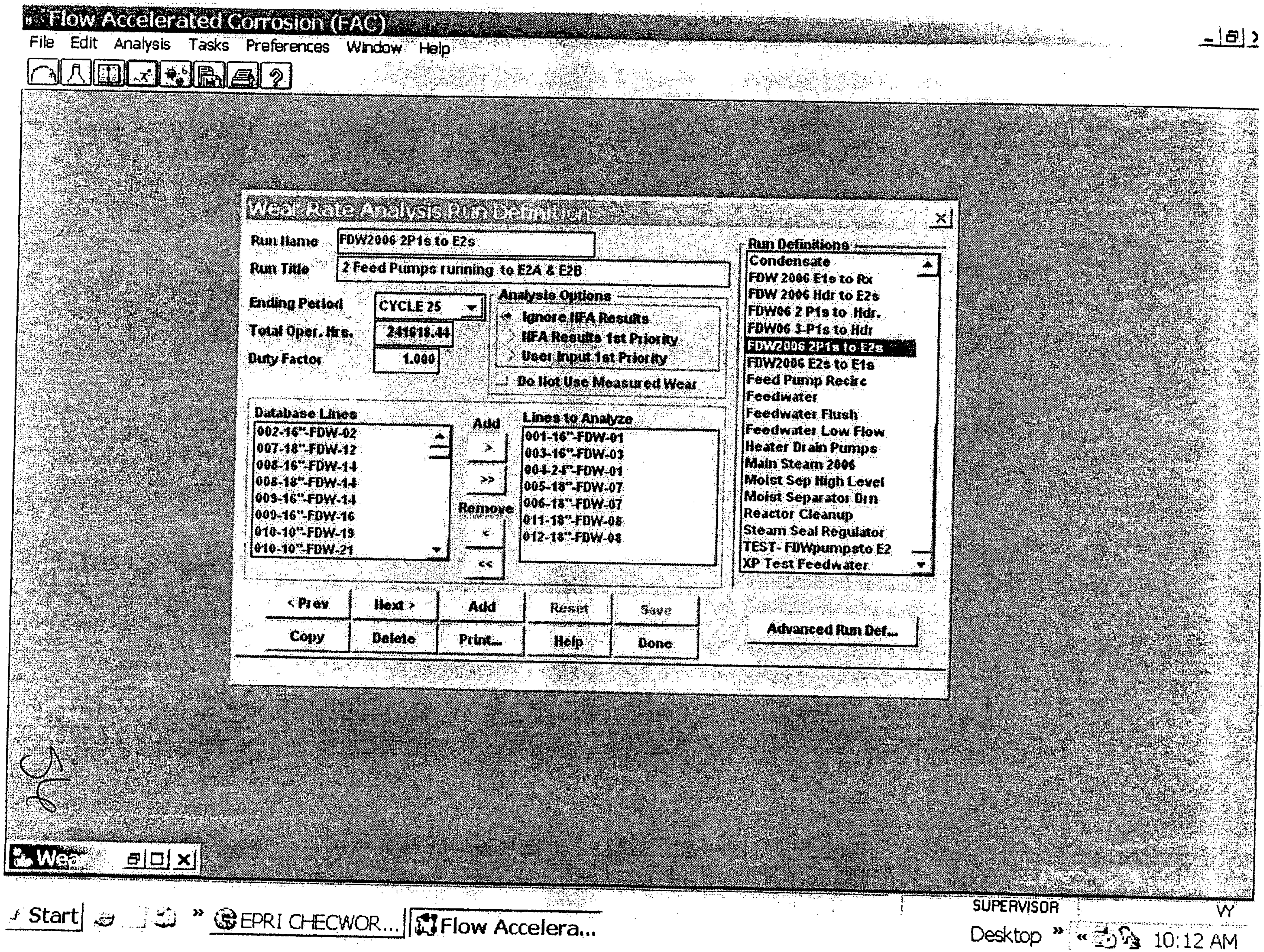
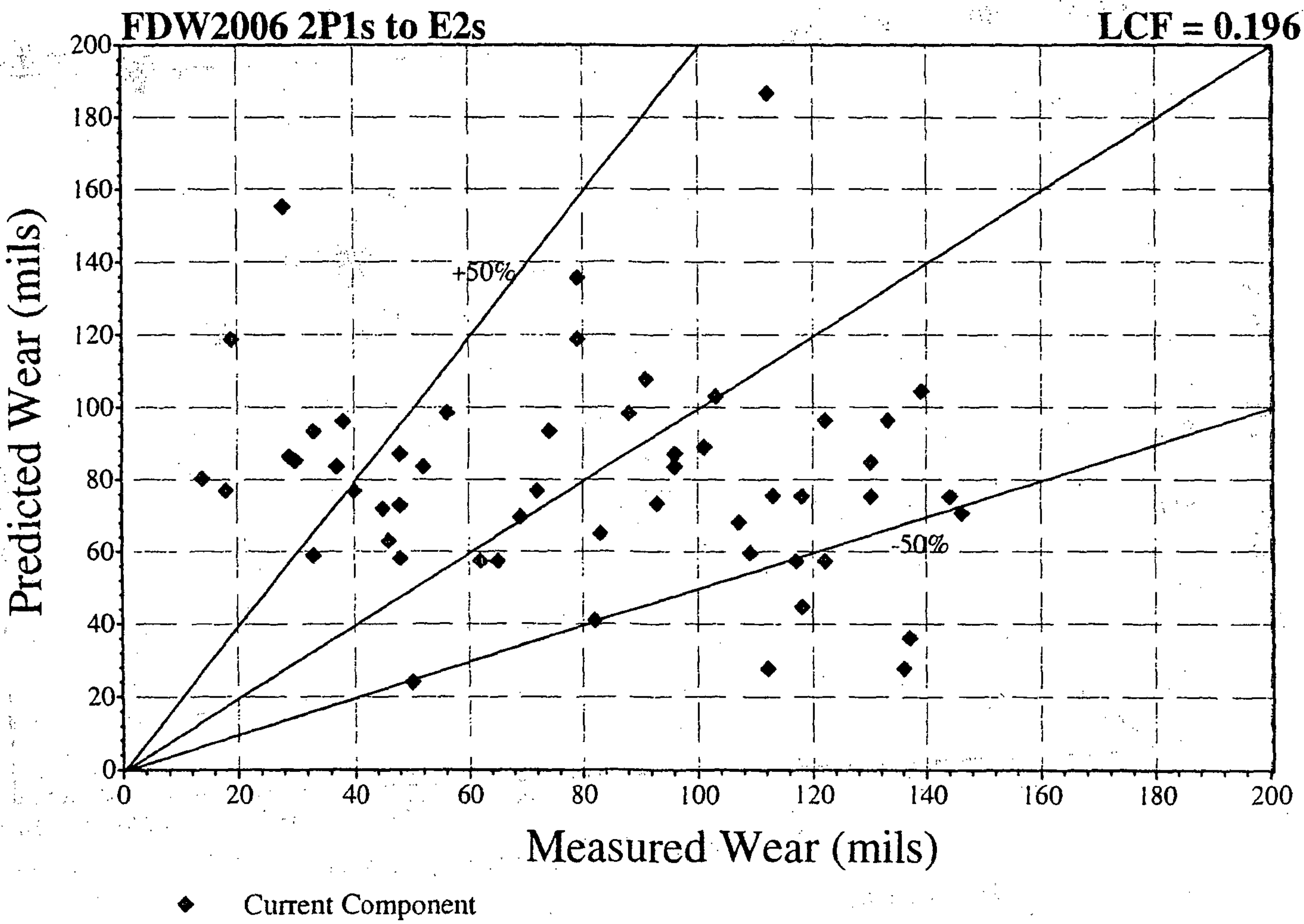

Flow Accelerated Corrosion (FAC)
File Edit Analysis Tasks Preferences Window Help
Wear Rate Analysis Run Definition
Run Name FDW2006 2P1s to E2s
Run Title 2 Feed Pumps running to E2A & E2B
Ending Period CYCLE 25
Total Oper. Hrs. 241618.44
Duty Factor 1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
002-16"-FDW-02
007-18"-FDW-12
008-16"-FDW-14
008-18"-FDW-14
009-16"-FDW-14
009-16"-FDW-16
010-10"-FDW-19
010-10"-FDW-21
Add
Remove
Lines to Analyze
001-16"-FDW-01
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
011-18"-FDW-08
012-18"-FDW-08
Run Definitions
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 2P1s to E2s
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
Moist Sep High Level
Moist Separator Drn
Reactor Cleanup
Steam Seal Regulator
TEST- FDWpumpsto E2
XP Test Feedwater
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
Wear
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
10:12 AM

# Comparison of Wear Predictions

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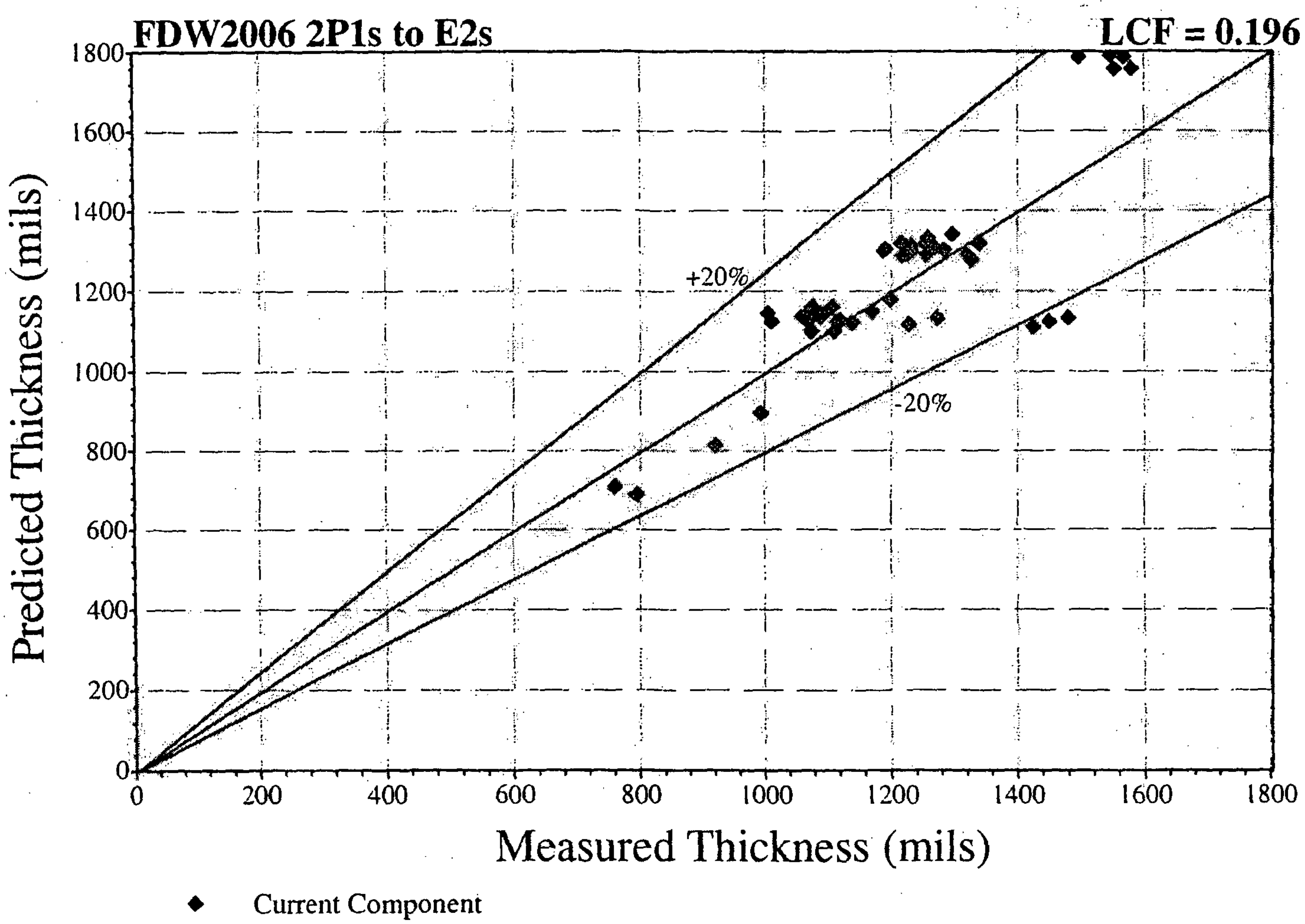
# Comparison of Thickness Predictions

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 10:04:53
Analysis Date: 28-SEP-2006 Time: 10:03:33
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: FDW2006 2P1s to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NFA Data Option: Ignore NFA
Line Correction Factor: 0.196

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET P-1-1A | 31 | 8.398 | 6.376 | 1.000 | 0.768 | 0.769 | 0.769 | -275 | ------ | --- | --- | --- | --- | 1.000 | -- | 0 | ----- |
| FD01RD01(L/E) | 18 | 3.762 | 2.856 | 1.219 | 1.024 | 0.964 | 0.964 | 181082 | ------ | --- | --- | --- | --- | 1.031 | MT | 218618 | ----- |
| FD01RD01(S/E) | 18 | 4.703 | 3.570 | 1.000 | 0.897 | 0.769 | 0.769 | 314205 | ------ | --- | --- | --- | --- | 0.906 | MT | 218618 | ----- |
| FD01EL01 | 4 | 4.639 | 3.522 | 1.219 | 1.065 | 0.964 | 0.964 | ------ | 249415 | 118.7 | 79.0 | 118.7 | 79.0 | 1.074 | MT | 218618 | 218618 |
| FD01TE05(U/S) | 15 | 3.762 | 2.856 | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 435674 | 96.3 | 122.0 | 96.3 | 122.0 | 1.114 | MT | 218618 | 218618 |
| FD01TE05(D/S) | 15 | 3.762 | 2.856 | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 116667 | 96.3 | 133.0 | 96.3 | 133.0 | 1.010 | MT | 218618 | 218618 |
| FD01SP01 | 58 | 2.759 | 2.094 | 1.219 | 1.143 | 0.964 | 0.964 | 746397 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL02 | 4 | 4.639 | 3.522 | 1.219 | 1.108 | 0.964 | 0.964 | ------ | 357616 | 98.2 | 88.0 | 98.2 | 88.0 | 1.138 | MT | 171740 | 171740 |
| FD01SP02 US | 54 | 4.013 | 3.046 | 1.219 | 1.093 | 0.964 | 0.964 | 370414 | ------ | --- | --- | --- | --- | 1.119 | MT | 171740 | ----- |
| FD01SP02 DS | 54 | 4.013 | 3.046 | 1.219 | 1.103 | 0.964 | 0.964 | ------ | 397168 | 93.3 | 74.0 | 93.3 | 74.0 | 1.120 | GW | 195618 | 195618 |
| FD01EL03 | 2 | 4.639 | 3.522 | 1.219 | 1.507 | 0.964 | 0.964 | 1348963 | ------ | --- | --- | --- | --- | 1.527 | MT | 195618 | ----- |
| FD01SP03 US | 52 | 3.135 | 2.380 | 1.219 | 1.055 | 0.964 | 0.964 | ------ | 334677 | 72.9 | 48.0 | 72.9 | 48.0 | 1.069 | MT | 195618 | 195618 |
| FD01SP03 DS | 52 | 3.135 | 2.380 | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL04 | 2 | 4.639 | 3.522 | 1.219 | 1.101 | 0.964 | 0.964 | ------ | 338950 | 118.7 | 19.0 | 118.7 | 19.0 | 1.110 | MT | 218618 | 218618 |
| FD01SP04 US | 52 | 3.135 | 2.380 | 1.219 | 1.059 | 0.964 | 0.964 | ------ | 347047 | 80.2 | 14.0 | 80.2 | 14.0 | 1.065 | MT | 218618 | 218618 |
| FD01SP04 DS | 52 | 3.135 | 2.380 | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL05 | 2 | 4.639 | 3.522 | 1.219 | 1.091 | 0.964 | 0.964 | 314779 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 US | 52 | 3.135 | 2.380 | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP05 DS | 52 | 3.135 | 2.380 | 1.219 | 1.159 | 0.964 | 0.964 | 717185 | ------ | --- | --- | --- | --- | 1.204 | MT | 102975 | ----- |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET P-1-1C | 31 | 8.398 | 6.376 | 1.000 | 0.874 | 0.769 | 0.769 | ------ | 144602 | 186.4 | 112.0 | 186.4 | 112.0 | 0.919 | MT | 183618 | 183618 |
| FD03RD01(L/E) | 18 | 3.762 | 2.856 | 1.219 | 1.038 | 0.964 | 0.964 | ------ | 224808 | 83.5 | 96.0 | 83.5 | 96.0 | 1.058 | MT | 183618 | 183618 |
| FD03RD01(S/E) | 18 | 4.703 | 3.570 | 1.000 | 0.967 | 0.769 | 0.769 | ------ | 486109 | 104.4 | 139.0 | 104.4 | 139.0 | 0.992 | MT | 183618 | 183618 |
| FD03EL01 | 4 | 4.639 | 3.522 | 1.219 | 1.201 | 0.964 | 0.964 | ------ | 588356 | 103.0 | 103.0 | 103.0 | 103.0 | 1.226 | MT | 183618 | 183618 |
| FD03TE01(U/S) | 15 | 3.762 | 2.856 | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 267751 | 83.5 | 37.0 | 83.5 | 37.0 | 1.072 | GW | 183618 | 183618 |
| FD03TE01(D/S) | 15 | 3.762 | 2.856 | 1.219 | 1.069 | 0.964 | 0.964 | ------ | 319897 | 83.5 | 52.0 | 83.5 | 52.0 | 1.089 | MT | 183618 | 183618 |
| FD03SP01 | 58 | 2.759 | 2.094 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 430970 | 70.6 | 146.0 | 70.6 | 146.0 | 1.073 | GW | 218618 | 218618 |
| FD03EL02 | 4 | 4.639 | 3.522 | 1.219 | 1.111 | 0.964 | 0.964 | 364624 | ------ | --- | --- | --- | --- | 1.152 | MT | 148782 | ----- |
| FD03SP02 US | 54 | 4.013 | 3.046 | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 273587 | 75.3 | 118.0 | 75.3 | 118.0 | 1.095 | GW | 148782 | 148782 |
| FD03SP02 DS | 54 | 4.013 | 3.046 | 1.219 | 1.056 | 0.964 | 0.964 | ------ | 262754 | 59.5 | 109.0 | 59.5 | 109.0 | 1.107 | MT | 114614 | 114614 |
| FD03EL03 | 1 | 4.138 | 3.141 | 1.219 | 1.430 | 0.964 | 0.964 | ------ | 1298252 | 96.2 | 38.0 | 96.2 | 38.0 | 1.448 | MT | 195618 | 195618 |
| FD03SP03 | 51 | 2.759 | 2.094 | 1.219 | 1.163 | 0.964 | 0.964 | ------ | 829696 | 40.9 | 82.0 | 40.9 | 82.0 | 1.198 | MT | 114614 | 114614 |
| FD03EL04 | 4 | 4.639 | 3.522 | 1.219 | 1.403 | 0.964 | 0.964 | ------ | 1090308 | 107.8 | 91.0 | 107.8 | 91.0 | 1.423 | MT | 195618 | 195618 |
| FD03SP04 US | 54 | 4.013 | 3.046 | 1.219 | 1.051 | 0.964 | 0.964 | ------ | 247633 | 93.3 | 33.0 | 93.3 | 33.0 | 1.068 | MT | 195618 | 195618 |
| FD03SP04 DS | 54 | 4.013 | 3.046 | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 256333 | 75.3 | 130.0 | 75.3 | 130.0 | 1.089 | MT | 148782 | 148782 |
| FD03EL05 | 2 | 4.639 | 3.522 | 1.219 | 1.230 | 0.964 | 0.964 | ------ | 660586 | 87.0 | 48.0 | 87.0 | 48.0 | 1.271 | MT | 148782 | 148782 |
| FD03SP05 | 52 | 3.135 | 2.380 | 1.219 | 1.048 | 0.964 | 0.964 | ------ | 308755 | 58.8 | 33.0 | 58.8 | 33.0 | 1.076 | MT | 148782 | 148782 |
| FD03EL06 | 4 | 4.639 | 3.522 | 1.219 | 1.437 | 0.964 | 0.964 | ------ | 1175408 | 87.0 | 96.0 | 87.0 | 96.0 | 1.478 | MT | 148782 | 148782 |
| FD03SP06 | 54 | 4.013 | 3.046 | 1.219 | 0.969 | 0.964 | 0.964 | ------ | 11901 | 75.3 | 144.0 | 75.3 | 144.0 | 1.004 | MT | 148782 | 148782 |
| FD03EL07 | 2 | 4.639 | 3.522 | 1.219 | 1.508 | 0.964 | 0.964 | 1351886 | ------ | --- | --- | --- | --- | 1.533 | MT | 183618 | ----- |
| FD03SP07 US | 52 | 3.135 | 2.380 | 1.219 | 1.151 | 0.964 | 0.964 | ------ | 687082 | 69.6 | 69.0 | 69.6 | 69.0 | 1.168 | GW | 183618 | 183618 |
| FD03SP07 DS | 52 | 3.135 | 2.380 | 1.219 | 1.039 | 0.964 | 0.964 | 272920 | ------ | --- | --- | --- | --- | 1.074 | MT | 125911 | ----- |
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | | | | | | | | | | | |
| FD01TE01(U/S) | 12 | 4.521 | 3.432 | 1.812 | 1.919 | 1.447 | 1.447 | 1205476 | ------ | --- | --- | --- | --- | 1.970 | MT | 125911 | ----- |
| FD01TE01(D/S) | 12 | 3.029 | 2.299 | 1.812 | 2.044 | 1.447 | 1.447 | 2274932 | ------ | --- | --- | --- | --- | 2.078 | MT | 125911 | ----- |
| FD01TE01(BR.) | 12 | 4.263 | 3.237 | 1.219 | 1.101 | 0.964 | 0.964 | 370635 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01SP06 DS | 62 | 1.477 | 1.122 | 1.812 | 1.555 | 1.447 | 1.447 | 845365 | ------ | --- | --- | --- | --- | 1.576 | MT | 102975 | ----- |
| FD01SP06 US | 62 | 1.477 | 1.122 | 1.812 | 1.482 | 1.447 | 1.447 | ------ | 275451 | 27.7 | 112.0 | 27.7 | 112.0 | 1.495 | MT | 148782 | 148782 |
| FD01TE02(U/S) | 12 | 4.521 | 3.432 | 1.812 | 1.667 | 1.447 | 1.447 | 562637 | ------ | --- | --- | --- | --- | 1.707 | MT | 148782 | ----- |
| FD01TE02(D.S) | 12 | 3.029 | 2.299 | 1.812 | 1.651 | 1.447 | 1.447 | 779445 | ------ | --- | --- | --- | --- | 1.678 | MT | 148782 | ----- |
| FD01TE02(BR.) | 12 | 4.263 | 3.237 | 1.219 | 1.669 | 0.964 | 0.964 | 1907893 | ------ | --- | --- | --- | --- | 1.707 | MT | 148782 | ----- |
| FD01SP07 US | 62 | 1.477 | 1.122 | 1.812 | 1.553 | 1.447 | 1.447 | ------ | 829982 | 27.7 | 136.0 | 27.7 | 136.0 | 1.566 | MT | 148782 | 148782 |
| FD01SP07 DS | 62 | 1.477 | 1.122 | 1.812 | 1.771 | 1.447 | 1.447 | 2534835 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD01EL06 | 2 | 2.733 | 2.075 | 1.812 | 1.737 | 1.447 | 1.447 | 1223953 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP08 | 52 | 1.847 | 1.402 | 1.812 | 1.761 | 1.447 | 1.447 | 1964216 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01EL07 | 4 | 2.733 | 2.075 | 1.812 | 1.737 | 1.447 | 1.447 | 1223953 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01SP09 | 54 | 2.364 | 1.795 | 1.812 | 1.747 | 1.447 | 1.447 | 1464924 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01TE03(U/S) | 15 | 2.216 | 1.682 | 1.812 | 1.751 | 1.447 | 1.447 | 1583803 | ------ | --- | --- | --- | --- | 1.812 | -- | 0 | ----- |
| FD01TE03(D/S) | 15 | 2.216 | 1.682 | 1.812 | 1.751 | 1.447 | 1.447 | 1583803 | ------ | --- | --- | --- | --- | 1.813 | -- | 0 | ----- |
| FD01SP10 US | 65 | 1.477 | 1.122 | 1.812 | 1.771 | 1.447 | 1.447 | 2534835 | ------ | --- | --- | --- | --- | 1.512 | -- | 0 | ----- |
| FD01SP10 DS | 65 | 1.477 | 1.122 | 1.812 | 1.528 | 1.447 | 1.447 | ------ | 637492 | 24.1 | 50.0 | 24.1 | 50.0 | 1.545 | MT | 125911 | 125911 |
| FD01TE04(U/S) | 12 | 4.521 | 3.432 | 1.812 | 2.757 | 1.447 | 1.447 | 3344486 | ------ | --- | --- | --- | --- | 2.808 | US | 125911 | ----- |
| FD01TE04(D,S) | 12 | 3.029 | 2.299 | 1.812 | 2.719 | 1.447 | 1.447 | 4846614 | ------ | --- | --- | --- | --- | 2.753 | US | 125911 | ----- |
| FD01TE04(BR.) | 12 | 4.263 | 3.237 | 1.219 | 1.101 | 0.964 | 0.964 | 370635 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD01EL08 | 4 | 2.733 | 2.075 | 1.812 | 1.894 | 1.447 | 1.447 | 1689019 | ------ | --- | --- | --- | --- | 1.935 | US | 125911 | ----- |
| FD01SP11 | 54 | 2.364 | 1.795 | 1.812 | 1.544 | 1.447 | 1.447 | ------ | 474631 | 58.1 | 48.0 | 58.1 | 48.0 | 1.551 | MT | 207118 | 207118 |

===>Grouped by Line: 005-18"-FDW-07, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD07RD01(L/E) | 7 | 2.585 | 1.963 | 1.812 | 1.606 | 1.447 | 1.447 | 711588 | ------ | --- | --- | --- | --- | 1.643 | MT | 102975 | ----- |
| FD07RD01(S E) | 7 | 3.462 | 2.628 | 1.375 | 1.254 | 1.085 | 1.085 | 561997 | ------ | --- | --- | --- | --- | 1.303 | MT | 102975 | ----- |
| FD07EL01 | 4 | 4.003 | 3.039 | 1.375 | 1.194 | 1.085 | 1.085 | ------ | 315448 | 88.9 | 101.0 | 88.9 | 101.0 | 1.216 | MT | 183618 | 183618 |
| FD07SP01 US | 54 | 3.462 | 2.628 | 1.375 | 1.212 | 1.085 | 1.085 | ------ | 424433 | 76.9 | 40.0 | 76.9 | 40.0 | 1.231 | MT | 183618 | 183618 |
| FD07SP01 DS | 54 | 3.462 | 2.628 | 1.375 | 1.241 | 1.085 | 1.085 | ------ | 518870 | 68.2 | 107.0 | 68.2 | 107.0 | 1.268 | GW | 160352 | 160352 |
| FD07EL02 | 2 | 4.003 | 3.039 | 1.375 | 1.296 | 1.085 | 1.085 | 609412 | ------ | --- | --- | --- | --- | 1.328 | MT | 160352 | ----- |
| FD07SP02 US | 52 | 2.705 | 2.053 | 1.375 | 1.204 | 1.085 | 1.085 | 506181 | ------ | --- | --- | --- | --- | 1.225 | MT | 160352 | ----- |
| FD07SP02 DS | 52 | 2.705 | 2.053 | 1.375 | 1.135 | 1.085 | 1.085 | 211531 | ------ | --- | --- | --- | --- | 1.140 | MT | 218618 | ----- |
| FD07EL03 | 2 | 4.003 | 3.039 | 1.375 | 1.313 | 1.085 | 1.085 | 657209 | ------ | --- | --- | --- | --- | 1.321 | US | 218618 | ----- |
| FD07RD02(L/E) | 7 | 3.787 | 2.875 | 1.375 | 1.239 | 1.085 | 1.085 | 469645 | ------ | --- | --- | --- | --- | 1.269 | US | 160352 | ----- |
| FD07RD02(S/E) | 7 | 6.663 | 5.059 | 0.844 | 0.716 | 0.648 | 0.648 | 118553 | ------ | --- | --- | --- | --- | 0.769 | MT | 160352 | ----- |
| FD07RD03(L/E) | 18 | 3.246 | 2.464 | 1.375 | 1.209 | 1.085 | 1.085 | ------ | 440427 | 75.4 | 113.0 | 75.4 | 113.0 | 1.223 | MT | 195618 | 195618 |
| FD07RD03(S/E) | 18 | 5.830 | 4.426 | 0.844 | 0.735 | 0.648 | 0.648 | ------ | 171557 | 135.5 | 79.0 | 135.5 | 79.0 | 0.760 | MT | 195618 | 195618 |
| FD07SP03 | 68 | 2.705 | 2.053 | 1.375 | 1.219 | 1.085 | 1.085 | ------ | 572660 | 62.9 | 46.0 | 62.9 | 46.0 | 1.231 | MT | 195618 | 195618 |
| FD07EL04 | 2 | 4.003 | 3.039 | 1.375 | 1.292 | 1.085 | 1.085 | ------ | 597590 | 84.7 | 130.0 | 84.7 | 130.0 | 1.318 | MT | 171740 | 171740 |
| FD07SP04 | 52 | 2.705 | 2.053 | 1.375 | 1.197 | 1.085 | 1.085 | ------ | 476257 | 57.3 | 117.0 | 57.3 | 117.0 | 1.214 | MT | 171740 | 171740 |
| FD07EL05 | 4 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP05 | 54 | 3.462 | 2.628 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP06 | 9 | 1.393 | 1.057 | 1.375 | 1.337 | 1.085 | 1.085 | 2083806 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL06 | 2 | 4.003 | 3.039 | 1.375 | 1.204 | 1.085 | 1.085 | 343925 | ------ | --- | --- | --- | --- | 1.230 | GW | 171740 | ----- |
| FD07SP07 | 52 | 2.705 | 2.053 | 1.375 | 1.321 | 1.085 | 1.085 | ------ | 1005264 | 57.3 | 65.0 | 57.3 | 65.0 | 1.338 | GW | 171740 | 171740 |
| FD07EL07 | 2 | 4.003 | 3.039 | 1.375 | 1.162 | 1.085 | 1.085 | 222858 | ------ | --- | --- | --- | --- | 1.188 | MT | 171740 | ----- |
| FD07SP08 US | 52 | 2.705 | 2.053 | 1.375 | 1.236 | 1.085 | 1.085 | ------ | 642638 | 57.3 | 122.0 | 57.3 | 122.0 | 1.253 | MT | 171740 | 171740 |
| FD07SP08 DS | 52 | 2.705 | 2.053 | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL08 | 1 | 3.570 | 2.710 | 1.375 | 1.277 | 1.085 | 1.085 | 618923 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP09 | 51 | 2.380 | 1.807 | 1.375 | 1.235 | 1.085 | 1.085 | ------ | 727091 | 44.7 | 118.0 | 44.7 | 118.0 | 1.256 | MT | 148782 | 148782 |
| FD07EL09 | 4 | 4.003 | 3.039 | 1.375 | 1.200 | 1.085 | 1.085 | 330527 | ------ | --- | --- | --- | --- | 1.235 | MT | 148782 | ----- |
| FD07SP10 US | 54 | 3.462 | 2.628 | 1.375 | 1.190 | 1.085 | 1.085 | ------ | 351414 | 65.0 | 83.0 | 65.0 | 83.0 | 1.221 | MT | 148782 | 148782 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 54 | 3.462 | 2.628 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ---- |
| FD07TE01(U/S) | 15 | 3.246 | 2.464 | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07TE01(D/S) | 15 | 3.246 | 2.464 | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL10 | 4 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07SP11 | 54 | 3.462 | 2.628 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL11 | 2 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD07EL12 | 4 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| INLET E-2-1A | 30 | 4.328 | 3.285 | 1.375 | 1.256 | 1.085 | 1.085 | 454916 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 7 | 2.585 | 1.963 | 1.812 | 1.570 | 1.447 | 1.447 | ------ | 551492 | 57.4 | 62.0 | 57.4 | 62.0 | 1.578 | MT | 207118 | 183618 |
| FD08RD01(S/E) | 7 | 3.462 | 2.628 | 1.375 | 1.168 | 1.085 | 1.085 | ------ | 277783 | 76.9 | 18.0 | 76.9 | 18.0 | 1.187 | MT | 183618 | 183618 |
| FD08EL01 | 4 | 4.003 | 3.039 | 1.375 | 1.314 | 1.085 | 1.085 | ------ | 660122 | 98.4 | 56.0 | 98.4 | 56.0 | 1.326 | MT | 207118 | 207118 |
| FD08SP01 US | 54 | 3.462 | 2.628 | 1.375 | 1.214 | 1.085 | 1.085 | ------ | 428695 | 85.1 | 30.0 | 85.1 | 30.0 | 1.224 | MT | 207118 | 207118 |
| FD08SP01 DS | 54 | 3.462 | 2.628 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL02 | 2 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08RD02(L/E) | 7 | 3.787 | 2.875 | 1.375 | 1.199 | 1.085 | 1.085 | 346089 | ------ | --- | --- | --- | --- | 1.232 | MT | 148782 | ----- |
| FD08RD02(S/E) | 7 | 6.663 | 5.059 | 0.844 | 1.345 | 0.648 | 0.648 | 1207354 | ------ | --- | --- | --- | --- | 1.404 | MT | 148782 | ----- |
| FD08RD03(L/E) | 18 | 3.246 | 2.464 | 1.375 | 1.251 | 1.085 | 1.085 | ------ | 589229 | 86.3 | 29.0 | 86.3 | 29.0 | 1.254 | MT | 230118 | 230118 |
| FD08RD03(S/E) | 18 | 5.830 | 4.426 | 0.844 | 0.788 | 0.648 | 0.648 | ------ | 277438 | 155.0 | 28.0 | 155.0 | 28.0 | 0.794 | MT | 230118 | 230118 |
| FD08SP02 | 68 | 2.705 | 2.053 | 1.375 | 1.188 | 1.085 | 1.085 | ------ | 440606 | 71.9 | 45.0 | 71.9 | 45.0 | 1.191 | MT | 230118 | 230118 |
| FD08EL03 | 2 | 4.003 | 3.039 | 1.375 | 1.327 | 1.085 | 1.085 | 697308 | ------ | --- | --- | --- | --- | 1.384 | MT | 102975 | ----- |
| FD08SP03 US | 52 | 2.705 | 2.053 | 1.375 | 1.256 | 1.085 | 1.085 | ------ | 731287 | 36.0 | 137.0 | 36.0 | 137.0 | 1.295 | MT | 102975 | 102975 |
| FD08SP03 DS | 52 | 2.705 | 2.053 | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL04 | 4 | 4.003 | 3.039 | 1.375 | 1.282 | 1.085 | 1.085 | 569113 | ------ | --- | --- | --- | --- | 1.304 | GW | 183618 | ----- |
| FD08SP04 | 54 | 3.462 | 2.628 | 1.375 | 1.204 | 1.085 | 1.085 | ------ | 397769 | 76.9 | 72.0 | 76.9 | 72.0 | 1.223 | MT | 183618 | 183618 |
| FD08EL05 | 2 | 4.003 | 3.039 | 1.375 | 1.303 | 1.085 | 1.085 | 629646 | ------ | --- | --- | --- | --- | 1.325 | MT | 183618 | ----- |
| FD08SP05 US | 52 | 2.705 | 2.053 | 1.375 | 1.166 | 1.085 | 1.085 | 347351 | ------ | --- | --- | --- | --- | 1.181 | MT | 183618 | ----- |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FL08SE05 DS | 52 | 2.705 | 2.053 | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD05TE01(U/S) | 15 | 3.246 | 2.464 | 1.375 | 1.285 | 1.085 | 1.065 | 712642 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FL08TE01(U/S) | 15 | 3.246 | 2.464 | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL06 | 4 | 4.003 | 3.039 | 1.375 | 1.302 | 1.085 | 1.085 | 626415 | ------ | --- | --- | --- | --- | 1.328 | MT | 171740 | ----- |
| FD08SE06 US | 54 | 3.462 | 2.628 | 1.375 | 1.260 | 1.085 | 1.085 | ------ | 582535 | 73.3 | 93.0 | 73.3 | 93.0 | 1.282 | GW | 171740 | 171740 |
| FD08SP06 DS | 54 | 3.462 | 2.628 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FL08EL07 | 2 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD08EL08 | 4 | 4.003 | 3.039 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| INLET E-2-1B | 30 | 4.328 | 3.285 | 1.375 | 1.256 | 1.085 | 1.085 | 454916 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

Notes:
(1) Predictions are based on last Tmeas to analysis ending period.
(2) Predictions are for the time of last inspection (last known meas. wear).
(3) GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
(4) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 10:04:44
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 10:03:33
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW2006 2P1s to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.196

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD03EL03 | 1 | 4.138 | ------ | 1298352 |
| FD03EL07 | 2 | 4.639 | 1351886 | ------ |
| FD08RD02(S/E) | 7 | 6.663 | 1207354 | ------ |
| FD03SP04 DS | 54 | 4.013 | ------ | 256333 |
| OUTLET P-1-1A | 31 | 8.398 | -275 | ------ |
| OUTLET P-1-1C | 31 | 8.398 | ------ | 144602 |
| FD03SP06 | 54 | 4.013 | ------ | 11301 |
| FD07RD02(S/E) | 7 | 6.663 | 118553 | ------ |
| FD01TE05(D/S) | 15 | 3.762 | ------ | 116667 |
| FD08RD03(S/E) | 18 | 5.830 | ------ | 277438 |
| FD07RD03(S/E) | 18 | 5.830 | ------ | 171557 |
| FD01RD01(S/E) | 18 | 4.703 | 314205 | ------ |
| FD01RD01(L/E) | 18 | 3.762 | 181082 | ------ |
| FD03RD01(S/E) | 18 | 4.703 | ------ | 486109 |
| FD07SP02 DS | 52 | 2.705 | 211531 | ------ |
| FD01EL01 | 4 | 4.639 | ------ | 249415 |
| FD07EL07 | 2 | 4.003 | 222858 | ------ |
| FD03EL06 | 4 | 4.639 | ------ | 1175408 |
| FD03RD01(L/E) | 18 | 3.762 | ------ | 224808 |
| FD03EL04 | 4 | 4.639 | ------ | 1090308 |
| FD03SP04 US | 54 | 4.013 | ------ | 247633 |
| FD01EL05 | 2 | 4.639 | 314779 | ------ |
| FD03EL05 | 2 | 4.639 | ------ | 660586 |
| FD01EL03 | 2 | 4.639 | 1348963 | ------ |
| FD03SP02 DS | 54 | 4.013 | ------ | 262754 |
| FD01EL02 | 4 | 4.639 | ------ | 357616 |
| FD03TE01(U/S) | 15 | 3.762 | ------ | 267751 |
| FD03SP07 DS | 52 | 3.135 | 272920 | ------ |
| FD03EL02 | 4 | 4.639 | 364624 | ------ |
| FD03SP02 US | 54 | 4.013 | ------ | 273587 |
| FD01EL04 | 2 | 4.639 | ------ | 338950 |
| FD01SP06 US | 62 | 1.477 | ------ | 275451 |
| FD03EL01 | 4 | 4.639 | ------ | 588356 |
| FD01TE04(U/S) | 12 | 4.521 | 3344486 | ------ |
| FD08RD01(S/E) | 7 | 3.462 | ------ | 277783 |
| FD01TE02(U/S) | 12 | 4.521 | 562637 | ------ |
| FD03SP05 | 52 | 3.135 | ------ | 308755 |
| FD01TE01(U/S) | 12 | 4.521 | 1205476 | ------ |
| INLET E-2-1B | 30 | 4.328 | 454916 | ------ |
| INLET E-2-1A | 30 | 4.328 | 454916 | ------ |
| FD07EL01 | 4 | 4.003 | ------ | 315448 |
| FD01TE02(BR.) | 12 | 4.263 | 1907893 | ------ |
| FD03TE01(D/S) | 15 | 3.762 | ------ | 319897 |
| FD01TE04(BR.) | 12 | 4.263 | 370635 | ------ |
| FD07EL09 | 4 | 4.003 | 330527 | ------ |
| FD01TE01(BR.) | 12 | 4.263 | 370635 | ------ |
| FD01SP03 US | 52 | 3.135 | ------ | 334677 |
| FD07EL06 | 2 | 4.003 | 343925 | ------ |
| FD08RD02(L/E) | 7 | 3.787 | 346089 | ------ |
| FD01SP02 DS | 54 | 4.013 | ------ | 397168 |
| FD01SP04 US | 52 | 3.135 | ------ | 347047 |
| FD08SP05 US | 52 | 2.705 | 347351 | ------ |
| FD07SP10 US | 54 | 3.462 | ------ | 351414 |
| FD01SP02 US | 54 | 4.013 | 370414 | ------ |
| FD07EL04 | 2 | 4.003 | ------ | 597590 |
| FD08EL04 | 4 | 4.003 | 569113 | ------ |
| FD08EL05 | 2 | 4.003 | 629646 | ------ |
| FD08SP04 | 54 | 3.462 | ------ | 397769 |
| FD08EL03 | 2 | 4.003 | 697308 | ------ |
| FD07SP01 US | 54 | 3.462 | ------ | 424433 |
| FD08EL01 | 4 | 4.003 | ------ | 660122 |
| FD08SP01 US | 54 | 3.462 | ------ | 428695 |
| FD08EL02 | 2 | 4.003 | 517606 | ------ |
| FD03SP01 | 58 | 2.759 | ------ | 430970 |
| FD08EL06 | 4 | 4.003 | 626415 | ------ |
| FD01TE05(U/S) | 15 | 3.762 | ------ | 435674 |
| FD07EL12 | 4 | 4.003 | 517606 | ------ |
| FD07RD03(L/E) | 18 | 3.246 | ------ | 440427 |
| FD08SP02 | 68 | 2.705 | ------ | 440606 |
| FD07EL10 | 4 | 4.003 | 517606 | ------ |
| FD07EL02 | 2 | 4.003 | 609412 | ------ |
| FD07EL05 | 4 | 4.003 | 517606 | ------ |
| FD07RD02(L/E) | 7 | 3.787 | 469645 | ------ |
| FD01SP11 | 54 | 2.364 | ------ | 474631 |
| FD07EL03 | 2 | 4.003 | 657209 | ------ |
| FD07SP04 | 52 | 2.705 | ------ | 476257 |
| FD07EL11 | 2 | 4.003 | 517606 | ------ |
| FD08EL08 | 4 | 4.003 | 517605 | ------ |
| FD07SP02 US | 52 | 2.705 | 505181 | ------ |
| FD08EL07 | 2 | 4.003 | 517605 | ------ |
| FD07SP01 DS | 54 | 3.462 | ------ | 518870 |
| FD08RD01(L/E) | 7 | 2.585 | ------ | 551432 |
| FD07EL08 | 1 | 3.570 | 618923 | ------ |
| FD07RD01(S/E) | 7 | 3.462 | 561397 | ------ |
| FD07SP10 DS | 54 | 3.462 | 648210 | ------ |

| | | | | |
|---|---|---|---|---|
| FD07SP03 | 58 | 2.705 | ------ | 572660 |
| FD08SP06 US | 54 | 3.462 | ------ | 582535 |
| FD07SP05 | 54 | 3.462 | 648210 | ------ |
| FD08RD03(L/E) | 18 | 3.246 | ------ | 589229 |
| FD08SP01 DS | 54 | 3.462 | 648210 | ------ |
| FD01SP05 US | 52 | 3.135 | 618638 | ------ |
| FD08SP06 DS | 54 | 3.462 | 648210 | ------ |
| FD01SP03 DS | 52 | 3.135 | 618638 | ------ |
| FD01SP04 DS | 52 | 3.135 | 618638 | ------ |
| FD07SP11 | 54 | 3.462 | 648210 | ------ |
| FD08TE01(U/S) | 15 | 3.246 | 712642 | ------ |
| FD08TE01(D/S) | 15 | 3.246 | 712642 | ------ |
| FD01SP10 DS | 65 | 1.477 | ------ | 637492 |
| FD07TE01(D/S) | 15 | 3.246 | 712642 | ------ |
| FD07SP08 US | 52 | 2.705 | ------ | 642638 |
| FD07TE01(U/S) | 15 | 3.246 | 712642 | ------ |
| FD01SP05 DS | 52 | 3.135 | 717185 | ------ |
| FD03SP07 US | 52 | 3.135 | ------ | 687082 |
| FD07RD01(L/E) | 7 | 2.585 | 711588 | ------ |
| FD01TE02(D/S) | 12 | 3.029 | 779445 | ------ |
| FD01TE01(D/S) | 12 | 3.029 | 2274932 | ------ |
| FD01TE04(D/S) | 12 | 3.029 | 4846614 | ------ |
| FD03SP03 | 51 | 2.759 | ------ | 829696 |
| FD07SP09 | 51 | 2.380 | ------ | 727091 |
| FD01SP01 | 58 | 2.759 | 746397 | ------ |
| FD08SP03 US | 52 | 2.705 | ------ | 731287 |
| FD01EL06 | 2 | 2.733 | 1223953 | ------ |
| FD01EL08 | 4 | 2.733 | 1889019 | ------ |
| FD01EL07 | 4 | 2.733 | 1223953 | ------ |
| FD01SP07 US | 62 | 1.477 | ------ | 829982 |
| FD01SP06 DS | 62 | 1.477 | 845365 | ------ |
| FD07SP08 DS | 52 | 2.705 | 918823 | ------ |
| FD08SP03 DS | 52 | 2.705 | 918823 | ------ |
| FD08SP05 DS | 52 | 2.705 | 918823 | ------ |
| FD07SP07 | 52 | 2.705 | ------ | 1005264 |
| FD01SP09 | 54 | 2.364 | 1464924 | ------ |
| FD01TE03(D/S) | 15 | 2.216 | 1583803 | ------ |
| FD01TE03(U/S) | 15 | 2.216 | 1583803 | ------ |
| FD01SP08 | 52 | 1.847 | 1964216 | ------ |
| FD01SP10 US | 65 | 1.477 | 2534835 | ------ |
| FD07SP06 | 9 | 1.393 | 2083806 | ------ |
| FD01SP07 DS | 62 | 1.477 | 2534835 | ------ |

Company: Vermont Yankee Nuclear Power Corporation   Report Date: 28-SEP-2006 Time: 10:54:49
Plant: Vermont Yankee   Analysis Date: 28-SEP-2006 Time: 10:03:33
Unit:   CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*******************************************************
*** Wear Rate Analysis: Thickness/Service Time Report ***
*******************************************************

Run Name: FDW2006 CP1s to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618   Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA   Exclude Measure Wear: No
Line Correction Factor: 0.196

===>Grouped by Line: 001-16"-FDW-01, No Sorting.

| Component Name | Thickness (in) Init. | Thickness (in) Prd.(1) | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Component Predicted(1) Time to Tcrit (hrs) Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 1.000 | 0.768 | 0.769 | 0.769 | -275 | ------ | 241618 |
| FD01RD01(L/E) | 1.219 | 1.024 | 0.964 | 0.964 | 181082 | ------ | 241618 |
| FD01RD01(S/E) | 1.000 | 0.897 | 0.769 | 0.769 | 314205 | ------ | 241618 |
| FD01EL01 | 1.219 | 1.065 | 0.964 | 0.964 | ------ | 249415 | 241618 |
| FD01TE05(U/S) | 1.219 | 1.107 | 0.964 | 0.964 | ------ | 435674 | 241618 |
| FD01TE05(D/S) | 1.219 | 1.003 | 0.964 | 0.964 | ------ | 116667 | 241618 |
| FD01SP01 | 1.219 | 1.143 | 0.964 | 0.964 | 746397 | ------ | 241618 |
| FD01EL02 | 1.219 | 1.108 | 0.964 | 0.964 | ------ | 357616 | 241618 |
| FD01SP02 US | 1.219 | 1.093 | 0.964 | 0.964 | 370414 | ------ | 241618 |
| FD01SP02 DS | 1.219 | 1.103 | 0.964 | 0.964 | ------ | 397168 | 241618 |
| FD01EL03 | 1.219 | 1.507 | 0.964 | 0.964 | 1348963 | ------ | 241618 |
| FD01SP03 US | 1.219 | 1.055 | 0.964 | 0.964 | ------ | 334677 | 241618 |
| FD01SP03 DS | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | 241618 |
| FD01EL04 | 1.219 | 1.101 | 0.964 | 0.964 | ------ | 338950 | 241618 |
| FD01SP04 US | 1.219 | 1.059 | 0.964 | 0.964 | ------ | 347047 | 241618 |
| FD01SP04 DS | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | 241618 |
| FD01EL05 | 1.219 | 1.091 | 0.964 | 0.964 | 314779 | ------ | 241618 |
| FD01SP05 US | 1.219 | 1.133 | 0.964 | 0.964 | 618638 | ------ | 241618 |
| FD01SP05 DS | 1.219 | 1.159 | 0.964 | 0.964 | 717185 | ------ | 241618 |

===>Grouped by Line: 003-16"-FDW-03, No Sorting.

| Component Name | Thickness (in) Init. | Thickness (in) Prd.(1) | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Component Predicted(1) Time to Tcrit (hrs) Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 1.000 | 0.874 | 0.769 | 0.769 | ------ | 144602 | 241618 |
| FD03RD01(L/E) | 1.219 | 1.038 | 0.964 | 0.964 | ------ | 224808 | 241618 |
| FD03RD01(S/E) | 1.000 | 0.967 | 0.769 | 0.769 | ------ | 486109 | 241618 |
| FD03EL01 | 1.219 | 1.201 | 0.964 | 0.964 | ------ | 588356 | 241618 |
| FD03TE01(U/S) | 1.219 | 1.052 | 0.964 | 0.964 | ------ | 267751 | 241618 |
| FD03TE01(D/S) | 1.219 | 1.069 | 0.964 | 0.964 | ------ | 319897 | 241618 |
| FD03SP01 | 1.219 | 1.068 | 0.964 | 0.964 | ------ | 430970 | 241618 |
| FD03EL02 | 1.219 | 1.111 | 0.964 | 0.964 | 364624 | ------ | 241618 |
| FD03SP02 US | 1.219 | 1.060 | 0.964 | 0.964 | ------ | 273587 | 241618 |
| FD03SP02 DS | 1.219 | 1.056 | 0.964 | 0.964 | ------ | 262754 | 241618 |
| FD03EL03 | 1.219 | 1.430 | 0.964 | 0.964 | ------ | 1298252 | 241618 |
| FD03SP03 | 1.219 | 1.163 | 0.964 | 0.964 | ------ | 829696 | 241618 |
| FD03EL04 | 1.219 | 1.403 | 0.964 | 0.964 | ------ | 1090308 | 241618 |
| FD03SP04 US | 1.219 | 1.051 | 0.964 | 0.964 | ------ | 247633 | 241618 |
| FD03SP04 DS | 1.219 | 1.054 | 0.964 | 0.964 | ------ | 256333 | 241618 |
| FD03EL05 | 1.219 | 1.230 | 0.964 | 0.964 | ------ | 660586 | 241618 |
| FD03SP05 | 1.219 | 1.048 | 0.964 | 0.964 | ------ | 308755 | 241618 |
| FD03EL06 | 1.219 | 1.437 | 0.964 | 0.964 | ------ | 1175408 | 241618 |
| FD03SP06 | 1.219 | 0.969 | 0.964 | 0.964 | ------ | 11901 | 241618 |
| FD03EL07 | 1.219 | 1.508 | 0.964 | 0.964 | 1351886 | ------ | 241618 |
| FD03SP07 US | 1.219 | 1.151 | 0.964 | 0.964 | ------ | 687082 | 241618 |
| FD03SP07 DS | 1.219 | 1.039 | 0.964 | 0.964 | 272920 | ------ | 241618 |

===>Grouped by Line: 004-24"-FDW-01, No Sorting.

| Component Name | Thickness (in) Init. | Thickness (in) Prd.(1) | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Component Predicted(1) Time to Tcrit (hrs) Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| FD01TE01(U/S) | 1.812 | 1.919 | 1.447 | 1.447 | 1205476 | ------ | 241618 |
| FD01TE01(D/S) | 1.812 | 2.044 | 1.447 | 1.447 | 2274932 | ------ | 241618 |
| FD01TE01(BR.) | 1.219 | 1.101 | 0.964 | 0.964 | 370635 | ------ | 241618 |
| FD01SP06 DS | 1.812 | 1.555 | 1.447 | 1.447 | 845365 | ------ | 241618 |
| FD01SP06 US | 1.812 | 1.482 | 1.447 | 1.447 | ------ | 275451 | 241618 |
| FD01TE02(U/S) | 1.812 | 1.667 | 1.447 | 1.447 | 562637 | ------ | 241618 |
| FD01TE02(D/S) | 1.812 | 1.651 | 1.447 | 1.447 | 779445 | ------ | 241618 |
| FD01TE02(BR.) | 1.219 | 1.669 | 0.964 | 0.364 | 1907893 | ------ | 241618 |
| FD01SP07 US | 1.812 | 1.553 | 1.447 | 1.447 | ------ | 829982 | 241618 |
| FD01SP07 DS | 1.812 | 1.771 | 1.447 | 1.447 | 2534835 | ------ | 241618 |
| FD01EL06 | 1.812 | 1.737 | 1.447 | 1.447 | 1223953 | ------ | 241618 |
| FD01SP08 | 1.812 | 1.761 | 1.447 | 1.447 | 1964216 | ------ | 241618 |
| FD01EL07 | 1.812 | 1.737 | 1.447 | 1.447 | 1223953 | ------ | 241618 |
| FD01SP09 | 1.812 | 1.747 | 1.447 | 1.447 | 1464924 | ------ | 241618 |
| FD01TE03(U/S) | 1.812 | 1.751 | 1.447 | 1.447 | 1583803 | ------ | 241618 |
| FD01TE03(D/S) | 1.812 | 1.751 | 1.447 | 1.447 | 1583803 | ------ | 241618 |
| FD01SP10 US | 1.812 | 1.771 | 1.447 | 1.447 | 2534835 | ------ | 241618 |
| FD01SP10 DS | 1.812 | 1.528 | 1.447 | 1.447 | ------ | 637492 | 241618 |
| FD01TE04(U/S) | 1.812 | 2.757 | 1.447 | 1.447 | 3344886 | ------ | 241618 |
| FD01TE04(D/S) | 1.812 | 2.719 | 1.447 | 1.447 | 4846614 | ------ | 241618 |
| FD01TE04(BR.) | 1.219 | 1.101 | 0.964 | 0.964 | 370635 | ------ | 241618 |
| FD01EL08 | 1.812 | 1.894 | 1.447 | 1.447 | 1889019 | ------ | 241618 |
| FD01SP11 | 1.812 | 1.544 | 1.447 | 1.447 | ------ | 474631 | 241618 |

===>Grouped by Line: 005-18"-FDW-07, No Sorting.

| Component Name | Thickness (in) Init. | Thickness (in) Prd.(1) | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Component Predicted(1) Time to Tcrit (hrs) Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| FD07RD01(L.E) | 1.812 | 1.606 | 1.447 | 1.447 | 711588 | ------ | 241618 |
| FD07RD01(S.E) | 1.375 | 1.254 | 1.085 | 1.085 | 561997 | ------ | 241618 |
| FD07EL01 | 1.375 | 1.194 | 1.085 | 1.085 | ------ | 315448 | 241618 |
| FD07SP01 US | 1.375 | 1.212 | 1.085 | 1.085 | ------ | 424433 | 241618 |
| FD07SP01 DS | 1.375 | 1.241 | 1.085 | 1.085 | ------ | 518870 | 241618 |
| FD07EL02 | 1.375 | 1.296 | 1.085 | 1.085 | 609412 | ------ | 241618 |
| FD07SP02 US | 1.375 | 1.204 | 1.085 | 1.085 | 536181 | ------ | 241618 |
| FD07SP02 DS | 1.375 | 1.125 | 1.085 | 1.085 | 211521 | ------ | 241618 |
| FD07EL03 | 1.375 | 1.313 | 1.085 | 1.085 | 657209 | ------ | 241618 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07RD02(L/E) | 1.375 | 1.233 | 1.085 | 1.085 | 463645 | ------ | 241618 |
| FD07RD02(S/E) | 0.844 | 0.716 | 0.648 | 0.648 | 118553 | ------ | 241618 |
| FD07RD03(L/E) | 1.375 | 1.209 | 1.085 | 1.085 | ------ | 440427 | 241618 |
| FD07RD03(S/E) | 0.844 | 0.735 | 0.648 | 0.648 | ------ | 171557 | 241618 |
| FD07SP03 | 1.375 | 1.219 | 1.085 | 1.085 | ------ | 572660 | 241618 |
| FD07EL04 | 1.375 | 1.292 | 1.085 | 1.085 | ------ | 597590 | 241618 |
| FD07SP04 | 1.375 | 1.197 | 1.085 | 1.085 | ------ | 476257 | 241618 |
| FD07EL05 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| FD07SP05 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | 241618 |
| FD07SP06 | 1.375 | 1.337 | 1.085 | 1.085 | 2083806 | ------ | 241618 |
| FD07EL06 | 1.375 | 1.204 | 1.085 | 1.085 | 343925 | ------ | 241618 |
| FD07SP07 | 1.375 | 1.321 | 1.085 | 1.085 | ------ | 1005264 | 241618 |
| FD07EL07 | 1.375 | 1.162 | 1.085 | 1.085 | 222858 | ------ | 241618 |
| FD07SP08 US | 1.375 | 1.236 | 1.085 | 1.085 | ------ | 642638 | 241618 |
| FD07SP08 DS | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | 241618 |
| FD07EL08 | 1.375 | 1.277 | 1.085 | 1.085 | 618923 | ------ | 241618 |
| FD07SP09 | 1.375 | 1.235 | 1.085 | 1.085 | ------ | 727091 | 241618 |
| FD07EL09 | 1.375 | 1.200 | 1.085 | 1.085 | 330527 | ------ | 241618 |
| FD07SP10 US | 1.375 | 1.190 | 1.085 | 1.085 | ------ | 351414 | 241618 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | 241618 |
| FD07TE01(U/S) | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | 241618 |
| FD07TE01(D/S) | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | 241618 |
| FD07EL10 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| FD07SP11 | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | 241618 |
| FD07EL11 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| FD07EL12 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| INLET E-2-1A | 1.375 | 1.256 | 1.085 | 1.085 | 454916 | ------ | 241618 |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 1.812 | 1.570 | 1.447 | 1.447 | ------ | 551492 | 241618 |
| FD08RD01(S/E) | 1.375 | 1.168 | 1.085 | 1.085 | ------ | 277783 | 241618 |
| FD08EL01 | 1.375 | 1.314 | 1.085 | 1.085 | ------ | 660122 | 241618 |
| FD08SP01 US | 1.375 | 1.214 | 1.085 | 1.085 | ------ | 428695 | 241618 |
| FD08SP01 DS | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | 241618 |
| FD08EL02 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| FD08RD02(L/E) | 1.375 | 1.199 | 1.085 | 1.085 | 346089 | ------ | 241618 |
| FD08RD02(S/E) | 0.844 | 1.345 | 0.648 | 0.648 | 1207354 | ------ | 241618 |
| FD08RD03(L/E) | 1.375 | 1.251 | 1.085 | 1.085 | ------ | 589229 | 241618 |
| FD08RD03(S/E) | 0.844 | 0.788 | 0.648 | 0.648 | ------ | 277438 | 241618 |
| FD08SP02 | 1.375 | 1.188 | 1.085 | 1.085 | ------ | 440606 | 241618 |
| FD08EL03 | 1.375 | 1.327 | 1.085 | 1.085 | 697308 | ------ | 241618 |
| FD08SP03 US | 1.375 | 1.256 | 1.085 | 1.085 | ------ | 731287 | 241618 |
| FD08SP03 DS | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | 241618 |
| FD08EL04 | 1.375 | 1.282 | 1.085 | 1.085 | 569113 | ------ | 241618 |
| FD08SP04 | 1.375 | 1.204 | 1.085 | 1.085 | ------ | 397769 | 241618 |
| FD08EL05 | 1.375 | 1.303 | 1.085 | 1.085 | 629646 | ------ | 241618 |
| FD08SP05 US | 1.375 | 1.166 | 1.085 | 1.085 | 347351 | ------ | 241618 |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08SP05 DS | 1.375 | 1.300 | 1.085 | 1.085 | 918823 | ------ | 241618 |
| FD08TE01(U/S) | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | 241618 |
| FD08TE01(D/S) | 1.375 | 1.285 | 1.085 | 1.085 | 712642 | ------ | 241618 |
| FD08EL06 | 1.375 | 1.302 | 1.085 | 1.085 | 626415 | ------ | 241618 |
| FD08SP06 US | 1.375 | 1.260 | 1.085 | 1.085 | ------ | 582535 | 241618 |
| FD08SP06 DS | 1.375 | 1.280 | 1.085 | 1.085 | 648210 | ------ | 241618 |
| FD08EL07 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| FD08EL08 | 1.375 | 1.265 | 1.085 | 1.085 | 517606 | ------ | 241618 |
| INLET E-2-1B | 1.375 | 1.256 | 1.085 | 1.085 | 454916 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

65

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 10:04:35
Analysis Date: 28-SEP-2006 Time: 10:03:33
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW2006 2P1s to E3s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WPA Data Option: Ignore NFA
Line Correction Factor: 0.196

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | |
| OUTLET P-1-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01RD01(S.E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 79 |
| FD01TE05(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 121 |
| FD01TE05(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 133 |
| FD01SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 88 |
| FD01SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 73 |
| FD01EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 48 |
| FD01SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 19 |
| FD01SP04 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 14 |
| FD01SP04 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | |
| OUTLET P-1-1C | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 112 |
| FD03RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 96 |
| FD03RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 139 |
| FD03EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 103 |
| FD03TE01(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 37 |
| FD03TE01(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 52 |
| FD03SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 146 |
| FD03EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 117 |
| FD03SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 109 |
| FD03EL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 38 |
| FD03SP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 82 |
| FD03EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 91 |
| FD03SP04 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 33 |
| FD03SP04 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 129 |
| FD03EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 48 |
| FD03SP05 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 33 |
| FD03EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 96 |
| FD03SP06 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 144 |
| FD03EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD03SP07 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 69 |
| FD03SP07 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | | | | |
| FD01TE01(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE01(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE01(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP06 DS | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP06 US | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 112 |
| FD01TE02(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE02(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01TE02(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP07 US | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 136 |
| FD01SP07 DS | 62 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL07 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP09 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE03(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE03(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP10 US | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01SP10 DS | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 125911 | ----- | | 50 |
| FD01TE04(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE04(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01TE04(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD01EL08 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD01SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | | 48 |
| ===>Grouped by Line: 005-18"-FDW-07, No Sorting. | | | | | | | | | | |
| FD07RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 100 |
| FD07SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 49 |
| FD07SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 150352 | ----- | | 107 |
| FD07EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FD07RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| FD07RD03(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 113 |
| FD07RD03(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 79 |
| FD07SP03 | 68 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 46 |
| FD07EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 130 |
| FD07SP04 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 117 |
| FD07EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP05 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP06 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP07 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 65 |
| FD07EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP08 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 122 |
| FD07SP08 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07EL08 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP09 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 118 |
| FD07EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD07SP10 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 148782 | ----- | | 83 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07EL10 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07EL11 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD07EL12 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET E-2-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | 62 |
| FD08RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | 18 |
| FD08EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | 55 |
| FD08SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | 29 |
| FD08SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08RD03(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 29 |
| FD08RD03(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 27 |
| FD08SP02 | 68 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 45 |
| FD08EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | 137 |
| FD08SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP04 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | 72 |
| FD08EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD08SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08SP06 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 93 |
| FD08SP06 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD08EL08 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET E-2-1B | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 28-SEP-2006 Time: 10:04:30
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006 Time: 10:03:33
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: FDW2006 2P1s to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.196

===>Grouped by Line: 001-16"-FDW-01, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1A | 31 | 8.398 | 6.376 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01RD01(L/E) | 18 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01RD01(S/E) | 18 | 4.703 | 3.570 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD01EL01 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(U/S) | 15 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01TE05(D/S) | 15 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP01 | 58 | 2.759 | 2.094 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL02 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 US | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP02 DS | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL03 | 2 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 US | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP03 DS | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL04 | 2 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 US | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP04 DS | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL05 | 2 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 US | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP05 DS | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |

===>Grouped by Line: 003-16"-FDW-03, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET P-1-1C | 31 | 8.398 | 6.376 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03RD01(L/E) | 18 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03RD01(S/E) | 18 | 4.703 | 3.570 | 296.9 | 24.599 | 0.000 | 12.750 |
| FD03EL01 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(U/S) | 15 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03TE01(D/S) | 15 | 3.762 | 2.856 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP01 | 58 | 2.759 | 2.094 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL02 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 US | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP02 DS | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL03 | 1 | 4.138 | 3.141 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP03 | 51 | 2.759 | 2.094 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL04 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 US | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP04 DS | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL05 | 2 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP05 | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL06 | 4 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP06 | 54 | 4.013 | 3.046 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03EL07 | 2 | 4.639 | 3.522 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 US | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD03SP07 DS | 52 | 3.135 | 2.380 | 296.9 | 15.456 | 0.000 | 16.000 |

===>Grouped by Line: 004-24"-FDW-01, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD01TE01(U/S) | 12 | 4.521 | 3.432 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE01(D/S) | 12 | 3.029 | 2.299 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE01(BR.) | 12 | 4.263 | 3.237 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP06 DS | 62 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP06 US | 62 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE02(U/S) | 12 | 4.521 | 3.432 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE02(D/S) | 12 | 3.029 | 2.299 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE02(BR.) | 12 | 4.263 | 3.237 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01SP07 US | 62 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP07 DS | 62 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01EL06 | 2 | 2.733 | 2.075 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP08 | 52 | 1.847 | 1.402 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01EL07 | 4 | 2.733 | 2.075 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP09 | 54 | 2.364 | 1.795 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE03(U/S) | 15 | 2.216 | 1.682 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE03(D/S) | 15 | 2.216 | 1.682 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP10 US | 65 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP10 DS | 65 | 1.477 | 1.122 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE04(U/S) | 12 | 4.521 | 3.432 | 294.7 | 13.741 | 0.000 | 24.000 |
| FD01TE04(D/S) | 12 | 3.029 | 2.299 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01TE04(BR.) | 12 | 4.263 | 3.237 | 296.9 | 15.456 | 0.000 | 16.000 |
| FD01EL08 | 4 | 2.733 | 2.075 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD01SP11 | 54 | 2.364 | 1.795 | 296.9 | 6.847 | 0.000 | 24.000 |

===>Grouped by Line: 005-18"-FDW-07, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD07RD01(L.E) | 7 | 2.585 | 1.963 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD07RD01(S.E) | 7 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL01 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP01 US | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP01 DS | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL02 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP02 US | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP02 DS | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL03 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07RD02(L/E) | 7 | 3.787 | 2.875 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07RD02(S/E) | 7 | 6.663 | 5.059 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD07RD03(L/E) | 18 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07RD03(S/E) | 18 | 5.830 | 4.426 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD07SP03 | 68 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL04 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP04 | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL05 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP05 | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP06 | 9 | 1.393 | 1.057 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL06 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP07 | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL07 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP08 US | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP08 DS | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL08 | 1 | 3.570 | 2.710 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP09 | 51 | 2.380 | 1.807 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL09 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP10 US | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |

===>Grouped by Line: 006-18"-FDW-07, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD07SP10 DS | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07TE01(U/S) | 15 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07TE01(D/S) | 15 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL10 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07SP11 | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL11 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD07EL12 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| INLET E-2-1A | 30 | 4.328 | 3.285 | 296.9 | 12.224 | 0.000 | 18.000 |

===>Grouped by Line: 011-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 7 | 2.585 | 1.963 | 296.9 | 6.847 | 0.000 | 24.000 |
| FD08RD01(S/E) | 7 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL01 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP01 US | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP01 DS | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL02 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD02(L/E) | 7 | 3.787 | 2.875 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD02(S/E) | 7 | 6.663 | 5.059 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD08RD03(L/E) | 18 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08RD03(S/E) | 18 | 5.830 | 4.426 | 296.9 | 34.617 | 0.000 | 10.750 |
| FD08SP02 | 68 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL03 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP03 US | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP03 DS | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL04 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP04 | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL05 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP05 US | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |

===>Grouped by Line: 012-18"-FDW-08, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD08SP05 DS | 52 | 2.705 | 2.053 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08TE01(U/S) | 15 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08TE01(D/S) | 15 | 3.246 | 2.464 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL06 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP06 US | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08SP06 DS | 54 | 3.462 | 2.628 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL07 | 2 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| FD08EL08 | 4 | 4.003 | 3.039 | 296.9 | 12.224 | 0.000 | 18.000 |
| INLET E-2-1B | 30 | 4.328 | 3.285 | 296.9 | 12.224 | 0.000 | 18.000 |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 10:04:44
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 10:03:33
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW2006 DPls to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.196

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD03EL09 | 1 | 4.138 | ------ | 1298252 |
| FD03EL07 | 2 | 4.639 | 1351886 | ------ |
| FD08RD02(S/E) | 7 | 6.663 | 1207354 | ------ |
| FD03SP04 DS | 54 | 4.013 | ------ | 256333 |
| OUTLET P-1-1A | 31 | 8.398 | -275 | ------ |
| OUTLET P-1-1C | 31 | 8.398 | ------ | 144602 |
| FD03SP06 | 54 | 4.013 | ------ | 11901 |
| FD07RD02(S/E) | 7 | 6.663 | 118553 | ------ |
| FD01TE05(D/S) | 15 | 3.762 | ------ | 116667 |
| FD08RD03(S/E) | 18 | 5.830 | ------ | 277438 |
| FD07RD03(S/E) | 18 | 5.830 | ------ | 171557 |
| FD01RD01(S/E) | 18 | 4.703 | 314205 | ------ |
| FD01RD01(L/E) | 18 | 3.762 | 181082 | ------ |
| FD03FD01(S/E) | 18 | 4.703 | ------ | 486109 |
| FD07SP02 DS | 52 | 2.705 | 211531 | ------ |
| FD01EL01 | 4 | 4.639 | ------ | 249415 |
| FD07EL07 | 2 | 4.003 | 222858 | ------ |
| FD03EL06 | 4 | 4.639 | ------ | 1175408 |
| FD03RD01(L/E) | 18 | 3.762 | ------ | 224808 |
| FD03EL04 | 4 | 4.639 | ------ | 1090308 |
| FD03SP04 US | 54 | 4.013 | ------ | 247633 |
| FD01EL05 | 2 | 4.639 | 314779 | ------ |
| FD03EL05 | 2 | 4.639 | ------ | 660586 |
| FD01EL03 | 2 | 4.639 | 1348963 | ------ |
| FD03SP02 DS | 54 | 4.013 | ------ | 262754 |
| FD01EL02 | 4 | 4.639 | ------ | 357616 |
| FD02TE01(U/S) | 15 | 3.762 | ------ | 267751 |
| FD03SP07 DS | 52 | 3.135 | 272920 | ------ |
| FD03EL02 | 4 | 4.639 | 364624 | ------ |
| FD03SP02 US | 54 | 4.013 | ------ | 273587 |
| FD01EL04 | 2 | 4.639 | ------ | 338950 |
| FD01SP06 US | 62 | 1.477 | ------ | 275451 |
| FD03EL01 | 4 | 4.639 | ------ | 588356 |
| FD01TE04(U/S) | 12 | 4.521 | 3344486 | ------ |
| FD08RD01(S/E) | 7 | 3.462 | ------ | 277783 |
| FD01TE02(U/S) | 12 | 4.521 | 562637 | ------ |
| FD03SP05 | 52 | 3.135 | ------ | 308755 |
| FD01TE01(U/S) | 12 | 4.521 | 1205476 | ------ |
| INLET E-2-1B | 30 | 4.328 | 454916 | ------ |
| INLET E-2-1A | 30 | 4.328 | 454916 | ------ |
| FD07EL01 | 4 | 4.003 | ------ | 315448 |
| FD01TE02(BR.) | 12 | 4.263 | 1907893 | ------ |
| FD03TE01(D/S) | 15 | 3.762 | ------ | 319897 |
| FD01TE04(BR.) | 12 | 4.263 | 370635 | ------ |
| FD07EL09 | 4 | 4.003 | 330527 | ------ |
| FD01TE01(BR.) | 12 | 4.263 | 370635 | ------ |
| FD01SP03 US | 52 | 3.135 | ------ | 334677 |
| FD07EL06 | 2 | 4.003 | 343925 | ------ |
| FD08RD02(L/E) | 7 | 3.787 | 346089 | ------ |
| FD01SP02 DS | 54 | 4.013 | ------ | 397168 |
| FD01SP04 US | 52 | 3.135 | ------ | 347047 |
| FD08SP05 US | 52 | 2.705 | 347351 | ------ |
| FD07SP10 US | 54 | 3.462 | ------ | 351414 |
| FD01SP02 US | 54 | 4.013 | 370414 | ------ |
| FD07EL04 | 2 | 4.003 | ------ | 597590 |
| FD08EL04 | 4 | 4.003 | 569113 | ------ |
| FD08EL05 | 2 | 4.003 | 629646 | ------ |
| FD08SP04 | 54 | 3.462 | ------ | 397769 |
| FD08EL03 | 2 | 4.003 | 697308 | ------ |
| FD07SP01 US | 54 | 3.462 | ------ | 424433 |

[redacted]

| | | | | |
|---|---|---|---|---|
| FD08EL01 | 4 | 4.003 | ------ | 660122 |
| FD08SP01 US | 54 | 3.462 | ------ | 428695 |
| FD08EL02 | 2 | 4.003 | 517606 | ------ |
| FD03SP01 | 58 | 2.759 | ------ | 430970 |
| FD08EL06 | 4 | 4.003 | 626415 | ------ |
| FD01TE05(U/S) | 15 | 3.762 | ------ | 435674 |
| FD07EL12 | 4 | 4.003 | 517606 | ------ |
| FD07RD03(L/E) | 18 | 3.246 | ------ | 440427 |
| FD08SP02 | 68 | 2.705 | ------ | 440606 |
| FD07EL10 | 4 | 4.003 | 517606 | ------ |
| FD07EL02 | 2 | 4.003 | 609412 | ------ |
| FD07EL05 | 4 | 4.003 | 517606 | ------ |
| FD07RD02(L/E) | 7 | 3.787 | 469645 | ------ |
| FD01SP11 | 54 | 2.364 | ------ | 474631 |
| FD07EL03 | 2 | 4.003 | 657209 | ------ |
| FD07SP04 | 52 | 2.705 | ------ | 476257 |
| FD07EL11 | 2 | 4.003 | 517606 | ------ |
| FD08EL08 | 4 | 4.003 | 517606 | ------ |
| FD07SP02 US | 52 | 2.705 | 506181 | ------ |
| FD08EL07 | 2 | 4.003 | 517606 | ------ |
| FD07SP01 DS | 54 | 3.462 | ------ | 518870 |
| FD08RD01(L/E) | 7 | 2.585 | ------ | 551492 |
| FD07EL08 | 1 | 3.570 | 618923 | ------ |
| FD07PD01(S/E) | 7 | 3.462 | 561997 | ------ |
| FD07SP10 DS | 54 | 3.462 | 648210 | ------ |
| FD07SP03 | 68 | 2.705 | ------ | 572660 |
| FD08SP06 US | 54 | 3.462 | ------ | 582535 |
| FD07SP05 | 54 | 3.462 | 648210 | ------ |
| FD08RD03(L/E) | 18 | 3.246 | ------ | 589229 |
| FD08SP01 DS | 54 | 3.462 | 648210 | ------ |
| FD01SP05 US | 52 | 3.135 | 618638 | ------ |
| FD08SP06 DS | 54 | 3.462 | 648210 | ------ |
| FD01SP03 DS | 52 | 3.135 | 618638 | ------ |
| FD01SP04 DS | 52 | 3.135 | 618638 | ------ |
| FD07SP11 | 54 | 3.462 | 648210 | ------ |
| FD08TE01(U/S) | 15 | 3.246 | 712642 | ------ |
| FD08TE01(D/S) | 15 | 3.246 | 712642 | ------ |
| FD01SP10 DS | 65 | 1.477 | ------ | 637492 |
| FD07TE01(D/S) | 15 | 3.246 | 712642 | ------ |
| FD07SP08 US | 52 | 2.705 | ------ | 642638 |
| FD07TE01(U/S) | 15 | 3.246 | 712642 | ------ |
| FD01SP05 DS | 52 | 3.135 | 717185 | ------ |
| FD03SP07 US | 52 | 3.135 | ------ | 687082 |
| FD07RD01(L/E) | 7 | 2.585 | 711588 | ------ |
| FD01TE02(D/S) | 12 | 3.029 | 779445 | ------ |
| FD01TE01(D/S) | 12 | 3.029 | 2274932 | ------ |
| FD01TE04(D/S) | 12 | 3.029 | 4846614 | ------ |
| FD03SP03 | 51 | 2.759 | ------ | 829696 |
| FD07SP09 | 51 | 2.380 | ------ | 727091 |
| FD01SP01 | 58 | 2.759 | 746397 | ------ |
| FD08SP03 US | 52 | 2.705 | ------ | 731287 |
| FD01EL06 | 2 | 2.733 | 1223953 | ------ |
| FD01EL08 | 4 | 2.733 | 1889019 | ------ |
| FD01EL07 | 4 | 2.733 | 1223953 | ------ |
| FD01SP07 US | 62 | 1.477 | ------ | 829982 |
| FD01SP06 DS | 62 | 1.477 | 845365 | ------ |
| FD07SP08 DS | 52 | 2.705 | 918823 | ------ |
| FD08SP03 DS | 52 | 2.705 | 918823 | ------ |
| FD08SP05 DS | 52 | 2.705 | 918823 | ------ |
| FD07SP07 | 52 | 2.705 | ------ | 1005264 |
| FD01SP09 | 54 | 2.364 | 1464924 | ------ |
| FD01TE03(D/S) | 15 | 2.216 | 1583803 | ------ |
| FD01TE03(U/S) | 15 | 2.216 | 1583803 | ------ |
| FD01SP08 | 52 | 1.847 | 1964216 | ------ |
| FD01SP10 US | 65 | 1.477 | 2534835 | ------ |
| FD07SP06 | 9 | 1.393 | 2083806 | ------ |
| FD01SP07 DS | 62 | 1.477 | 2534835 | ------ |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 10:04:48
Analysis Date: 28-SEP-2006 Time: 10:03:33
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: FDW2006 2P1s to E2s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.196

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | In-Service Cmp. Method [2] | In-Service Cmp. Time (hrs)[3] | In-Service Cmp. Thickness(mils)[4] Tp | In-Service Cmp. Thickness(mils)[4] Tm | Incremental Wear(mils)[5] PRWEAR | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 001-16"-FDW-01, No Sorting. | | | | | | | | | | | |
| FD01EL01 | 118.7 | 79.0 | 118.7 | 79.0 | 1.074 | MT | 218618 | 1100.3 | 1074.0 | 9.2 | 218618 |
| FD01TE05(U/S) | 96.3 | 122.0 | 96.3 | 122.0 | 1.114 | MT | 218618 | 1122.7 | 1114.0 | 7.5 | 218618 |
| FD01TE05(D/S) | 96.3 | 133.0 | 96.3 | 133.0 | 1.010 | MT | 218618 | 1122.7 | 1010.0 | 7.5 | 218618 |
| FD01EL02 | 98.2 | 88.0 | 98.2 | 88.0 | 1.138 | MT | 171740 | 1120.8 | 1138.0 | 29.7 | 171740 |
| FD01SP02 DS | 93.3 | 74.0 | 93.3 | 74.0 | 1.120 | GW | 195618 | 1125.7 | 1120.0 | 17.4 | 195618 |
| FD01SP03 US | 72.9 | 48.0 | 72.9 | 48.0 | 1.069 | MT | 195618 | 1146.1 | 1069.0 | 13.6 | 195618 |
| FD01EL04 | 118.7 | 19.0 | 118.7 | 19.0 | 1.110 | MT | 218618 | 1100.3 | 1110.0 | 9.2 | 218618 |
| FD01SP04 US | 80.2 | 14.0 | 80.2 | 14.0 | 1.065 | MT | 218618 | 1138.8 | 1065.0 | 6.2 | 218618 |
| ===>Grouped by Line: 003-16"-FDW-03, No Sorting. | | | | | | | | | | | |
| OUTLET P-1-1C | 186.4 | 112.0 | 186.4 | 112.0 | 0.919 | MT | 183618 | 813.6 | 919.0 | 45.2 | 183618 |
| FD03RD01(L/E) | 83.5 | 96.0 | 83.5 | 96.0 | 1.058 | MT | 183618 | 1135.5 | 1058.0 | 20.2 | 183618 |
| FD03RD01(S/E) | 104.4 | 139.0 | 104.4 | 139.0 | 0.992 | MT | 183618 | 895.6 | 992.0 | 25.3 | 183618 |
| FD03EL01 | 103.0 | 103.0 | 103.0 | 103.0 | 1.226 | MT | 183618 | 1116.0 | 1226.0 | 25.0 | 183618 |
| FD03TE01(U/S) | 83.5 | 37.0 | 83.5 | 37.0 | 1.072 | GW | 183618 | 1135.5 | 1072.0 | 20.2 | 183618 |
| FD03TE01(D/S) | 83.5 | 52.0 | 83.5 | 52.0 | 1.089 | MT | 183618 | 1135.5 | 1089.0 | 20.2 | 183618 |
| FD03SP01 | 70.6 | 146.0 | 70.6 | 146.0 | 1.073 | GW | 218618 | 1148.4 | 1073.0 | 5.5 | 218618 |
| FD03SP02 US | 75.3 | 118.0 | 75.3 | 118.0 | 1.095 | GW | 148782 | 1143.7 | 1095.0 | 35.4 | 148782 |
| FD03SP02 DS | 59.5 | 109.0 | 59.5 | 109.0 | 1.107 | MT | 114614 | 1159.5 | 1107.0 | 51.2 | 114614 |
| FD03EL03 | 96.2 | 38.0 | 96.2 | 38.0 | 1.448 | MT | 195618 | 1122.8 | 1448.0 | 18.0 | 195618 |
| FD03SP03 | 40.9 | 82.0 | 40.9 | 82.0 | 1.198 | MT | 114614 | 1178.1 | 1198.0 | 35.2 | 114614 |
| FD03EL04 | 107.8 | 91.0 | 107.8 | 91.0 | 1.423 | MT | 195618 | 1111.2 | 1423.0 | 20.1 | 195618 |
| FD03SP04 US | 93.3 | 33.0 | 93.3 | 33.0 | 1.068 | MT | 195618 | 1125.7 | 1068.0 | 17.4 | 195618 |
| FD03SP04 DS | 75.3 | 130.0 | 75.3 | 130.0 | 1.089 | MT | 148782 | 1143.7 | 1089.0 | 35.4 | 148782 |
| FD03EL05 | 87.0 | 48.0 | 87.0 | 48.0 | 1.271 | MT | 148782 | 1132.0 | 1271.0 | 40.9 | 148782 |
| FD03SP05 | 58.8 | 33.0 | 58.8 | 33.0 | 1.076 | MT | 148782 | 1160.2 | 1076.0 | 27.7 | 148782 |
| FD03EL06 | 87.0 | 96.0 | 87.0 | 96.0 | 1.478 | MT | 148782 | 1132.0 | 1478.0 | 40.9 | 148782 |
| FD03SP06 | 75.3 | 144.0 | 75.3 | 144.0 | 1.004 | MT | 148782 | 1143.7 | 1004.0 | 35.4 | 148782 |
| FD03SP07 US | 69.6 | 69.0 | 69.6 | 69.0 | 1.168 | GW | 183618 | 1149.4 | 1168.0 | 16.9 | 183618 |
| ===>Grouped by Line: 004-24"-FDW-01, No Sorting. | | | | | | | | | | | |
| FD01SP06 US | 27.7 | 112.0 | 27.7 | 112.0 | 1.495 | MT | 148782 | 1784.3 | 1495.0 | 13.0 | 148782 |
| FD01SP07 US | 27.7 | 136.0 | 27.7 | 136.0 | 1.566 | MT | 148782 | 1784.3 | 1566.0 | 13.0 | 148782 |
| FD01SP10 DS | 24.1 | 50.0 | 24.1 | 50.0 | 1.545 | MT | 125911 | 1787.9 | 1545.0 | 16.7 | 125911 |
| FD01SP11 | 58.1 | 48.0 | 58.1 | 48.0 | 1.551 | MT | 207118 | 1753.9 | 1551.0 | 7.1 | 207118 |
| ===>Grouped by Line: 005-18"-FDW-07, No Sorting. | | | | | | | | | | | |
| FD07EL01 | 88.9 | 101.0 | 88.9 | 101.0 | 1.216 | MT | 183618 | 1286.1 | 1216.0 | 21.5 | 183618 |
| FD07SP01 US | 76.9 | 40.0 | 76.9 | 40.0 | 1.231 | MT | 183618 | 1298.1 | 1231.0 | 18.6 | 183618 |
| FD07SP01 DS | 68.2 | 107.0 | 68.2 | 107.0 | 1.268 | GW | 160352 | 1306.8 | 1268.0 | 27.3 | 160352 |
| FD07RD03(L/E) | 75.4 | 113.0 | 75.4 | 113.0 | 1.223 | MT | 195618 | 1299.6 | 1223.0 | 14.1 | 195618 |
| FD07RD03(S/E) | 135.5 | 79.0 | 135.5 | 79.0 | 0.760 | MT | 195618 | 708.5 | 760.0 | 25.3 | 195618 |
| FD07SP03 | 62.9 | 46.0 | 62.9 | 46.0 | 1.231 | MT | 195618 | 1312.1 | 1231.0 | 11.7 | 195618 |
| FD07EL04 | 84.7 | 130.0 | 84.7 | 130.0 | 1.318 | MT | 171740 | 1290.3 | 1318.0 | 25.7 | 171740 |
| FD07SP04 | 57.3 | 117.0 | 57.3 | 117.0 | 1.214 | MT | 171740 | 1317.7 | 1214.0 | 17.3 | 171740 |
| FD07SP07 | 57.3 | 65.0 | 57.3 | 65.0 | 1.338 | GW | 171740 | 1317.7 | 1338.0 | 17.3 | 171740 |
| FD07SP08 US | 57.3 | 122.0 | 57.3 | 122.0 | 1.253 | MT | 171740 | 1317.7 | 1253.0 | 17.3 | 171740 |
| FD07SP09 | 44.7 | 118.0 | 44.7 | 118.0 | 1.256 | MT | 148782 | 1330.3 | 1256.0 | 21.0 | 148782 |
| FD07SP10 US | 65.0 | 83.0 | 65.0 | 83.0 | 1.221 | MT | 148782 | 1310.0 | 1221.0 | 30.5 | 148782 |
| ===>Grouped by Line: 006-18"-FDW-07, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 011-18"-FDW-08, No Sorting | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FD08RD01(L/E) | 57.4 | 62.0 | 57.4 | 62.0 | 1.578 | MT | 207118 | 1754.6 | 1578.0 | 7.7 | 183618 |
| FD08RD01(S/E) | 76.9 | 18.0 | 76.9 | 18.0 | 1.187 | MT | 183618 | 1298.1 | 1187.0 | 18.6 | 183618 |
| FD08EL01 | 98.4 | 56.0 | 98.4 | 56.0 | 1.326 | MT | 207118 | 1276.6 | 1326.0 | 12.0 | 207118 |
| FD08SP01 US | 85.1 | 30.0 | 85.1 | 30.0 | 1.224 | MT | 207118 | 1289.9 | 1224.0 | 10.4 | 207118 |
| FD08RD03(L/E) | 86.3 | 29.0 | 86.3 | 29.0 | 1.254 | MT | 230118 | 1288.7 | 1254.0 | 3.2 | 230118 |
| FD08RD03(S'E) | 155.0 | 28.0 | 155.0 | 28.0 | 0.794 | MT | 230118 | 689.0 | 794.0 | 5.8 | 230118 |
| FD08SP02 | 71.9 | 45.0 | 71.9 | 45.0 | 1.191 | MT | 230118 | 1303.1 | 1191.0 | 2.7 | 230118 |
| FD08SP03 US | 36.0 | 137.0 | 36.0 | 137.0 | 1.295 | MT | 102975 | 1339.0 | 1295.0 | 38.6 | 102975 |
| FD08SP04 | 76.9 | 72.0 | 76.9 | 72.0 | 1.223 | MT | 183618 | 1298.1 | 1223.0 | 18.6 | 183618 |

===: Grouped by Line: 013-18"-FDW-08, No Sorting.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FD08SP06 US | 73.3 | 93.0 | 73.3 | 93.0 | 1.282 | GW | 171740 | 1301.7 | 1282.0 | 22.2 | 171740 |

Notes:

(1) Predictions are for the time of last inspection (last known meas. wear).

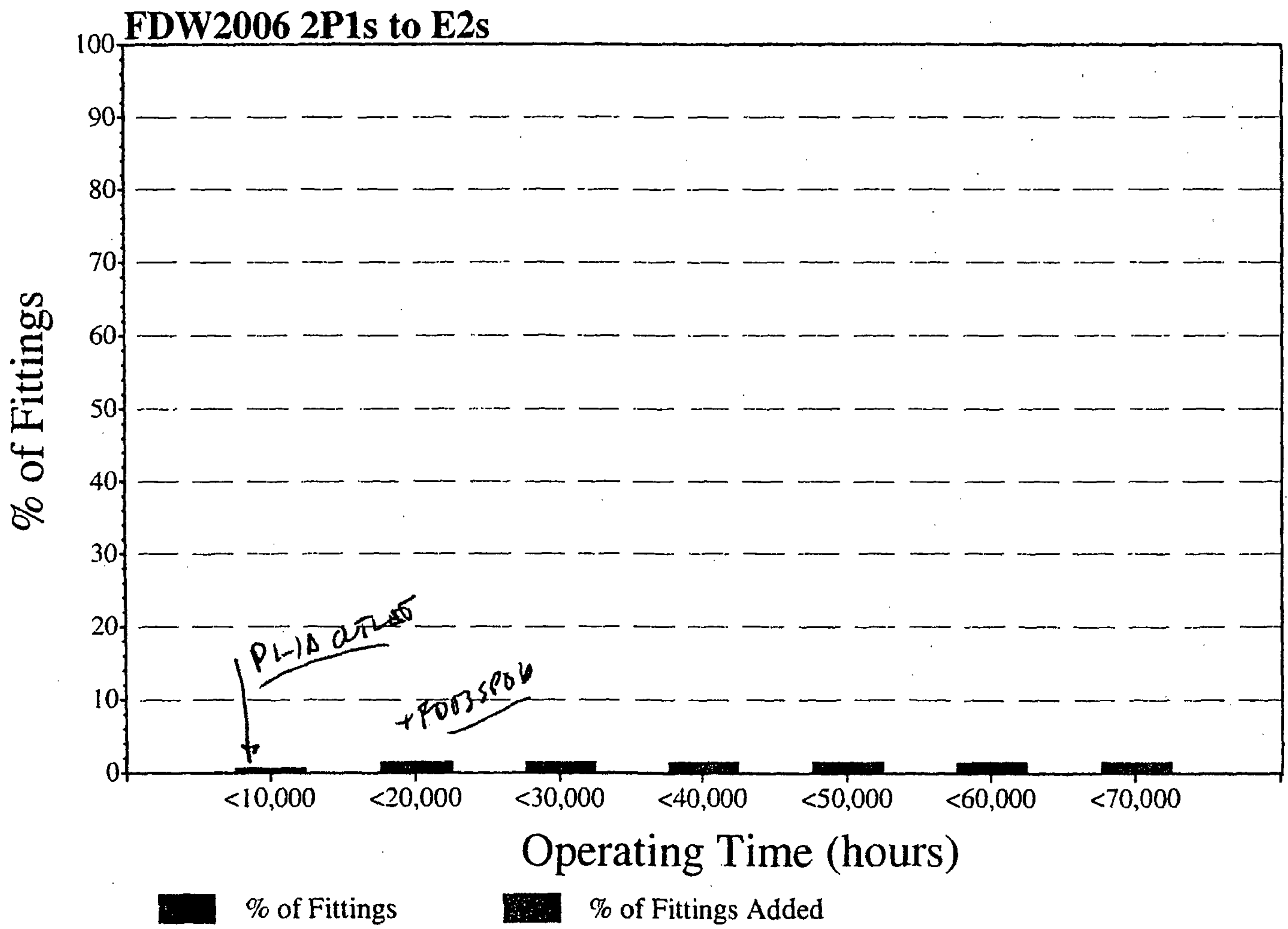
(2) GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
    MT = Tmeas is component minimum thickness.
    PW = Tmeas is Tinit - predicted wear.
    US = Tmeas is user specified.

(3) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
    Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

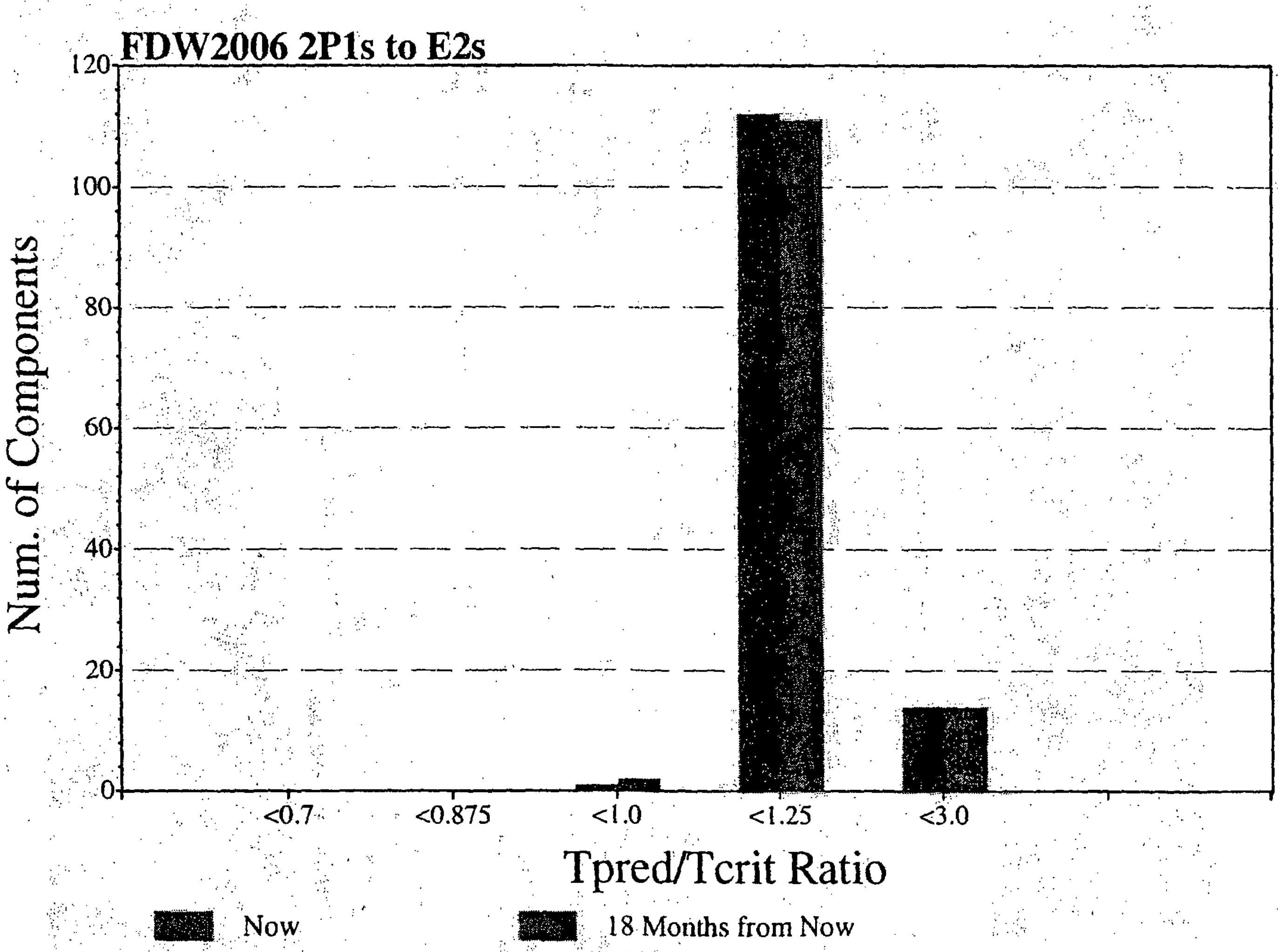
(4) These two values are used for thickness plot.
    Tp = Predicted thickness at Tmeas.
    Tm = Last measured thickness (Tmeas).

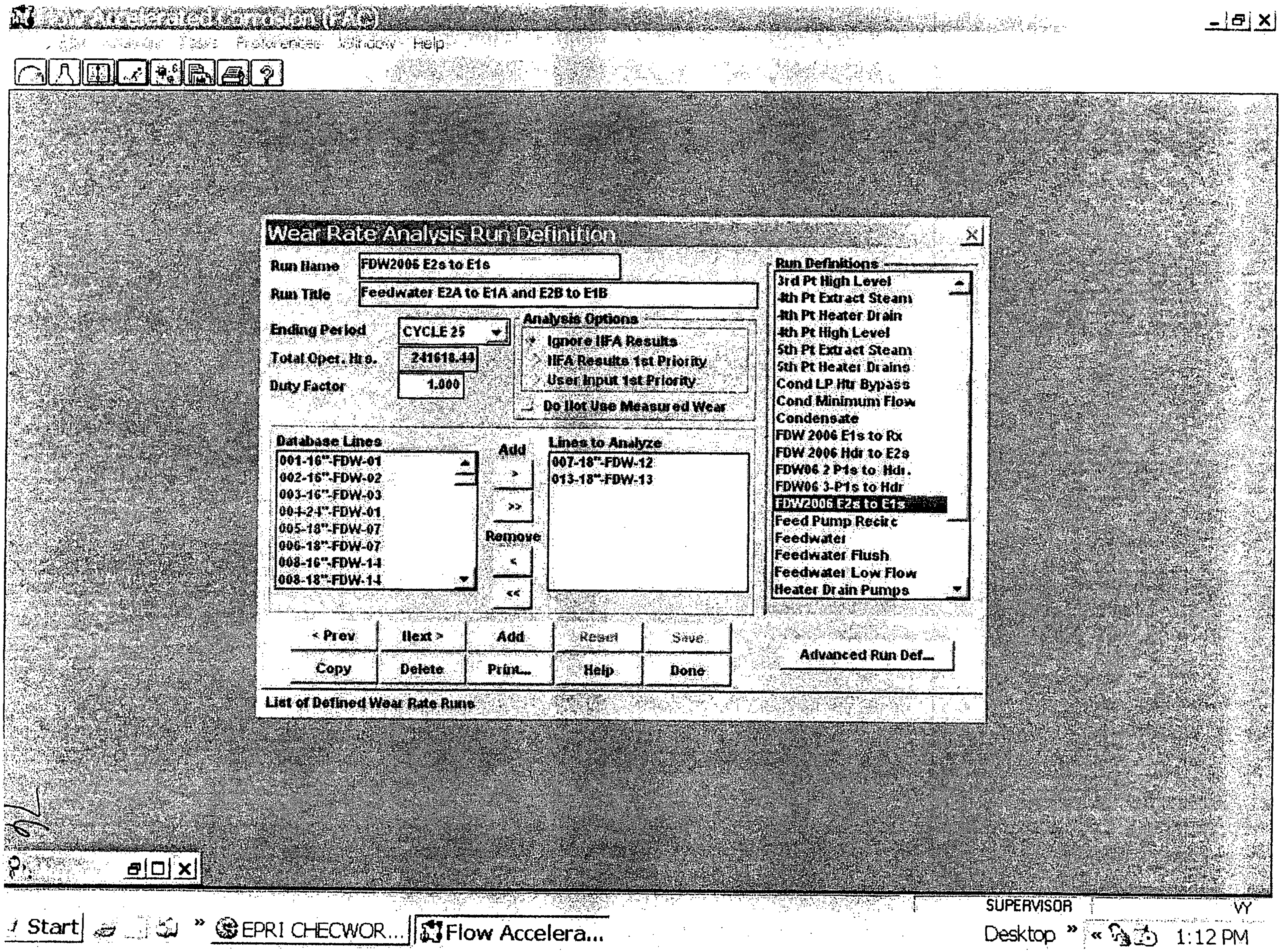
(5) PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

# Cumulative % of Comp. Time to Tcrit

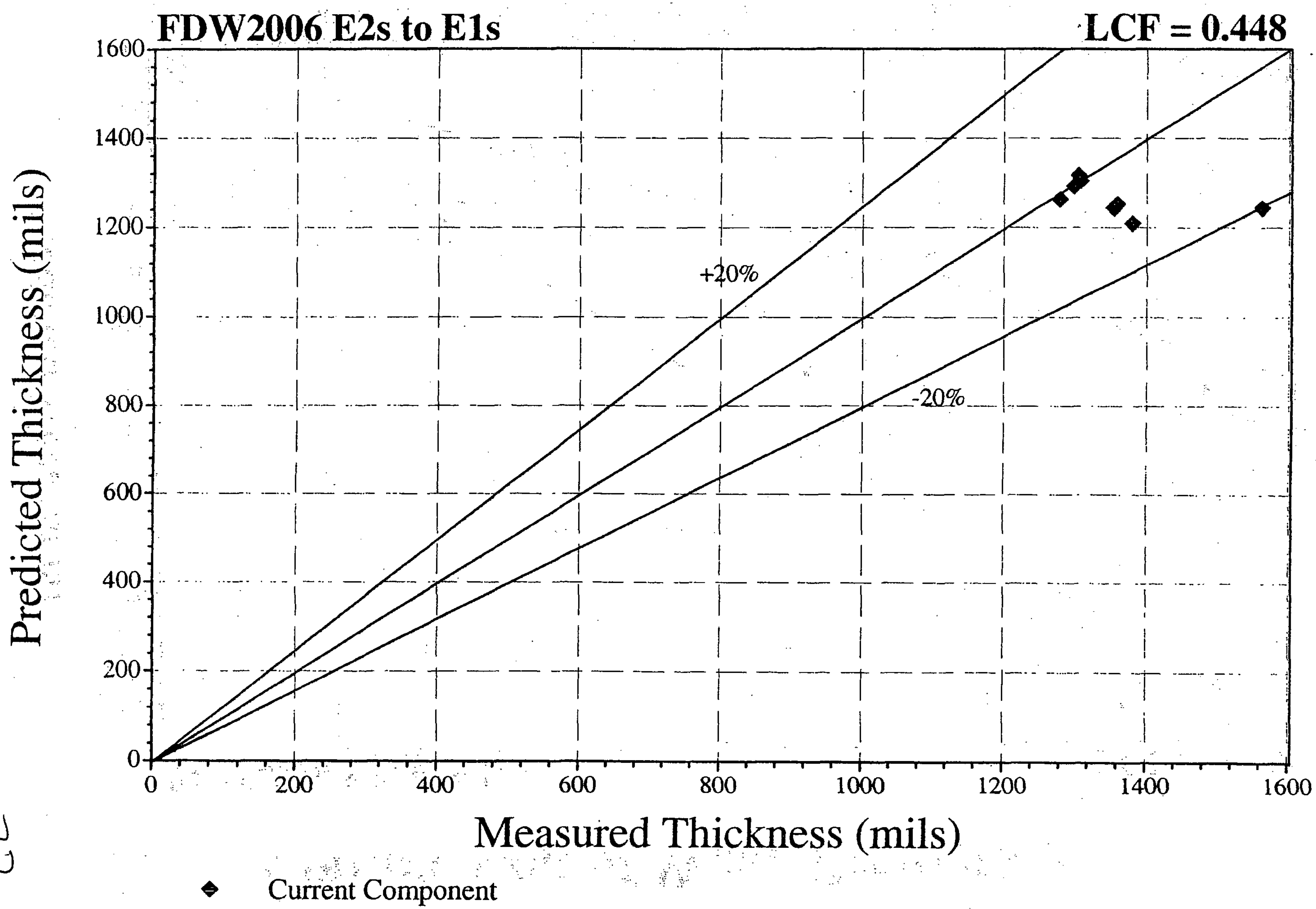


# Tpred/Tcrit Ratio Plot

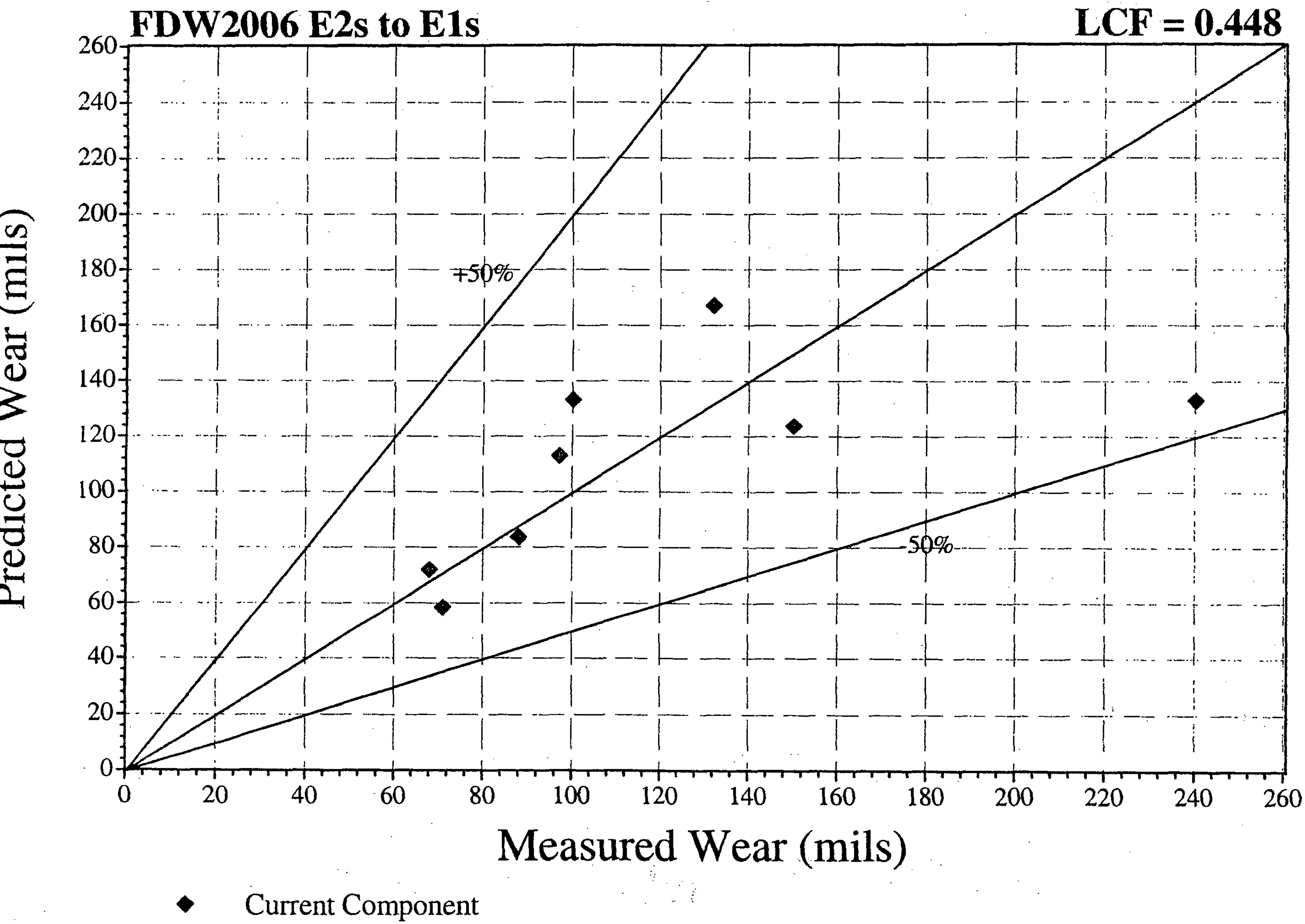



Flow Accelerated Corrosion (FAC)
Help
Wear Rate Analysis Run Definition
Run Name
FDW2006 E2s to E1s
Run Title
Feedwater E2A to E1A and E2B to E1B
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore IIFA Results
IIFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
008-16"-FDW-14
008-18"-FDW-14
Add
Remove
Lines to Analyze
007-18"-FDW-12
013-18"-FDW-13
Run Definitions
3rd Pt High Level
4th Pt Extract Steam
4th Pt Heater Drain
4th Pt High Level
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
SUPERVISOR
VY
Start
EPRI CHECWOR...
Flow Accelera...
Desktop
1:12 PM

# Comparison of Thickness Predictions



# Comparison of Wear Predictions

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 19:32:04
Analysis Date: 13-SEP-2006 Time: 19:29:27
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: FDW2006 E2s to E1s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.448

Duty Factor (Global): 1.000
Exclude Measure Wear: No

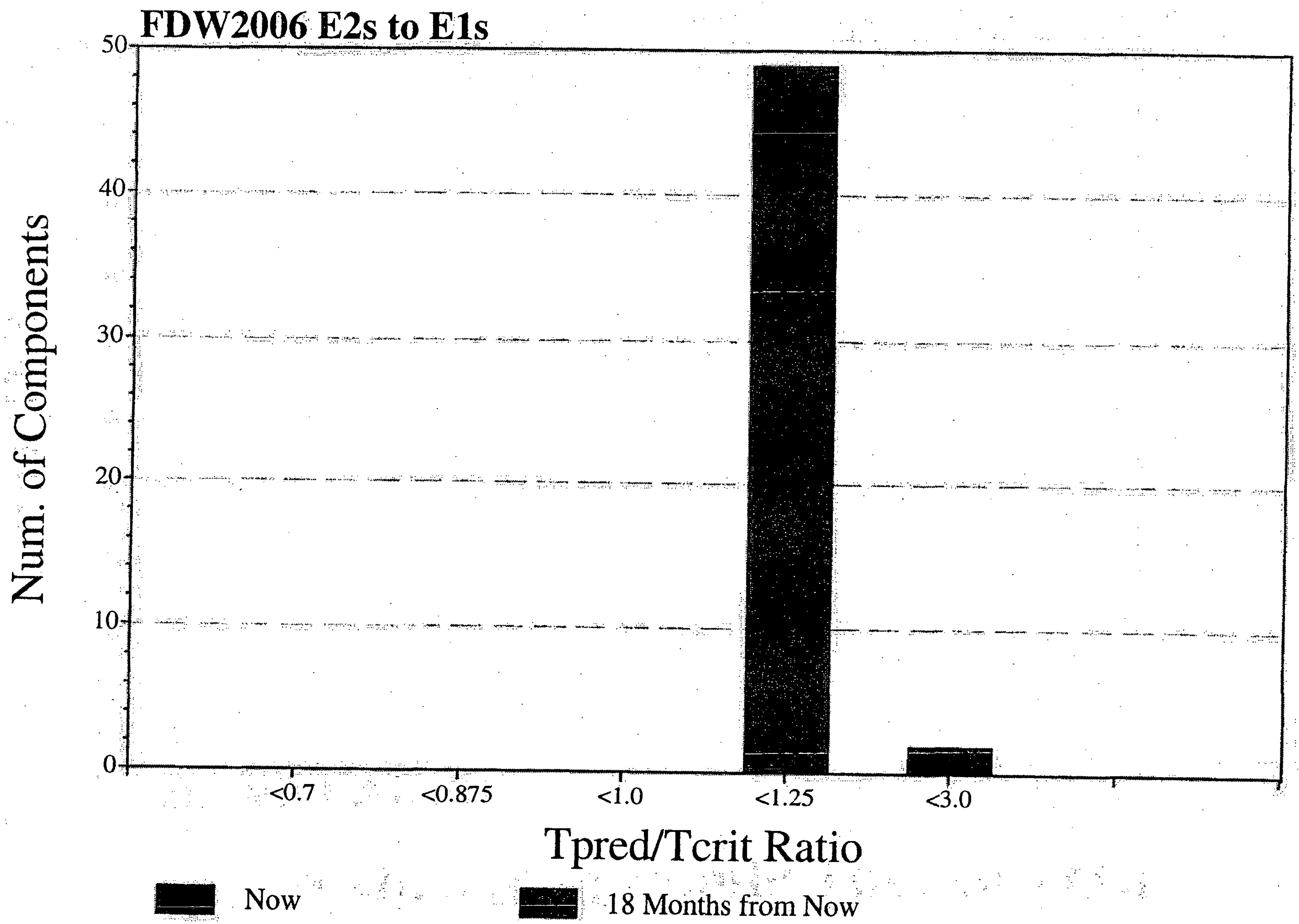
| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Insp. | Total Lifetime Wear (mils) Prd.[2] | Meas. | In-Service Cmp. Wear (mils) Prd.[2] | Meas. | In-Service Cmp. Tmeas (in)[4] | Method [3] | Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 007-18"-FDW-12, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET E-2-1A | 31 | 8.482 | 6.440 | 1.375 | 1.141 | 1.085 | 1.085 | 76194 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12EL01 | 4 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP01 US | 54 | 5.429 | 4.121 | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP01 DS | 54 | 5.429 | 4.121 | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12EL02 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP02 | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12EL03 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP03 | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP04 | 9 | 2.196 | 1.667 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12EL04 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP05 US | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP05 DS | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12EL05 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP06 | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP07 | 9 | 2.196 | 1.667 | 1.375 | 1.302 | 1.085 | 1.085 | ------ | 1139023 | 58.4 | 71.0 | 58.4 | 71.0 | 1.304 | US | 230118 | 230118 |
| FD12EL06 | 2 | 6.277 | 4.765 | 1.375 | 1.373 | 1.085 | 1.085 | ------ | 528901 | 166.9 | 132.0 | 166.9 | 132.0 | 1.379 | US | 230118 | 230118 |
| FD12SP08 | 52 | 4.241 | 3.220 | 1.375 | 1.274 | 1.085 | 1.085 | ------ | 513511 | 112.8 | 97.0 | 112.8 | 97.0 | 1.278 | US | 230118 | 230118 |
| FD12EL07 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP09 | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12TE01(U/S) | 15 | 5.089 | 3.864 | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12TE01(D/S) | 15 | 5.089 | 3.864 | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP10 US | 65 | 3.393 | 2.576 | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD12SP10 DS | 65 | 3.393 | 2.576 | 1.375 | 1.285 | 1.085 | 1.085 | ------ | 680915 | 71.8 | 68.0 | 71.8 | 68.0 | 1.307 | US | 171740 | 171740 |
| FD12EL08 | 2 | 6.277 | 4.765 | 1.375 | 1.313 | 1.085 | 1.085 | ------ | 418635 | 132.9 | 100.0 | 132.9 | 100.0 | 1.353 | MT | 171740 | 171740 |
| FD12EL09 | 4 | 6.277 | 4.765 | 1.375 | 1.521 | 1.085 | 1.085 | ------ | 800993 | 132.9 | 240.0 | 132.9 | 240.0 | 1.561 | US | 171740 | 171740 |
| INLET E-1-1A | 30 | 6.786 | 5.152 | 1.375 | 1.188 | 1.085 | 1.085 | 174808 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| ===>Grouped by Line: 013-18"-FDW-13, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET E-2-1B | 31 | 8.482 | 6.440 | 1.375 | 1.141 | 1.085 | 1.085 | 76194 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL01 | 4 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP01 US | 54 | 5.429 | 4.121 | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP01 DS | 54 | 5.429 | 4.121 | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL02 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP02 US | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP02 DS | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL03 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP03 | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP04 | 9 | 2.196 | 1.667 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL04 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP05 US | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP05 DS | 52 | 4.241 | 3.220 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL05 | 2 | 6.277 | 4.765 | 1.375 | 1.309 | 1.085 | 1.085 | ------ | 410823 | 123.6 | 150.0 | 123.6 | 150.0 | 1.358 | US | 160352 | 160352 |
| FD13SP06 | 52 | 4.241 | 3.220 | 1.375 | 1.265 | 1.085 | 1.085 | ------ | 488448 | 83.5 | 88.0 | 83.5 | 88.0 | 1.298 | GW | 160352 | 160352 |
| FD13SP07 | 9 | 2.196 | 1.667 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL06 | 1 | 5.598 | 4.250 | 1.375 | 1.221 | 1.085 | 1.085 | 279399 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL07 | 4 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13TE01(U/S) | 15 | 5.089 | 3.864 | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13TE01(D/S) | 15 | 5.089 | 3.864 | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP08 US | 65 | 3.393 | 2.576 | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13SP08 DS | 65 | 3.393 | 2.576 | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD13EL08 | 2 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD13EL09 | 4 | 6.277 | 4.765 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| INLET E-1-1B | 30 | 6.786 | 5.152 | 1.375 | 1.188 | 1.085 | 1.085 | 174808 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |

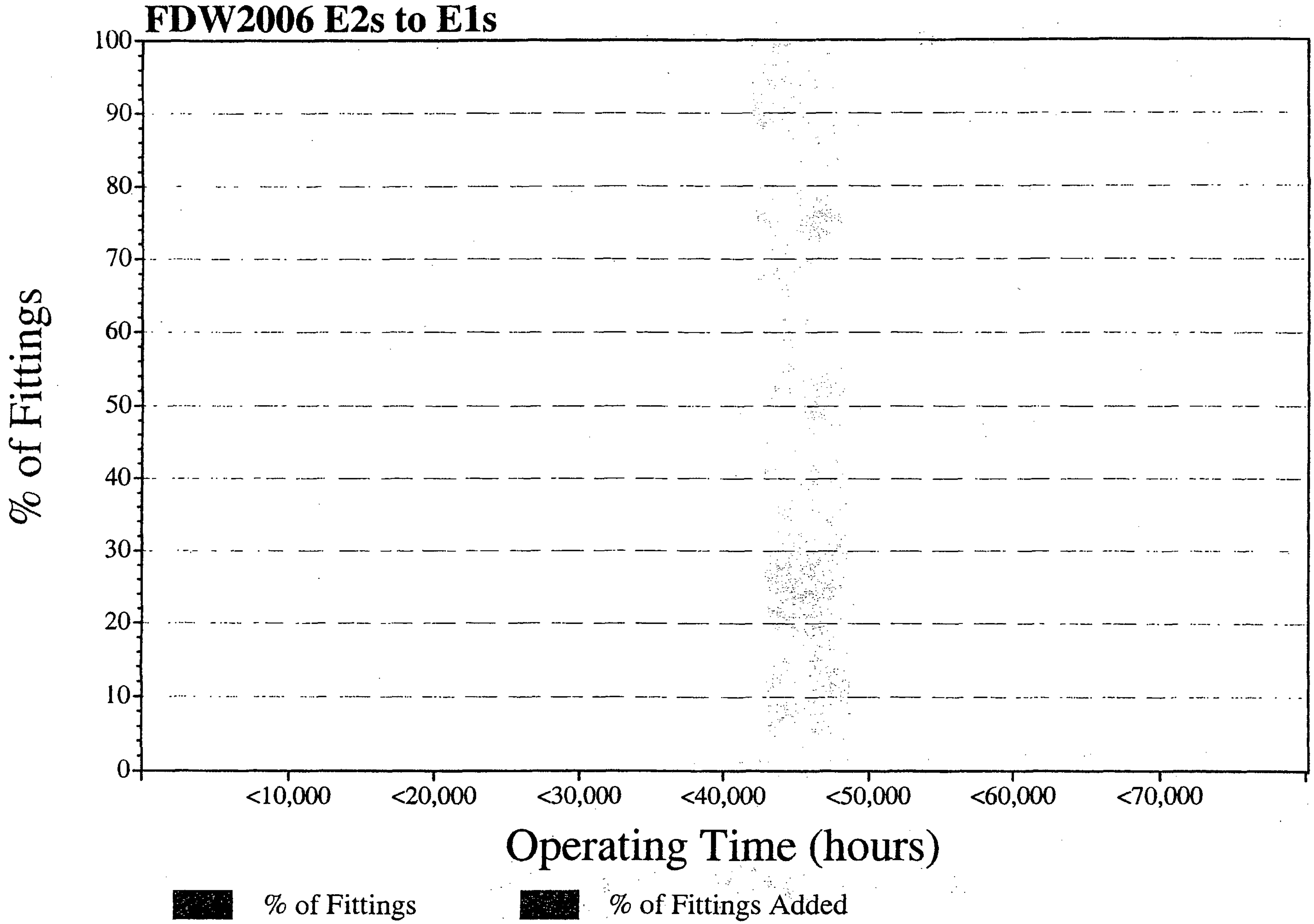
Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

[redacted]

# Tpred/Tcrit Ratio Plot



# Cumulative % of Comp. Time to Tcrit

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 19:31:48
Analysis Date: 13-SEP-2006 Time: 19:29:27
CHECWORKS FAC Version 1.0F (Build 52)

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*** Wear Rate Analysis: Combined Rankings for Inspection ***

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Run Name: FDW2006 E2s to E1s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.448

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD13EL06 | 1 | 5.598 | 279399 | ------ |
| FD12EL05 | 2 | 6.277 | 214787 | ------ |
| FD12SP01 US | 54 | 5.429 | 298076 | ------ |
| OUTLET E-2-1B | 31 | 8.482 | 76194 | ------ |
| OUTLET E-2-1A | 31 | 8.482 | 76194 | ------ |
| INLET E-1-1B | 30 | 6.786 | 174808 | ------ |
| INLET E-1-1A | 30 | 6.786 | 174808 | ------ |
| FD12EL06 | 2 | 6.277 | ------ | 528901 |
| FD12EL04 | 2 | 6.277 | 214787 | ------ |
| FD13EL02 | 2 | 6.277 | 214787 | ------ |
| FD12EL03 | 2 | 6.277 | 214787 | ------ |
| FD12EL02 | 2 | 6.277 | 214787 | ------ |
| FD13EL03 | 2 | 6.277 | 214787 | ------ |
| FD13EL09 | 4 | 6.277 | 214787 | ------ |
| FD13EL04 | 2 | 6.277 | 214787 | ------ |
| FD13EL07 | 4 | 6.277 | 214787 | ------ |
| FD13EL01 | 4 | 6.277 | 214787 | ------ |
| FD12EL07 | 2 | 6.277 | 214787 | ------ |
| FD12EL01 | 4 | 6.277 | 214787 | ------ |
| FD12EL09 | 4 | 6.277 | ------ | 800993 |
| FD13EL08 | 2 | 6.277 | 214787 | ------ |
| FD13EL05 | 2 | 6.277 | ------ | 410823 |
| FD13SP01 US | 54 | 5.429 | 298076 | ------ |
| FD12EL08 | 2 | 6.277 | ------ | 418635 |
| FD12SP01 DS | 54 | 5.429 | 298076 | ------ |
| FD13SP01 DS | 54 | 5.429 | 298076 | ------ |
| FD12TE01(U/S) | 15 | 5.089 | 339165 | ------ |
| FD13TE01(D/S) | 15 | 5.089 | 339165 | ------ |
| FD12TE01(D/S) | 15 | 5.089 | 339165 | ------ |
| FD13TE01(U/S) | 15 | 5.089 | 339165 | ------ |
| FD12SP05 US | 52 | 4.241 | 470651 | ------ |
| FD12SP03 | 52 | 4.241 | 470651 | ------ |
| FD13SP03 | 52 | 4.241 | 470651 | ------ |
| FD12SP06 | 52 | 4.241 | 470651 | ------ |
| FD13SP02 US | 52 | 4.241 | 470651 | ------ |
| FD12SP08 | 52 | 4.241 | ------ | 513511 |
| FD13SP05 US | 52 | 4.241 | 470651 | ------ |
| FD12SP02 | 52 | 4.241 | 470651 | ------ |
| FD13SP06 | 52 | 4.241 | ------ | 488448 |
| FD12SP09 | 52 | 4.241 | 470651 | ------ |
| FD12SP05 DS | 52 | 4.241 | 470651 | ------ |
| FD13SP02 DS | 52 | 4.241 | 470651 | ------ |
| FD13SP05 DS | 52 | 4.241 | 470651 | ------ |
| FD12SP10 US | 65 | 3.393 | 667878 | ------ |
| FD13SP08 DS | 65 | 3.393 | 667878 | ------ |
| FD13SP08 US | 65 | 3.393 | 667878 | ------ |
| FD12SP10 DS | 65 | 3.393 | ------ | 680915 |
| FD12SP07 | 9 | 2.196 | ------ | 1139023 |
| FD13SP07 | 9 | 2.196 | 1205306 | ------ |
| FD12SP04 | 9 | 2.196 | 1205306 | ------ |
| FD13SP04 | 9 | 2.196 | 1205306 | ------ |

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 19:31:57
Analysis Date: 13-SEP-2006 Time: 19:29:27
CHECWORKS FAC Version 1.0F (Build 52)

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

*** Wear Rate Analysis: Wear Predictions Report ***

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

Run Name: FDW2006 E2s to Els
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.448

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | Method [2] | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | Tm | Incremental Wear (mils)[5] PRWEAR | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 007-18"-FDW-12, No Sorting. | | | | | | | | | | | |
| FD12SP07 | 58.4 | 71.0 | 58.4 | 71.0 | 1.304 | US | 230118 | 1316.6 | 1304.0 | 2.2 | 230118 |
| FD12EL06 | 166.9 | 132.0 | 166.9 | 132.0 | 1.379 | US | 230118 | 1208.1 | 1379.0 | 6.3 | 230118 |
| FD12SP08 | 112.8 | 97.0 | 112.8 | 97.0 | 1.278 | US | 230118 | 1262.2 | 1278.0 | 4.2 | 230118 |
| FD12SP10 DS | 71.8 | 68.0 | 71.8 | 68.0 | 1.307 | US | 171740 | 1303.2 | 1307.0 | 21.8 | 171740 |
| FD12EL08 | 132.9 | 100.0 | 132.9 | 100.0 | 1.353 | MT | 171740 | 1242.1 | 1353.0 | 40.2 | 171740 |
| FD12EL09 | 132.9 | 240.0 | 132.9 | 240.0 | 1.561 | US | 171740 | 1242.1 | 1561.0 | 40.2 | 171740 |
| ===>Grouped by Line: 013-18"-FDW-13, No Sorting. | | | | | | | | | | | |
| FD13EL05 | 123.6 | 150.0 | 123.6 | 150.0 | 1.358 | US | 160352 | 1251.4 | 1358.0 | 49.5 | 160352 |
| FD13SP06 | 83.5 | 88.0 | 83.5 | 88.0 | 1.298 | GW | 160352 | 1291.5 | 1298.0 | 33.4 | 160352 |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

[redacted]

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 19:31:43
Analysis Date: 13-SEP-2006 Time: 19:29:27
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: FDW2006 E2s to E1s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.448

Duty Factor (Global): 1.000
Exclude Measure Wear: No

===>Grouped by Line: 007-18"-FDW-12, No Sorting.

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| OUTLET E-2-1A | 1.375 | 1.141 | 1.085 | 1.085 | 76194 | ------ | 241618 |
| FD12EL01 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP01 US | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | 241618 |
| FD12SP01 DS | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | 241618 |
| FD12EL02 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP02 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12EL03 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP03 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12SP04 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | 241618 |
| FD12EL04 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP05 US | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12SP05 DS | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12EL05 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP06 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12SP07 | 1.375 | 1.302 | 1.085 | 1.085 | ------ | 1139023 | 241618 |
| FD12EL06 | 1.375 | 1.373 | 1.085 | 1.085 | ------ | 528901 | 241618 |
| FD12SP08 | 1.375 | 1.274 | 1.085 | 1.085 | ------ | 513511 | 241618 |
| FD12EL07 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD12SP09 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD12TE01(U/S) | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | 241618 |
| FD12TE01(D/S) | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | 241618 |
| FD12SP10 US | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | 241618 |
| FD12SP10 DS | 1.375 | 1.285 | 1.085 | 1.085 | ------ | 680915 | 241618 |
| FD12EL08 | 1.375 | 1.313 | 1.085 | 1.085 | ------ | 418635 | 241618 |
| FD12EL09 | 1.375 | 1.521 | 1.085 | 1.085 | ------ | 800993 | 241618 |
| INLET E-1-1A | 1.375 | 1.188 | 1.085 | 1.085 | 174808 | ------ | 241618 |

===>Grouped by Line: 013-18"-FDW-13, No Sorting.

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| OUTLET E-2-1B | 1.375 | 1.141 | 1.085 | 1.085 | 76194 | ------ | 241618 |
| FD13EL01 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD13SP01 US | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | 241618 |
| FD13SP01 DS | 1.375 | 1.225 | 1.085 | 1.085 | 298076 | ------ | 241618 |
| FD13EL02 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD13SP02 US | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD13SP02 DS | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD13EL03 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD13SP03 | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD13SP04 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | 241618 |
| FD13EL04 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD13SP05 US | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD13SP05 DS | 1.375 | 1.258 | 1.085 | 1.085 | 470651 | ------ | 241618 |
| FD13EL05 | 1.375 | 1.309 | 1.085 | 1.085 | ------ | 410823 | 241618 |
| FD13SP06 | 1.375 | 1.265 | 1.085 | 1.085 | ------ | 488448 | 241618 |
| FD13SP07 | 1.375 | 1.314 | 1.085 | 1.085 | 1205306 | ------ | 241618 |
| FD13EL06 | 1.375 | 1.221 | 1.085 | 1.085 | 279399 | ------ | 241618 |
| FD13EL07 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| FD13TE01(U/S) | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | 241618 |
| FD13TE01(D/S) | 1.375 | 1.235 | 1.085 | 1.085 | 339165 | ------ | 241618 |
| FD13SP08 US | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | 241618 |
| FD13SP08 DS | 1.375 | 1.281 | 1.085 | 1.085 | 667878 | ------ | 241618 |
| FD13EL08 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD13EL09 | 1.375 | 1.202 | 1.085 | 1.085 | 214787 | ------ | 241618 |
| INLET E-1-1B | 1.375 | 1.188 | 1.085 | 1.085 | 174808 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 19:31:39
Analysis Date: 13-SEP-2006 Time: 19:29:27
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW2006 E2s to E1s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.448

Duty Factor (Global): 1.000
Exclude Measure Wear: No

===>Grouped by Line: 007-18"-FDW-12, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-2-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP02 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP03 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP07 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 71 |
| FD12EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 132 |
| FD12SP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 97 |
| FD12EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP09 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP10 US | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD12SP10 DS | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 68 |
| FD12EL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 100 |
| FD12EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | | 240 |
| INLET E-1-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 013-18"-FDW-13, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-2-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP03 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 150 |
| FD13SP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 88 |
| FD13SP07 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL06 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL07 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP08 US | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13SP08 DS | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD13EL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD13EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET E-1-1B | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

[redacted]

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 13-SEP-2006 Time: 19:31:34
Plant: Vermont Yankee  Analysis Date: 13-SEP-2006 Time: 19:29:27
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

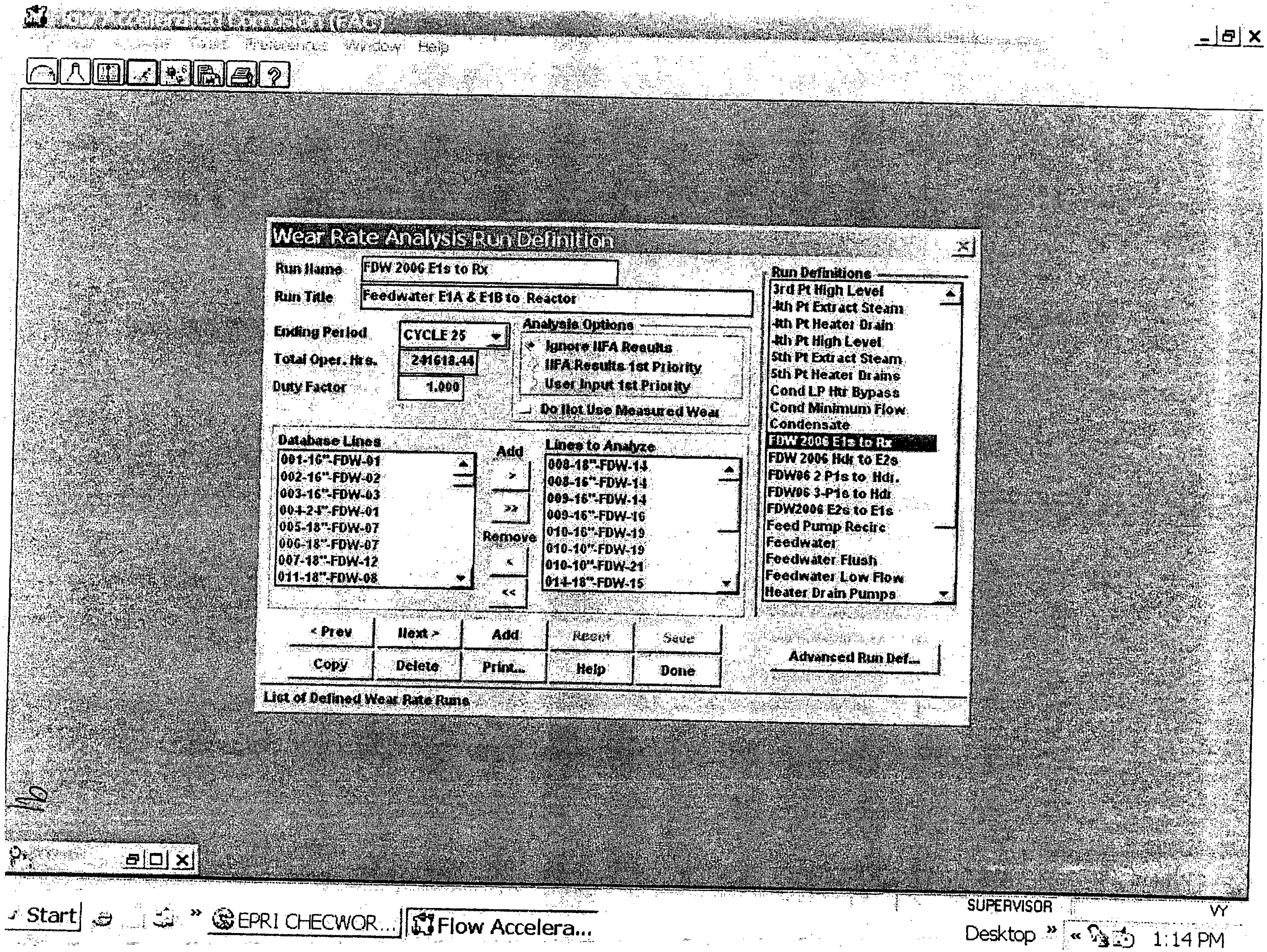
*** Wear Rate Analysis: Wear Rates/Input Data Report ***

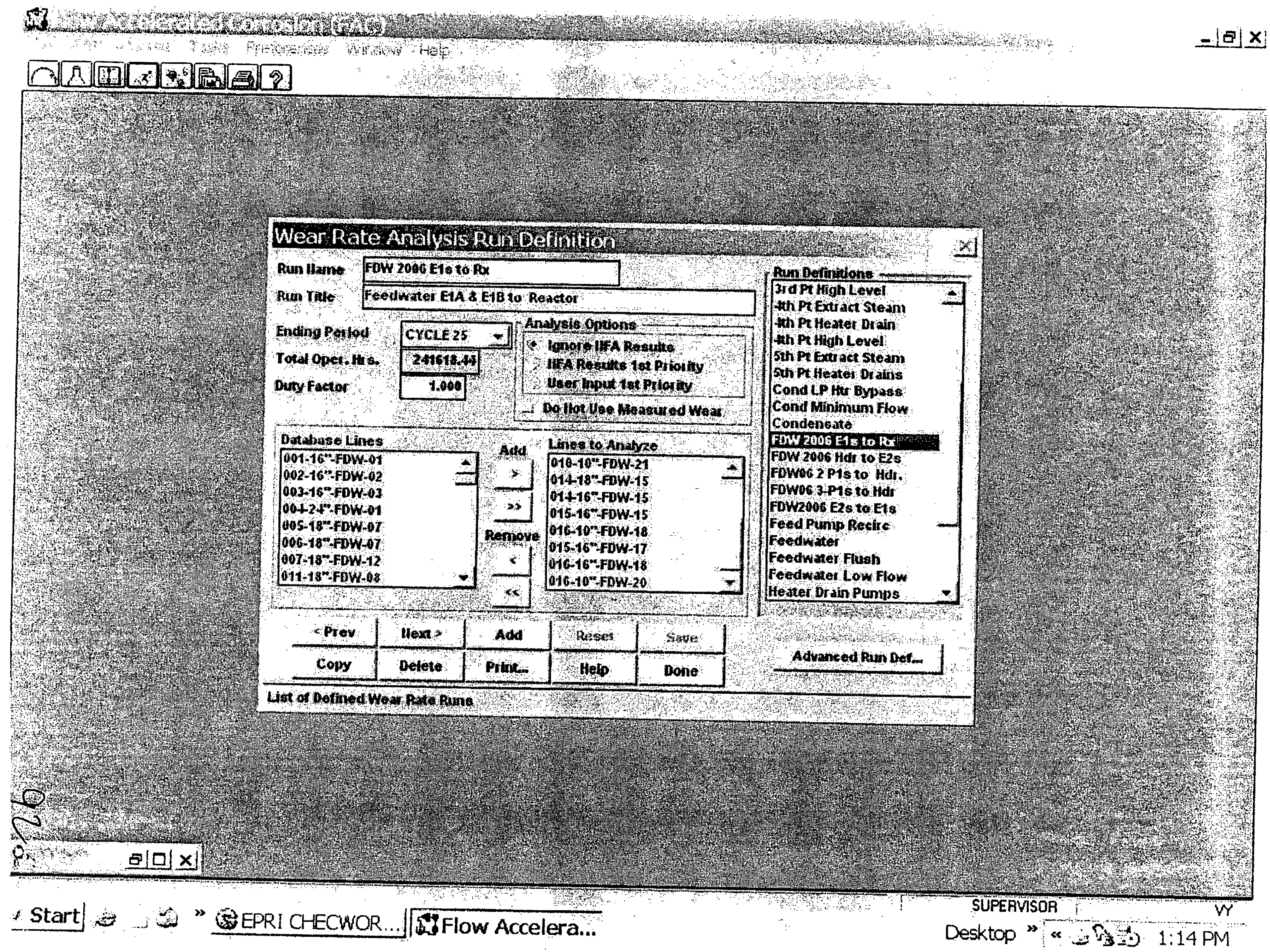
Run Name: FDW2006 E2s to E1s
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.448

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 007-18"-FDW-12, No Sorting. | | | | | | | |
| OUTLET E-2-1A | 31 | 8.482 | 6.440 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL01 | 4 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP01 US | 54 | 5.429 | 4.121 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP01 DS | 54 | 5.429 | 4.121 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL02 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP02 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL03 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP03 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP04 | 9 | 2.196 | 1.667 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL04 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP05 US | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP05 DS | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL05 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP06 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP07 | 9 | 2.196 | 1.667 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL06 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP08 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL07 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP09 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12TE01(U/S) | 15 | 5.089 | 3.864 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12TE01(D/S) | 15 | 5.089 | 3.864 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP10 US | 65 | 3.393 | 2.576 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12SP10 DS | 65 | 3.393 | 2.576 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL08 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD12EL09 | 4 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| INLET E-1-1A | 30 | 6.786 | 5.152 | 327.7 | 12.446 | 0.000 | 18.000 |
| ===>Grouped by Line: 013-18"-FDW-13, No Sorting. | | | | | | | |
| OUTLET E-2-1B | 31 | 8.482 | 6.440 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL01 | 4 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP01 US | 54 | 5.429 | 4.121 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP01 DS | 54 | 5.429 | 4.121 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL02 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP02 US | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP02 DS | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL03 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP03 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP04 | 9 | 2.196 | 1.667 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL04 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP05 US | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP05 DS | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL05 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP06 | 52 | 4.241 | 3.220 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP07 | 9 | 2.196 | 1.667 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL06 | 1 | 5.598 | 4.250 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL07 | 4 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13TE01(U/S) | 15 | 5.089 | 3.864 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13TE01(D/S) | 15 | 5.089 | 3.864 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP08 US | 65 | 3.393 | 2.576 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13SP08 DS | 65 | 3.393 | 2.576 | 327.7 | 12.446 | 0.000 | 18.000 |
| FD13EL08 | 2 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD13EL09 | 4 | 6.277 | 4.765 | 327.7 | 12.446 | 0.000 | 18.000 |
| INLET E-1-1B | 30 | 6.786 | 5.152 | 327.7 | 12.446 | 0.000 | 18.000 |

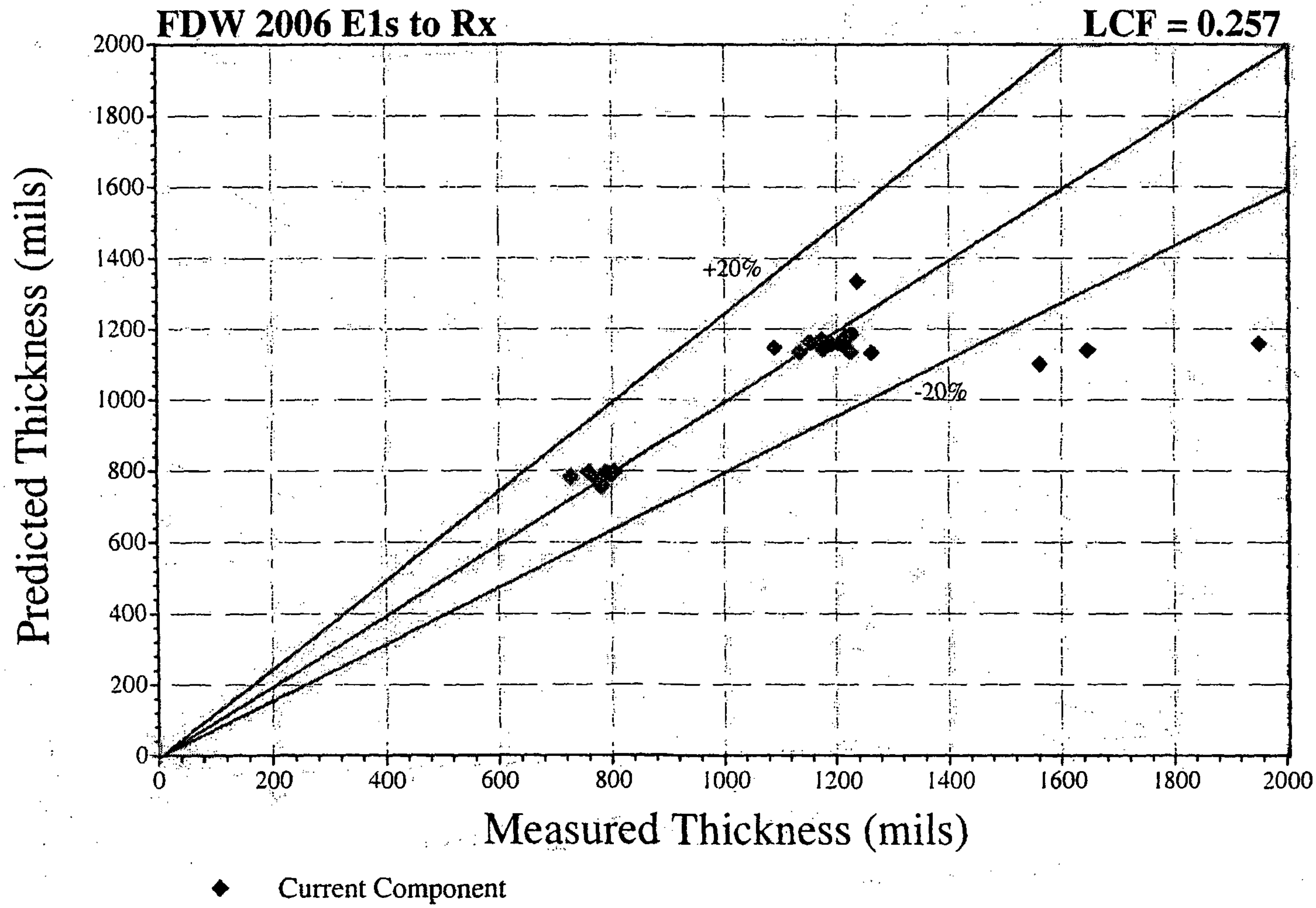
Glo


Wear Rate Analysis Run Definition
Run Name: FDW 2006 E1s to Rx
Run Title: Feedwater E1A & E1B to Reactor
Ending Period: CYCLE 25
Total Oper. Hrs.: 241618.44
Duty Factor: 1.000
Analysis Options
Ignore IIFA Results
IIFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
011-18"-FDW-08
Add
Remove
Lines to Analyze
008-18"-FDW-14
008-16"-FDW-14
009-16"-FDW-14
009-16"-FDW-16
010-16"-FDW-19
010-10"-FDW-19
010-10"-FDW-21
014-18"-FDW-15
Run Definitions
3rd Pt High Level
4th Pt Extract Steam
4th Pt Heater Drain
4th Pt High Level
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
1:14 PM

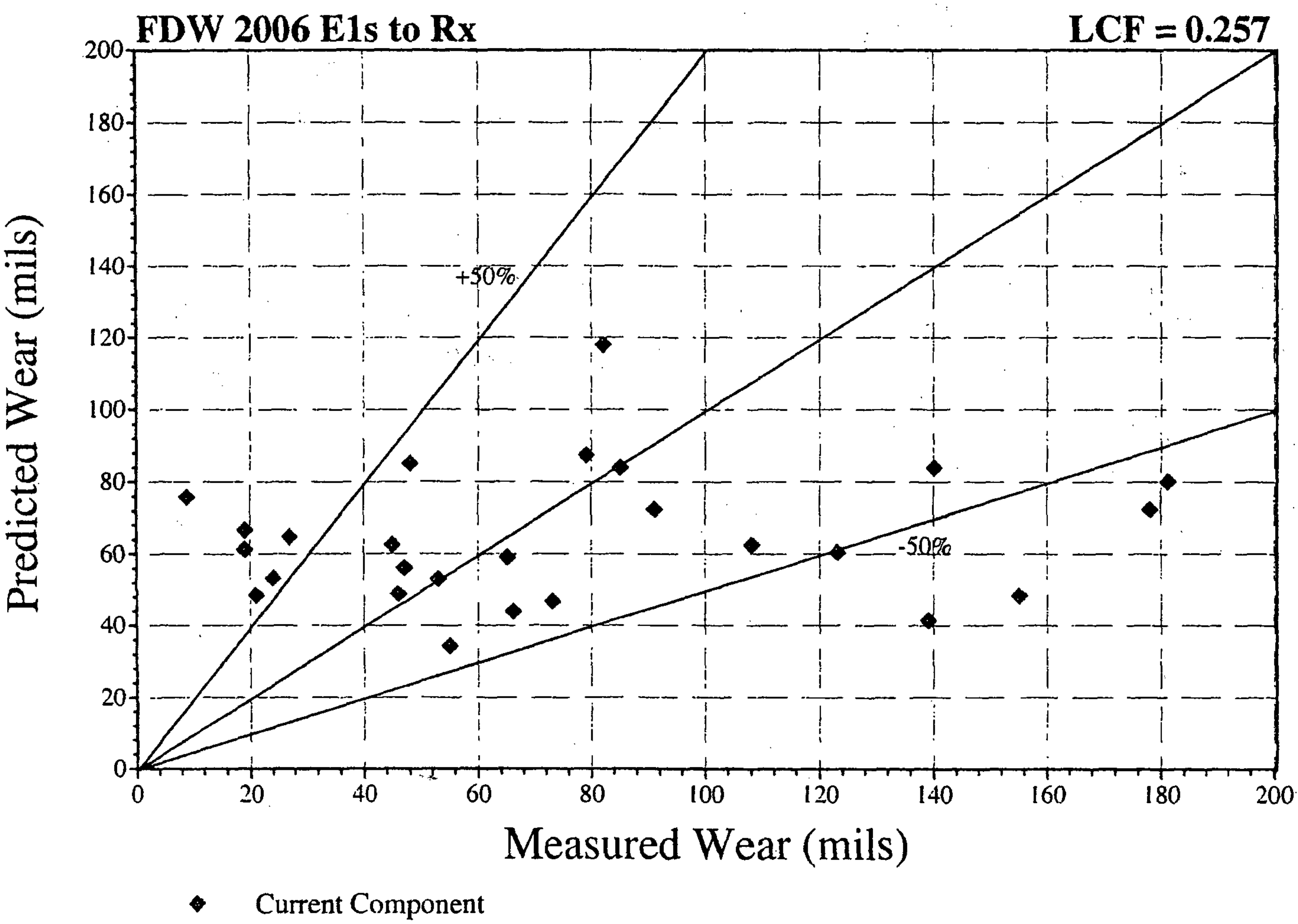


Flow Accelerated Corrosion (FAC)
Tasks
Preferences
Window
Help
Wear Rate Analysis Run Definition
Run Name
FDW 2006 E1s to Rx
Run Title
Feedwater E1A & E1B to Reactor
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
011-18"-FDW-08
Add
Remove
Lines to Analyze
010-10"-FDW-21
014-18"-FDW-15
014-16"-FDW-15
015-16"-FDW-15
016-10"-FDW-18
015-16"-FDW-17
016-16"-FDW-18
016-10"-FDW-20
Run Definitions
3rd Pt High Level
4th Pt Extract Steam
4th Pt Heater Drain
4th Pt High Level
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
VY
Desktop
1:14 PM

# Comparison of Thickness Predictions



# Comparison of Wear Predictions



Company: Vermont Yankee Nuclear Power Corporation  Report Date: 25-SEP-2006 Time: 15:00:23
Plant: Vermont Yankee  Analysis Date: 19-SEP-2006 Time: 19:19:21
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: FDW 2006 Els to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.257
Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Tmeas,Method,Time (in)[3] | [2] | (hrs)[3] | In-Service Cmp. Thickness(mils)[4] Tp | Tm | Incremental Wear(mils)[5] PRWEAR | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 008-18"-FDW-14, No Sorting. | | | | | | | | | | | |
| FD14RD01(L/E) | 41.3 | 139.0 | 41.3 | 139.0 | 1.236 | MT | 114614 | 1333.7 | 1236.0 | 35.5 | 114614 |
| FD14RD01(S/E) | 43.8 | 66.0 | 43.8 | 66.0 | 1.213 | MT | 114614 | 1175.2 | 1213.0 | 37.6 | 114614 |
| ===>Grouped by Line: 008-16"-FDW-14, No Sorting. | | | | | | | | | | | |
| FD14SP02 | 34.2 | 55.0 | 34.2 | 55.0 | 1.224 | US | 114614 | 1184.8 | 1224.0 | 29.4 | 114614 |
| FD14EL03 | 75.8 | 9.0 | 75.8 | 9.0 | 1.176 | US | 230118 | 1143.2 | 1176.0 | 3.4 | 183618 |
| FD14SP03 US | 61.3 | 19.0 | 61.3 | 19.0 | 1.205 | US | 230118 | 1157.7 | 1205.0 | 2.3 | 230118 |
| FD14EL05 | 83.9 | 85.0 | 83.9 | 85.0 | 1.134 | MT | 207118 | 1135.1 | 1134.0 | 10.2 | 207118 |
| ===>Grouped by Line: 009-16"-FDW-14, No Sorting. | | | | | | | | | | | |
| FD14SP08 DS | 59.0 | 65.0 | 59.0 | 65.0 | 1.153 | US | 218618 | 1160.0 | 1153.0 | 4.6 | 218618 |
| FD14EL07 | 87.3 | 79.0 | 87.3 | 79.0 | 1.261 | US | 218618 | 1131.7 | 1261.0 | 6.8 | 218618 |
| ===>Grouped by Line: 009-16"-FDW-16, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 010-16"-FDW-19, No Sorting. | | | | | | | | | | | |
| FD19SP03 DS | 48.5 | 21.0 | 48.5 | 21.0 | 0.789 | MT | 218618 | 795.5 | 789.0 | 3.8 | 218618 |
| FD19TE01(D/S) | 61.2 | 19.0 | 61.2 | 19.0 | 1.950 | MT | 137270 | 1157.8 | 1950.0 | 33.8 | 137270 |
| FD19TE01(BR.) | 64.6 | 27.0 | 64.6 | 27.0 | 0.769 | MT | 218618 | 779.4 | 769.0 | 7.3 | 137270 |
| FD19RD01(L/E) | 56.1 | 47.0 | 56.1 | 47.0 | 1.151 | MT | 218618 | 1162.9 | 1151.0 | 4.4 | 218618 |
| FD19RD01(S/E) | 85.1 | 48.0 | 85.1 | 48.0 | 0.781 | MT | 218618 | 758.9 | 781.0 | 6.6 | 218618 |
| ===>Grouped by Line: 010-10"-FDW-19, No Sorting. | | | | | | | | | | | |
| FD19SP04 | 66.5 | 19.0 | 66.5 | 19.0 | 0.778 | US | 218618 | 777.5 | 778.0 | 5.2 | 218618 |
| ===>Grouped by Line: 010-10"-FDW-21, No Sorting. | | | | | | | | | | | |
| FD21SP01 US | 53.2 | 24.0 | 53.2 | 24.0 | 0.796 | MT | 218618 | 790.8 | 796.0 | 4.1 | 218618 |
| ===>Grouped by Line: 014-18"-FDW-15, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 014-16"-FDW-15, No Sorting. | | | | | | | | | | | |
| FD15EL04 | 72.3 | 91.0 | 72.3 | 91.0 | 1.175 | MT | 171740 | 1146.7 | 1175.0 | 21.9 | 171740 |
| FD15SP10 | 62.5 | 45.0 | 62.5 | 45.0 | 1.210 | GW | 171740 | 1156.5 | 1210.0 | 18.9 | 171740 |
| FD15EL05 | 72.3 | 178.0 | 72.3 | 178.0 | 1.089 | MT | 171740 | 1146.7 | 1089.0 | 21.9 | 171740 |
| FD15SP03 | 62.5 | 108.0 | 62.5 | 108.0 | 1.190 | GW | 171740 | 1156.5 | 1190.0 | 18.9 | 171740 |
| ===>Grouped by Line: 015-16"-FDW-15, No Sorting. | | | | | | | | | | | |
| FD15SP08 US | 48.8 | 46.0 | 48.8 | 46.0 | 1.172 | GW | 171740 | 1170.2 | 1172.0 | 14.8 | 171740 |
| ===>Grouped by Line: 016-10"-FDW-18, No Sorting. | | | | | | | | | | | |
| FD18SP04 US | 48.3 | 155.0 | 48.3 | 155.0 | 0.758 | MT | 195618 | 795.7 | 758.0 | 9.0 | 195618 |
| ===>Grouped by Line: 015-16"-FDW-17, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 016-16"-FDW-18, No Sorting. | | | | | | | | | | | |
| FD18SP01 DS | 46.6 | 73.0 | 46.6 | 73.0 | 0.803 | GW | 207118 | 797.4 | 803.0 | 5.7 | 207118 |
| FD18EL01 | 83.9 | 140.0 | 83.9 | 140.0 | 1.223 | US | 207118 | 1135.1 | 1223.0 | 10.2 | 207118 |
| FD18SP02 US | 53.0 | 53.0 | 53.0 | 53.0 | 0.799 | US | 207118 | 791.0 | 799.0 | 6.4 | 207118 |
| FD18TE01(U/S) | 117.9 | 82.0 | 117.9 | 82.0 | 1.560 | US | 195618 | 1101.1 | 1560.0 | 22.0 | 195618 |
| FD18TE01(D/S) | 80.0 | 181.0 | 80.0 | 181.0 | 1.644 | US | 195618 | 1139.0 | 1644.0 | 15.0 | 195618 |
| ===>Grouped by Line: 016-10"-FDW-20, No Sorting. | | | | | | | | | | | |
| FD20SP01 | 60.4 | 123.0 | 60.4 | 123.0 | 0.727 | MT | 195618 | 783.6 | 727.0 | 11.3 | 195618 |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 25-SEP-2006 Time: 16:00:25
Plant: Vermont Yankee  Analysis Date: 13-SEP-2006 Time: 19:19:21
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: FDW 2006 Els to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.257

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| FD20EL02 | 1 | 3.431 | 1062259 | ------ |
| FD20EL01 | 2 | 3.847 | 913014 | ------ |
| FD14FE01 | 6 | 0.033 | 88712408 | ------ |
| FD19RD01(S/E) | 7 | 3.327 | ------ | 1182188 |
| FD15SP03 | 54 | 2.952 | ------ | 807624 |
| FD19TE01(U/S) | 14 | 5.074 | 2849744 | ------ |
| FD18TE01(U/S) | 14 | 5.074 | ------ | 2030518 |
| FD15EL05 | 4 | 3.413 | ------ | 347038 |
| FD15RD01(L/E) | 7 | 2.786 | 473292 | ------ |
| OUTLET E-1-1A | 31 | 3.979 | 522532 | ------ |
| FD14RD01(L/E) | 7 | 2.786 | ------ | 478243 |
| OUTLET E-1-1B | 31 | 3.979 | 522532 | ------ |
| FD19EL03 | 2 | 3.847 | 913014 | ------ |
| FD19EL05 | 2 | 3.847 | 913014 | ------ |
| FD14EL05 | 2 | 3.413 | ------ | 538641 |
| FD20EL03 | 2 | 3.847 | 913014 | ------ |
| FD14EL04 | 2 | 3.413 | 542240 | ------ |
| FD18EL04 | 2 | 3.847 | 913014 | ------ |
| FD17EL01 | 4 | 3.413 | 542240 | ------ |
| FD21EL02 | 2 | 3.847 | 913014 | ------ |
| FD14EL06 | 2 | 3.413 | 542240 | ------ |
| FD15EL08 | 2 | 3.413 | 542240 | ------ |
| FD19TE01(BR.) | 14 | 3.639 | ------ | 1040838 |
| FD15EL06 | 2 | 3.413 | 542240 | ------ |
| FD18TE01(BR.) | 14 | 3.639 | 983372 | ------ |
| FD16EL01 | 4 | 3.413 | 542240 | ------ |
| FD19TE01(D/S) | 14 | 3.444 | ------ | 4258696 |
| FD16SP05 | 58 | 1.785 | 588604 | ------ |
| FD18TE01(D/S) | 14 | 3.444 | ------ | 3296613 |
| FD15EL04 | 4 | 3.413 | ------ | 637778 |
| FD18EL03 | 1 | 3.431 | 1062259 | ------ |
| FD15SP02 | 57 | 2.306 | 678744 | ------ |
| FD19EL04 | 1 | 3.431 | 1062259 | ------ |
| FD15SP09 | 51 | 2.029 | 702760 | ------ |
| FD21EL01 | 1 | 3.431 | 1062259 | ------ |
| FD14EL03 | 2 | 3.413 | ------ | 703631 |
| FD15EL03 | 1 | 3.044 | 716912 | ------ |
| FD15RD01(S/E) | 7 | 2.952 | 724912 | ------ |
| FD16TE01(D/S) | 15 | 2.767 | 743024 | ------ |
| FD19EL01 | 2 | 3.413 | 1621719 | ------ |
| FD16TE01(U/S) | 15 | 2.767 | 743024 | ------ |
| FD14TE02(D/S) | 15 | 2.767 | 743024 | ------ |
| FD15TE02(U/S) | 15 | 2.767 | 743024 | ------ |
| FD14EL07 | 2 | 3.413 | ------ | 979491 |
| FD15TE02(D/S) | 15 | 2.767 | 743024 | ------ |
| FD15EL07 | 2 | 3.413 | 810194 | ------ |
| FD17TE01(D/S) | 15 | 2.767 | 743024 | ------ |
| FD14TE02(U/S) | 15 | 2.767 | 743024 | ------ |
| FD17TE01(U/S) | 15 | 2.767 | 743024 | ------ |
| FD18EL01 | 2 | 3.413 | ------ | 1919003 |
| FD18SP02 DS | 52 | 2.155 | 746318 | ------ |
| FD19SP02 | 52 | 2.155 | 746318 | ------ |
| FD18SP02 US | 52 | 2.155 | ------ | 789150 |
| FD20RD01(S/E) | 7 | 3.327 | 1116948 | ------ |
| FD14EL02 | 2 | 2.945 | 817946 | ------ |
| FD14EL01 | 4 | 2.945 | 817946 | ------ |
| FD19EL02 | 1 | 3.044 | 1856868 | ------ |
| FD15EL02 | 2 | 2.945 | 817946 | ------ |
| FD15EL01 | 4 | 2.945 | 817946 | ------ |
| FD18EL02 | 1 | 3.044 | 1856868 | ------ |
| FD14RD01(S/E) | 7 | 2.952 | ------ | 824378 |
| FD15TE01(U/S) | 15 | 2.388 | 830885 | ------ |
| FD19SP03 DS | 51 | 1.897 | ------ | 852124 |
| FD15SP10 | 54 | 2.952 | ------ | 885803 |
| FD19SP03 US | 51 | 1.897 | 891487 | ------ |
| FD18SP03 US | 51 | 1.897 | 891487 | ------ |
| FD18SP03 DS | 51 | 1.897 | 891487 | ------ |
| FD18SP01 US | 58 | 1.897 | 891487 | ------ |
| FD19SP01 US | 58 | 1.897 | 891487 | ------ |
| FD19SP01 DS | 58 | 1.897 | 891487 | ------ |
| FD14SP08 DS | 52 | 2.306 | ------ | 920314 |
| FD18SP01 DS | 58 | 1.897 | ------ | 925801 |
| FD14FE01A | 52 | 2.306 | 955281 | ------ |
| FD21SP04 DS | 52 | 2.599 | 1504026 | ------ |
| FD14SP04 | 52 | 2.306 | 955281 | ------ |
| FD20SP03 US | 52 | 2.599 | 1504026 | ------ |
| FD15SP08 DS | 52 | 2.306 | 955281 | ------ |
| FD19SP06 DS | 52 | 2.599 | 1504026 | ------ |
| FD14SP03 DS | 52 | 2.306 | 955281 | ------ |
| FD19SP06 US | 52 | 2.599 | 1504026 | ------ |
| FD14SP08 US | 52 | 2.306 | 955281 | ------ |
| FD21SP04 US | 52 | 2.599 | 1504026 | ------ |
| FD15SP08 US | 52 | 2.306 | ------ | 964409 |
| FD20SP01 | 57 | 2.599 | ------ | 1352849 |
| FD20SP06 DS | 52 | 2.599 | 1504026 | ------ |

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| | | | | |
|---|---|---|---|---|
| FD20SP06 US | 52 | 2.599 | 1504026 | ------ |
| FD15TE01(D/S) | 15 | 2.388 | 990359 | ------ |
| FD18SP07 DS | 52 | 2.599 | 1504026 | ------ |
| FD19SP09 DS | 52 | 2.599 | 1504026 | ------ |
| FD19SP09 US | 52 | 2.599 | 1504026 | ------ |
| FD19SP04 | 57 | 2.599 | ------ | 1506324 |
| FD18SP07 US | 52 | 2.599 | 1504026 | ------ |
| FD20SP03 DS | 52 | 2.599 | 1504026 | ------ |
| FD17SP01 DS | 58 | 2.029 | 1128945 | ------ |
| FD17SP03 | 58 | 2.029 | 1128945 | ------ |
| FD14TE01(D/S) | 15 | 2.388 | 1254199 | ------ |
| FD17SP01 US | 58 | 2.029 | 1128945 | ------ |
| FD14TE01(U/S) | 15 | 2.388 | 1370181 | ------ |
| FD16SP04 | 58 | 2.029 | 1128945 | ------ |
| FD17SP04 | 58 | 2.029 | 1128945 | ------ |
| FD14SP03 US | 52 | 2.306 | ------ | 1191994 |
| FD16SP01 DS | 58 | 2.029 | 1128945 | ------ |
| FD16SP03 | 58 | 2.029 | 1128945 | ------ |
| FD14SP02 | 57 | 2.306 | ------ | 1151436 |
| FD16SP01 US | 58 | 2.029 | 1128945 | ------ |
| FD14SP07 US | 65 | 1.845 | 1157152 | ------ |
| FD18SP05 | 51 | 2.288 | 1752520 | ------ |
| FD16SP02 | 65 | 1.845 | 1273666 | ------ |
| FD21SP02 | 51 | 2.288 | 1752520 | ------ |
| FD15SP06 | 65 | 1.845 | 1273666 | ------ |
| FD20SP04 | 51 | 2.288 | 1752520 | ------ |
| FD14SP07 DS | 65 | 1.845 | 1273666 | ------ |
| FD19SP07 | 51 | 2.288 | 1752520 | ------ |
| FD17SP02 | 65 | 1.845 | 1273666 | ------ |
| FD19RD01(L/E) | 7 | 2.191 | ------ | 2640355 |
| FD17SP05 | 58 | 1.785 | 1300083 | ------ |
| FD20RD01(L/E) | 7 | 2.191 | 2518487 | ------ |
| FD14SP06 DS | 56 | 1.692 | 1319530 | ------ |
| FD15SP05 DS | 56 | 1.692 | 1417698 | ------ |
| FD15SP05 US | 56 | 1.692 | 1417698 | ------ |
| FD21SP01 US | 64 | 2.080 | ------ | 1988529 |
| FD14FE01B | 56 | 1.692 | 1417698 | ------ |
| FD21SP01 DS | 64 | 2.080 | 1959598 | ------ |
| FD15FE01B | 56 | 1.692 | 1417698 | ------ |
| FD18SP04 DS | 64 | 2.080 | 1959598 | ------ |
| FD14SP06 US | 56 | 1.692 | 1441875 | ------ |
| FD18SP04 US | 64 | 2.080 | ------ | 1750591 |
| FD14SP01 | 58 | 1.751 | 1592633 | ------ |
| FD15SP01 | 58 | 1.751 | 1592633 | ------ |
| FD14SP05 | 9 | 1.293 | 1953036 | ------ |
| FD15SP04 | 9 | 1.293 | 1953036 | ------ |
| FD15FE01A | 9 | 1.293 | 1953036 | ------ |
| FD15SP07 | 9 | 1.293 | 1953036 | ------ |
| FD19SP05 | 9 | 1.508 | 2822808 | ------ |
| FD19SP08 | 9 | 1.508 | 2822808 | ------ |
| FD18SP06 | 9 | 1.508 | 2822808 | ------ |
| FD21SP03 | 9 | 1.508 | 2822808 | ------ |
| FD20SP05 | 9 | 1.508 | 2822808 | ------ |
| FD20SP02 | 9 | 1.508 | 2822808 | ------ |
| FD14CP01 | 65 | 0.054 | 42529632 | ------ |
| FD15CP01 | 65 | 0.054 | 42529632 | ------ |
| FD15FE01 | 6 | 0.033 | 88712408 | ------ |
| RX NOZZLE 4C | 30 | 0.008 | 99000000 | ------ |
| RX NOZZLE 4A | 30 | 0.008 | 99000000 | ------ |
| RX NOZZLE 4B | 30 | 0.008 | 99000000 | ------ |
| RX NOZZLE 4D | 30 | 0.008 | 99000000 | ------ |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 25-SEP-2006 Time: 16:00:20
Analysis Date: 19-SEP-2006 Time: 19:19:21
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: FDW 2006 E1s to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.257

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Thickness (in) Init. | Prd.(1) | Thoop | Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 008-18"-FDW-14, No Sorting. | | | | | | | |
| OUTLET E-1-1A | 1.375 | 1.265 | 1.085 | 1.085 | 522532 | ------ | 241618 |
| FD14EL01 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | 241618 |
| FD14SP01 | 1.375 | 1.327 | 1.085 | 1.085 | 1592633 | ------ | 241618 |
| FD14EL02 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | 241618 |
| FD14TE01(U/S) | 1.375 | 1.369 | 1.085 | 1.085 | 1370181 | ------ | 241618 |
| FD14TE01(D/S) | 1.375 | 1.345 | 1.085 | 1.085 | 1254199 | ------ | 241618 |
| FD14RD01(L/E) | 1.375 | 1.200 | 1.085 | 1.085 | ------ | 478243 | 241618 |
| FD14RD01(S/E) | 1.219 | 1.175 | 0.964 | 0.964 | ------ | 824378 | 241618 |
| ===>Grouped by Line: 008-16"-FDW-14, No Sorting. | | | | | | | |
| FD14SP02 | 1.219 | 1.195 | 0.964 | 0.964 | ------ | 1151436 | 241618 |
| FD14EL03 | 1.219 | 1.173 | 0.964 | 0.964 | ------ | 703631 | 241618 |
| FD14SP03 US | 1.219 | 1.203 | 0.964 | 0.964 | ------ | 1191994 | 241618 |
| FD14SP03 DS | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | 241618 |
| FD14EL04 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |
| FD14SP04 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | 241618 |
| FD14SP05 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | 241618 |
| FD14FE01A | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | 241618 |
| FD14FE01 | 1.219 | 1.218 | 0.964 | 0.964 | 88712408 | ------ | 241618 |
| FD14FE01B | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | 241618 |
| FD14SP06 US | 1.219 | 1.176 | 0.964 | 0.964 | 1441875 | ------ | 241618 |
| FD14SP06 DS | 1.219 | 1.158 | 0.964 | 0.964 | 1319530 | ------ | 241618 |
| FD14EL05 | 1.219 | 1.124 | 0.964 | 0.964 | ------ | 538641 | 241618 |
| FD14TE02(U/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD14TE02(D/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD14CP01 | 0.719 | 0.718 | 0.520 | 0.520 | 42529632 | ------ | 241618 |
| FD14SP07 US | 1.219 | 1.149 | 0.964 | 0.964 | 1157152 | ------ | 241618 |
| ===>Grouped by Line: 009-16"-FDW-14, No Sorting. | | | | | | | |
| FD14SP07 DS | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | 241618 |
| FD14EL06 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |
| FD14SP08 US | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | 241618 |
| FD14SP08 DS | 1.219 | 1.148 | 0.964 | 0.964 | ------ | 920314 | 241618 |
| FD14EL07 | 1.219 | 1.254 | 0.964 | 0.964 | ------ | 979491 | 241618 |
| ===>Grouped by Line: 009-16"-FDW-16, No Sorting. | | | | | | | |
| FD16SP01 US | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD16SP01 DS | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD16TE01(U/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD16TE01(D/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD16SP02 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | 241618 |
| FD16SP03 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD16SP04 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD16SP05 | 1.219 | 1.068 | 0.964 | 0.964 | 588604 | ------ | 127004 |
| FD16EL01 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |
| ===>Grouped by Line: 010-16"-FDW-19, No Sorting. | | | | | | | |
| FD19SP01 US | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD19SP01 DS | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD19EL01 | 1.219 | 1.125 | 0.645 | 0.645 | 1621719 | ------ | 241618 |
| FD19SP02 | 0.844 | 0.785 | 0.645 | 0.645 | 746318 | ------ | 241618 |
| FD19EL02 | 1.219 | 1.135 | 0.645 | 0.645 | 1856868 | ------ | 241618 |
| FD19SP03 US | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD19SP03 DS | 0.844 | 0.785 | 0.645 | 0.645 | ------ | 852124 | 241618 |
| FD19TE01(U/S) | 1.219 | 1.898 | 0.645 | 0.645 | 2849744 | ------ | 241618 |
| FD19TE01(D/S) | 1.219 | 1.916 | 0.645 | 0.645 | ------ | 4258696 | 241618 |
| FD19TE01(BR.) | 0.844 | 0.762 | 0.433 | 0.433 | ------ | 1040838 | 241618 |
| FD19RD01(L/E) | 1.219 | 1.147 | 0.645 | 0.645 | ------ | 2640355 | 241618 |
| FD19RD01(S/E) | 0.844 | 0.774 | 0.433 | 0.433 | ------ | 1182188 | 241618 |
| ===>Grouped by Line: 010-10"-FDW-19, No Sorting. | | | | | | | |
| FD19SP04 | 0.844 | 0.773 | 0.433 | 0.433 | ------ | 1506324 | 241618 |
| FD19SP05 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD19EL03 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD19SP06 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD19SP06 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD19EL04 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | 241618 |
| FD19SP07 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | 241618 |
| FD19SP08 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD19EL05 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD19SP09 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD19SP09 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| RX NOZZLE 4A | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | 241618 |
| ===>Grouped by Line: 010-10"-FDW-21, No Sorting. | | | | | | | |
| FD21SP01 US | 0.844 | 0.773 | 0.433 | 0.433 | ------ | 1968529 | 241618 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD21SP01 DS | 0.844 | 0.787 | 0.433 | 0.433 | 1959598 | ------ | 241618 |
| FD21EL01 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | 241618 |
| FD21SP02 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | 241618 |
| FD21SP03 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD21EL02 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD21SP04 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD21SP04 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| RX NOZZLE 4B | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | 241618 |

===>Grouped by Line: 014-18"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OUTLET E-1-1B | 1.375 | 1.265 | 1.085 | 1.085 | 522532 | ------ | 241618 |
| FD15EL01 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | 241618 |
| FD15SP01 | 1.375 | 1.327 | 1.085 | 1.085 | 1592633 | ------ | 241618 |
| FD15EL02 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | 241618 |
| FD15TE01(U/S) | 1.375 | 1.257 | 1.085 | 1.085 | 830885 | ------ | 241618 |
| FD15TE01(D/S) | 1.375 | 1.290 | 1.085 | 1.085 | 990359 | ------ | 241618 |
| FD15RD01(L/E) | 1.375 | 1.199 | 1.085 | 1.085 | 473292 | ------ | 241618 |
| FD15RD01(S/E) | 1.219 | 1.150 | 0.964 | 0.964 | 724912 | ------ | 241618 |

===>Grouped by Line: 014-16"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD15SP02 | 1.219 | 1.100 | 0.964 | 0.964 | 678744 | ------ | 241618 |
| FD15EL03 | 1.219 | 1.154 | 0.964 | 0.964 | 716912 | ------ | 241618 |
| FD15SP09 | 1.219 | 1.088 | 0.964 | 0.964 | 702760 | ------ | 241618 |
| FD15EL04 | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 637778 | 241618 |
| FD15SP10 | 1.219 | 1.191 | 0.964 | 0.964 | ------ | 885803 | 241618 |
| FD15EL05 | 1.219 | 1.067 | 0.964 | 0.964 | ------ | 347038 | 241618 |
| FD15SP03 | 1.219 | 1.171 | 0.964 | 0.964 | ------ | 807624 | 241618 |
| FD15SP04 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | 241618 |
| FD15FE01A | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | 241618 |
| FD15FE01 | 1.219 | 1.218 | 0.964 | 0.964 | 88712408 | ------ | 241618 |
| FD15FE01B | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | 241618 |
| FD15SP05 US | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | 241618 |
| FD15SP05 DS | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | 241618 |
| FD15EL06 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |
| FD15TE02(U/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD15TE02(D/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD15CP01 | 0.719 | 0.718 | 0.520 | 0.520 | 42529632 | ------ | 241618 |
| FD15SP06 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | 241618 |

===>Grouped by Line: 015-16"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD15SP07 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | 241618 |
| FD15EL07 | 1.219 | 1.204 | 0.964 | 0.964 | 810194 | ------ | 241618 |
| FD15SP08 US | 1.219 | 1.157 | 0.964 | 0.964 | ------ | 964409 | 241618 |
| FD15SP08 DS | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | 241618 |
| FD15EL08 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |

===>Grouped by Line: 016-10"-FDW-18, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD18SP04 US | 0.844 | 0.749 | 0.433 | 0.433 | ------ | 1750591 | 241618 |
| FD18SP04 DS | 0.844 | 0.787 | 0.433 | 0.433 | 1959598 | ------ | 241618 |
| FD18EL03 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | 241618 |
| FD18SP05 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | 241618 |
| FD18SP06 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD18EL04 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD18SP07 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD18SP07 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| RX NOZZLE 4C | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | 241618 |

===>Grouped by Line: 015-16"-FDW-17, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD17SP01 US | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD17SP01 DS | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD17TE01(U/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD17TE01(D/S) | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | 241618 |
| FD17SP02 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | 241618 |
| FD17SP03 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD17SP04 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | 241618 |
| FD17SP05 | 1.219 | 1.193 | 0.964 | 0.964 | 1300083 | ------ | 127004 |
| FD17EL01 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | 241618 |

===>Grouped by Line: 016-16"-FDW-18, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD18SP01 US | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD18SP01 DS | 0.844 | 0.797 | 0.645 | 0.645 | ------ | 925801 | 241618 |
| FD18EL01 | 1.219 | 1.213 | 0.645 | 0.645 | ------ | 1919003 | 241618 |
| FD18SP02 US | 0.844 | 0.793 | 0.645 | 0.645 | ------ | 789150 | 241618 |
| FD18SP02 DS | 0.844 | 0.785 | 0.645 | 0.645 | 746318 | ------ | 241618 |
| FD18EL02 | 1.219 | 1.135 | 0.645 | 0.645 | 1856868 | ------ | 241618 |
| FD18SP03 US | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD18SP03 DS | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | 241618 |
| FD18TE01(U/S) | 1.219 | 1.538 | 0.645 | 0.645 | ------ | 2030518 | 241618 |
| FD18TE01(D/S) | 1.219 | 1.629 | 0.645 | 0.645 | ------ | 3296613 | 241618 |
| FD18TE01(BR.) | 0.844 | 0.744 | 0.433 | 0.433 | 983372 | ------ | 241618 |

===>Grouped by Line: 016-10"-FDW-20, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD20RD01(L/E) | 1.219 | 1.123 | 0.645 | 0.645 | 2518487 | ------ | 241618 |
| FD20RD01(S/E) | 0.844 | 0.756 | 0.433 | 0.433 | 1116948 | ------ | 241618 |
| FD20SP01 | 0.844 | 0.716 | 0.433 | 0.433 | ------ | 1252849 | 241618 |
| FD20SP02 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD20EL01 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD20SP03 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD20SP03 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD20EL02 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | 241618 |
| FD20SP04 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | 241618 |
| FD20SP05 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | 241618 |
| FD20EL03 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | 241618 |
| FD20SP06 US | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| FD20SP06 DS | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | 241618 |
| RX NOZZLE 4D | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 25-SEP-2006 Time: 16:00:16
Plant: Vermont Yankee Analysis Date: 19-SEP-2006 Time: 19:19:21
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: FDW 2006 E1s to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.257

===>Grouped by Line: 008-18"-FDW-14, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-1-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 139 |
| FD14RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 66 |

===>Grouped by Line: 008-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD14SP02 | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 114614 | ----- | | 55 |
| FD14EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 183618 | ----- | | 9 |
| FD14SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 19 |
| FD14SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP04 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP05 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14FE01A | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14FE01 | 6 | 5 | 18.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14FE01B | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP06 US | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP06 DS | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | | 85 |
| FD14TE02(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14TE02(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14CP01 | 65 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP07 US | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 009-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD14SP07 DS | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP08 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD14SP08 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 64 |
| FD14EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 79 |

===>Grouped by Line: 009-16"-FDW-16, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD16SP01 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16SP01 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16SP02 | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16SP03 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16SP04 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD16SP05 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 114614 | | --- |
| FD16EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 010-16"-FDW-19, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD19SP01 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP01 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19EL01 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP02 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19EL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP03 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP03 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 21 |
| FD19TE01(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19TE01(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 137270 | ----- | | 19 |
| FD19TE01(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 137270 | ----- | | 27 |
| FD19RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 47 |
| FD19RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 48 |

===>Grouped by Line: 010-10"-FDW-19, No Sorting.

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| FD19SP04 | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 19 |
| FD19SP05 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP06 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP06 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19EL04 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP07 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP08 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP09 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FD19SP09 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| FX NOZZLE 4A | 30 | 83 | 16.00 | 0.00 | 0.00 | 13725 | ----- | ----- | | --- |

===>Grouped by Line: 010-10"-FDW-21, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD21SP01 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 24 |
| FD21SP01 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21EL01 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21SP02 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21SP03 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21SP04 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD21SP04 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| RX NOZZLE 4B | 30 | 83 | 16.00 | 0.00 | 2.00 | 13725 | ----- | ----- | --- |

===>Grouped by Line: 014-18"-FDW-15, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-1-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL02 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 014-16"-FDW-15, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD15SP02 | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP09 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 91 |
| FD15SP10 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 44 |
| FD15EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 178 |
| FD15SP03 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 108 |
| FD15SP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15FE01A | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15FE01 | 6 | 5 | 18.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15FE01B | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP05 US | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP05 DS | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15TE02(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15TE02(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15CP01 | 65 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP06 | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 015-16"-FDW-15, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD15SP07 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15SP08 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 171740 | ----- | 45 |
| FD15SP08 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD15EL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 016-10"-FDW-18, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD18SP04 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 155 |
| FD18SP04 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18EL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP05 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP06 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP07 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP07 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| RX NOZZLE 4C | 30 | 83 | 16.00 | 0.00 | 2.00 | 13725 | ----- | ----- | --- |

===>Grouped by Line: 015-16"-FDW-17, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD17SP01 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17SP01 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17TE01(U/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17TE01(D/S) | 15 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17SP02 | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17SP03 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17SP04 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD17SP05 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| *Replacement #1 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 114614 | --- |
| FD17EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 016-16"-FDW-18, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD18SP01 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP01 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | 73 |
| FD18EL01 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | 140 |
| FD18SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 207118 | ----- | 53 |
| FD18SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18EL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP03 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18SP03 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD18TE01(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 82 |
| FD18TE01(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 181 |
| FD18TE01(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 016-10"-FDW-20, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD20RD01(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20RD01(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP01 | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 123 |
| FD20SP02 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20EL01 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP03 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP03 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20EL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP04 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP05 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| FD20SP06 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FD20SP06 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| RX NOZZLE 4D | 30 | H3 | 16.00 | 0.00 | 2.00 | 13725 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation　Report Date: 25-SEP-2006　Time: 16:00:06
Plant: Vermont Yankee　Analysis Date: 19-SEP-2006　Time: 19:19:21
Unit:　CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: FDW 2006 E1s to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618　Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA　Exclude Measure Wear: No
Line Correction Factor: 0.257

===>Grouped by Line: 008-18"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| OUTLET E-1-1A | 31 | 3.979 | 3.021 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14EL01 | 4 | 2.945 | 2.236 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14SP01 | 58 | 1.751 | 1.329 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14EL02 | 2 | 2.945 | 2.236 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14TE01(U/S) | 15 | 2.388 | 1.813 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14TE01(D/S) | 15 | 2.388 | 1.813 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14RD01(L/E) | 7 | 2.786 | 2.115 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD14RD01(S/E) | 7 | 2.952 | 2.241 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 008-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD14SP02 | 57 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14EL03 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP03 US | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP03 DS | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14EL04 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP04 | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP05 | 9 | 1.293 | 0.982 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14FE01A | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14FE01 | 6 | 0.033 | 0.025 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD14FE01B | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD14SP06 US | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD14SP06 DS | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD14EL05 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14TE02(U/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14TE02(D/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14CP01 | 65 | 0.054 | 0.041 | 373.1 | 0.180 | 0.000 | 8.625 |
| FD14SP07 US | 65 | 1.845 | 1.401 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 009-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD14SP07 DS | 65 | 1.845 | 1.401 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14EL06 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP08 US | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14SP08 DS | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD14EL07 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 009-16"-FDW-16, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD16SP01 US | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16SP01 DS | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16TE01(U/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16TE01(D/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16SP02 | 65 | 1.845 | 1.401 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16SP03 | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16SP04 | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16SP05 | 58 | 1.785 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD16EL01 | 4 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 010-16"-FDW-19, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD19SP01 US | 58 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD19SP01 DS | 58 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD19EL01 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD19SP02 | 52 | 2.155 | 1.636 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD19EL02 | 1 | 3.044 | 2.311 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD19SP03 US | 51 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD19SP03 DS | 51 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD19TE01(U/S) | 14 | 5.074 | 3.852 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD19TE01(D/S) | 14 | 3.444 | 2.614 | 373.1 | 8.107 | 0.000 | 16.000 |
| FD19TE01(BR.) | 14 | 3.639 | 2.763 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19RD01(L/E) | 7 | 2.191 | 1.664 | 373.1 | 8.107 | 0.000 | 16.000 |
| FD19RD01(S/E) | 7 | 3.327 | 2.526 | 373.1 | 18.157 | 0.000 | 10.750 |

===>Grouped by Line: 010-10"-FDW-19, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD19SP04 | 57 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP05 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19EL03 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP06 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP06 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19EL04 | 1 | 3.431 | 2.605 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP07 | 51 | 2.288 | 1.737 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP08 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19EL05 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP09 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD19SP09 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| RX NOZZLE 4A | 30 | 0.008 | 0.006 | 373.1 | 16.308 | 0.000 | 10.750 |

===>Grouped by Line: 010-10"-FDW-21, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| FD21SP01 US | 64 | 2.080 | 1.579 | 373.1 | 18.157 | 0.000 | 10.750 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD21SP01 DS | 64 | 2.080 | 1.579 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21EL01 | 1 | 3.431 | 2.605 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21SP02 | 51 | 2.288 | 1.737 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21SP03 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21EL03 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21SP04 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD21SP04 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| RX NOZZLE 4B | 30 | 0.008 | 0.006 | 373.1 | 16.308 | 0.000 | 10.750 |

===>Grouped by Line: 014-18"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OUTLET E-1-1B | 31 | 3.979 | 3.021 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15EL01 | 4 | 2.945 | 2.236 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15SP01 | 58 | 1.751 | 1.329 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15EL02 | 2 | 2.945 | 2.236 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15TE01(U/S) | 15 | 2.388 | 1.813 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15TE01(D/S) | 15 | 2.388 | 1.813 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15RD01(L/E) | 7 | 2.786 | 2.115 | 373.1 | 12.823 | 0.000 | 18.000 |
| FD15RD01(S/E) | 7 | 2.952 | 2.241 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 014-16"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD15SP02 | 57 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15EL03 | 1 | 3.044 | 2.311 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP09 | 51 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15EL04 | 4 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP10 | 54 | 2.952 | 2.241 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15EL05 | 4 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP03 | 54 | 2.952 | 2.241 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP04 | 9 | 1.293 | 0.982 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15FE01A | 9 | 1.293 | 0.982 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15FE01 | 6 | 0.033 | 0.025 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD15FE01B | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD15SP05 US | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD15SP05 DS | 56 | 1.692 | 1.284 | 373.1 | 42.526 | 0.000 | 16.000 |
| FD15EL06 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15TE02(U/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15TE02(D/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15CP01 | 65 | 0.054 | 0.041 | 373.1 | 0.180 | 0.000 | 8.625 |
| FD15SP06 | 65 | 1.845 | 1.401 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 015-16"-FDW-15, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD15SP07 | 9 | 1.293 | 0.982 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15EL07 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP08 US | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15SP08 DS | 52 | 2.306 | 1.751 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD15EL08 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 016-10"-FDW-18, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD18SP04 US | 64 | 2.080 | 1.579 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18SP04 DS | 64 | 2.080 | 1.579 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18EL03 | 1 | 3.431 | 2.605 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18SP05 | 51 | 2.288 | 1.737 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18SP06 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18EL04 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18SP07 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD18SP07 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| RX NOZZLE 4C | 30 | 0.008 | 0.006 | 373.1 | 16.308 | 0.000 | 10.750 |

===>Grouped by Line: 015-16"-FDW-17, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD17SP01 US | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17SP01 DS | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17TE01(U/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17TE01(D/S) | 15 | 2.767 | 2.101 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17SP02 | 65 | 1.845 | 1.401 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17SP03 | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17SP04 | 58 | 2.029 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17SP05 | 58 | 1.785 | 1.541 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD17EL01 | 4 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |

===>Grouped by Line: 016-16"-FDW-18, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD18SP01 US | 58 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18SP01 DS | 58 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18EL01 | 2 | 3.413 | 2.591 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD18SP02 US | 52 | 2.155 | 1.636 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18SP02 DS | 52 | 2.155 | 1.636 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18EL02 | 1 | 3.044 | 2.311 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD18SP03 US | 51 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18SP03 DS | 51 | 1.897 | 1.440 | 373.1 | 14.559 | 0.000 | 16.000 |
| FD18TE01(U/S) | 14 | 5.074 | 3.852 | 373.1 | 16.213 | 0.000 | 16.000 |
| FD18TE01(D/S) | 14 | 3.444 | 2.614 | 373.1 | 8.107 | 0.000 | 16.000 |
| FD18TE01(BR.) | 14 | 3.639 | 2.763 | 373.1 | 18.157 | 0.000 | 10.750 |

===>Grouped by Line: 016-10"-FDW-20, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FD20RD01(L/E) | 7 | 2.191 | 1.664 | 373.1 | 8.107 | 0.000 | 16.000 |
| FD20RD01(S/E) | 7 | 3.327 | 2.526 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP01 | 57 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP02 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20EL01 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP03 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP03 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20EL02 | 1 | 3.431 | 2.605 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP04 | 51 | 2.288 | 1.737 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP05 | 9 | 1.508 | 1.145 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20EL03 | 2 | 3.847 | 2.921 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP06 US | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| FD20SP06 DS | 52 | 2.599 | 1.973 | 373.1 | 18.157 | 0.000 | 10.750 |
| RX NOZZLE 4D | 30 | 0.008 | 0.006 | 373.1 | 16.308 | 0.000 | 10.750 |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 25-SEP-2006 Time: 16:00:34
Analysis Date: 19-SEP-2006 Time: 19:19:21
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: FDW 2006 Els to Rx
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.257

Duty Factor (Global): 1.000
Exclude Measure Wear: No

===>Grouped by Line: 008-18"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-1-1A | 31 | 3.979 | 3.021 | 1.375 | 1.265 | 1.085 | 1.085 | 522532 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD14EL01 | 4 | 2.945 | 2.236 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD14SP01 | 58 | 1.751 | 1.329 | 1.375 | 1.327 | 1.085 | 1.085 | 1592633 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD14EL02 | 2 | 2.945 | 2.236 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD14TE01(U/S) | 15 | 2.388 | 1.813 | 1.375 | 1.369 | 1.085 | 1.085 | 1370181 | ------ | --- | --- | --- | --- | 1.399 | US | 114614 | ----- |
| FD14TE01(D/S) | 15 | 2.388 | 1.813 | 1.375 | 1.345 | 1.085 | 1.085 | 1254199 | ------ | --- | --- | --- | --- | 1.375 | GW | 114614 | ----- |
| FD14RD01(L/E) | 7 | 2.786 | 2.115 | 1.375 | 1.200 | 1.085 | 1.085 | ------ | 478243 | 41.3 | 139.0 | 41.3 | 139.0 | 1.236 | MT | 114614 | 114614 |
| FD14RD01(S/E) | 7 | 2.952 | 2.241 | 1.219 | 1.175 | 0.964 | 0.964 | ------ | 824378 | 43.8 | 66.0 | 43.8 | 66.0 | 1.213 | MT | 114614 | 114614 |

===>Grouped by Line: 008-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD14SP02 | 57 | 2.306 | 1.751 | 1.219 | 1.195 | 0.964 | 0.964 | ------ | 1151436 | 34.2 | 55.0 | 34.2 | 55.0 | 1.224 | US | 114614 | 114614 |
| FD14EL03 | 2 | 3.413 | 2.591 | 1.219 | 1.173 | 0.964 | 0.964 | ------ | 703631 | 75.8 | 9.0 | 75.8 | 9.0 | 1.176 | US | 230118 | 183618 |
| FD14SP03 US | 52 | 2.306 | 1.751 | 1.219 | 1.203 | 0.964 | 0.964 | ------ | 1191994 | 61.3 | 19.0 | 61.3 | 19.0 | 1.205 | US | 230118 | 230118 |
| FD14SP03 DS | 52 | 2.306 | 1.751 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14EL04 | 2 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14SP04 | 52 | 2.306 | 1.751 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14SP05 | 9 | 1.293 | 0.982 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14FE01A | 52 | 2.306 | 1.751 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14FE01 | 6 | 0.033 | 0.025 | 1.219 | 1.218 | 0.964 | 0.964 | 88712408 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14FE01B | 56 | 1.692 | 1.284 | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14SP06 US | 56 | 1.692 | 1.284 | 1.219 | 1.176 | 0.964 | 0.964 | 1441875 | ------ | --- | --- | --- | --- | 1.200 | US | 102975 | ----- |
| FD14SP06 DS | 56 | 1.692 | 1.284 | 1.219 | 1.158 | 0.964 | 0.964 | 1319530 | ------ | --- | --- | --- | --- | 1.163 | GW | 207118 | ----- |
| FD14EL05 | 2 | 3.413 | 2.591 | 1.219 | 1.124 | 0.964 | 0.964 | ------ | 538641 | 83.9 | 85.0 | 83.9 | 85.0 | 1.134 | MT | 207118 | 207118 |
| FD14TE02(U/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.151 | PW | 207118 | ----- |
| FD14TE02(D/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14CP01 | 65 | 0.054 | 0.041 | 0.719 | 0.718 | 0.520 | 0.520 | 42529632 | ------ | --- | --- | --- | --- | 0.719 | -- | 0 | ----- |
| FD14SP07 US | 65 | 1.845 | 1.401 | 1.219 | 1.149 | 0.964 | 0.964 | 1157152 | ------ | --- | --- | --- | --- | 1.155 | MT | 207118 | ----- |

===>Grouped by Line: 009-16"-FDW-14, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD14SP07 DS | 65 | 1.845 | 1.401 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14EL06 | 2 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14SP08 US | 52 | 2.306 | 1.751 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD14SP08 DS | 52 | 2.306 | 1.751 | 1.219 | 1.148 | 0.964 | 0.964 | ------ | 920314 | 59.0 | 65.0 | 59.0 | 65.0 | 1.153 | US | 218618 | 218618 |
| FD14EL07 | 2 | 3.413 | 2.591 | 1.219 | 1.254 | 0.964 | 0.964 | ------ | 979491 | 87.3 | 79.0 | 87.3 | 79.0 | 1.261 | US | 218618 | 218618 |

===>Grouped by Line: 009-16"-FDW-16, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD16SP01 US | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16SP01 DS | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16TE01(U/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16TE01(D/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16SP02 | 65 | 1.845 | 1.401 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16SP03 | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16SP04 | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD16SP05 | 58 | 1.785 | 1.541 | 1.219 | 1.068 | 0.964 | 0.964 | 588604 | ------ | --- | --- | --- | --- | 1.081 | MT | 171740 | ----- |
| FD16EL01 | 4 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |

===>Grouped by Line: 010-16"-FDW-19, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD19SP01 US | 58 | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP01 DS | 58 | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19EL01 | 2 | 3.413 | 2.591 | 1.219 | 1.125 | 0.645 | 0.645 | 1621719 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD19SP02 | 52 | 2.155 | 1.636 | 0.844 | 0.785 | 0.645 | 0.645 | 746318 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19EL02 | 1 | 3.044 | 2.311 | 1.219 | 1.135 | 0.645 | 0.645 | 1856868 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD19SP03 US | [illegible] | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD19SP05 DS | 51 | 1.897 | 1.440 | 0.844 | 0.785 | 0.645 | 0.645 | ------ | 852124 | 48.5 | 21.0 | 48.5 | 21.0 | 0.769 | MT | 218618 | 218618 |
| FD19TE01(U/S) | 14 | 5.074 | 3.852 | 1.219 | 1.898 | 0.645 | 0.645 | 2849744 | ------ | --- | --- | --- | --- | 1.948 | MT | 137270 | ----- |
| FD19TE01(D/S) | 14 | 3.444 | 2.614 | 1.219 | 1.916 | 0.645 | 0.645 | ------ | 4258696 | 61.2 | 19.0 | 61.2 | 19.0 | 1.950 | MT | 137270 | 137270 |
| FD19TE01(BR.) | 14 | 3.639 | 2.763 | 0.844 | 0.762 | 0.433 | 0.433 | ------ | 1040838 | 64.6 | 27.0 | 64.6 | 27.0 | 0.769 | MT | 218618 | 137270 |
| FD19RD01(L/E) | 7 | 2.191 | 1.664 | 1.219 | 1.147 | 0.645 | 0.645 | ------ | 2640355 | 56.1 | 47.0 | 56.1 | 47.0 | 1.151 | MT | 218618 | 218618 |
| FD19RD01(S/E) | 7 | 3.327 | 2.526 | 0.844 | 0.774 | 0.433 | 0.433 | ------ | 1182188 | 85.1 | 48.0 | 85.1 | 48.0 | 0.781 | MT | 218618 | 218618 |

===>Grouped by Line: 010-10"-FDW-19, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD19SP04 | 57 | 2.599 | 1.973 | 0.844 | 0.773 | 0.433 | 0.433 | ------ | 1506324 | 66.5 | 19.0 | 66.5 | 19.0 | 0.778 | US | 218618 | 218618 |
| FD19SP05 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19EL03 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP06 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP06 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19EL04 | 1 | 3.431 | 2.605 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP07 | 51 | 2.288 | 1.737 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP08 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19EL05 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP09 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD19SP09 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| RX NOZZLE 4A | 30 | 0.008 | 0.006 | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |

===>Grouped by Line: 010-10"-FDW-21, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD21SP01 US | 64 | 2.080 | 1.579 | 0.844 | 0.792 | 0.433 | 0.433 | ------ | 1988529 | 53.2 | 24.0 | 53.2 | 24.0 | 0.796 | MT | 218618 | 218618 |
| FD21SP01 DS | 64 | 2.080 | 1.579 | 0.844 | 0.787 | 0.433 | 0.433 | 1959598 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21EL01 | 1 | 3.431 | 2.605 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21SP02 | 51 | 2.288 | 1.737 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21SP03 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21EL02 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21SP04 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD21SP04 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| RX NOZZLE 4B | 30 | 0.008 | 0.006 | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |

===>Grouped by Line: 014-18"-FDW-15, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET E-1-1B | 31 | 3.979 | 3.021 | 1.375 | 1.265 | 1.085 | 1.085 | 522532 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD15EL01 | 4 | 2.945 | 2.236 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD15SP01 | 58 | 1.751 | 1.329 | 1.375 | 1.327 | 1.085 | 1.085 | 1592633 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD15EL02 | 2 | 2.945 | 2.236 | 1.375 | 1.294 | 1.085 | 1.085 | 817946 | ------ | --- | --- | --- | --- | 1.375 | -- | 0 | ----- |
| FD15TE01(U/S) | 15 | 2.388 | 1.813 | 1.375 | 1.257 | 1.085 | 1.085 | 830885 | ------ | --- | --- | --- | --- | 1.291 | MT | 102975 | ----- |
| FD15TE01(D/S) | 15 | 2.388 | 1.813 | 1.375 | 1.290 | 1.085 | 1.085 | 990359 | ------ | --- | --- | --- | --- | 1.324 | MT | 102975 | ----- |
| FD15RD01(L/E) | 7 | 2.786 | 2.115 | 1.375 | 1.199 | 1.085 | 1.085 | 473292 | ------ | --- | --- | --- | --- | 1.239 | MT | 102975 | ----- |
| FD15RD01(S/E) | 7 | 2.952 | 2.241 | 1.219 | 1.150 | 0.964 | 0.964 | 724912 | ------ | --- | --- | --- | --- | 1.192 | MT | 102975 | ----- |

===>Grouped by Line: 014-16"-FDW-15, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD15SP02 | 57 | 2.306 | 1.751 | 1.219 | 1.100 | 0.964 | 0.964 | 678744 | ------ | --- | --- | --- | --- | 1.133 | MT | 102975 | ----- |
| FD15EL03 | 1 | 3.044 | 2.311 | 1.219 | 1.154 | 0.964 | 0.964 | 716912 | ------ | --- | --- | --- | --- | 1.197 | MT | 102975 | ----- |
| FD15SP09 | 51 | 2.029 | 1.541 | 1.219 | 1.088 | 0.964 | 0.964 | 702760 | ------ | --- | --- | --- | --- | 1.117 | MT | 102975 | ----- |
| FD15EL04 | 4 | 3.413 | 2.591 | 1.219 | 1.153 | 0.964 | 0.964 | ------ | 637778 | 72.3 | 91.0 | 72.3 | 91.0 | 1.175 | MT | 171740 | 171740 |
| FD15SP10 | 54 | 2.952 | 2.241 | 1.219 | 1.191 | 0.964 | 0.964 | ------ | 885803 | 62.5 | 45.0 | 62.5 | 45.0 | 1.210 | GW | 171740 | 171740 |
| FD15EL05 | 4 | 3.413 | 2.591 | 1.219 | 1.067 | 0.964 | 0.964 | ------ | 347038 | 72.3 | 178.0 | 72.3 | 178.0 | 1.089 | MT | 171740 | 171740 |
| FD15SP03 | 54 | 2.952 | 2.241 | 1.219 | 1.171 | 0.964 | 0.964 | ------ | 807624 | 62.5 | 108.0 | 62.5 | 108.0 | 1.190 | GW | 171740 | 171740 |
| FD15SP04 | 9 | 1.293 | 0.982 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15FE01A | 9 | 1.293 | 0.982 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15FE01 | 6 | 0.033 | 0.025 | 1.219 | 1.218 | 0.964 | 0.964 | 88712408 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15FE01B | 56 | 1.692 | 1.284 | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15SP05 US | 56 | 1.692 | 1.284 | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15SP05 DS | 56 | 1.692 | 1.284 | 1.219 | 1.172 | 0.964 | 0.964 | 1417698 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15EL06 | 2 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15TE02(U/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15TE02(D/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15CP01 | 65 | 0.054 | 0.041 | 0.719 | 0.718 | 0.520 | 0.520 | 42529632 | ------ | --- | --- | --- | --- | 0.719 | -- | 0 | ----- |
| FD15SP06 | 65 | 1.845 | 1.401 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |

===>Grouped by Line: 015-16"-FDW-15, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD15SP07 | 9 | 1.293 | 0.982 | 1.219 | 1.183 | 0.964 | 0.964 | 1953036 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15EL07 | 2 | 3.413 | 2.591 | 1.219 | 1.204 | 0.964 | 0.964 | 810194 | ------ | --- | --- | --- | --- | 1.226 | US | 171740 | ----- |
| FD15SP08 US | 52 | 2.306 | 1.751 | 1.219 | 1.157 | 0.964 | 0.964 | ------ | 964409 | 48.8 | 46.0 | 48.8 | 46.0 | 1.172 | GW | 171740 | 171740 |
| FD15SP08 DS | 52 | 2.306 | 1.751 | 1.219 | 1.155 | 0.964 | 0.964 | 955281 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD15EL08 | 2 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |

===>Grouped by Line: 016-10"-FDW-18, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD18SP04 US | 64 | 2.080 | 1.579 | 0.844 | 0.749 | 0.433 | 0.433 | ------ | 1750591 | 48.3 | 155.0 | 48.3 | 155.0 | 0.758 | MT | 195618 | 195618 |
| FD18SP04 DS | 64 | 2.080 | 1.579 | 0.844 | 0.787 | 0.433 | 0.433 | 1959598 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD18EL03 | 1 | 3.431 | 2.605 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP05 | 51 | 2.288 | 1.737 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP06 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18EL04 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP07 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP07 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| RX NOZZLE 4C | 30 | 0.008 | 0.006 | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |

===>Grouped by Line: 015-16"-FDW-17, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD17SP01 US | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17SP01 DS | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17TE01(U/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17TE01(D/S) | 15 | 2.767 | 2.101 | 1.219 | 1.143 | 0.964 | 0.964 | 743024 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17SP02 | 65 | 1.845 | 1.401 | 1.219 | 1.168 | 0.964 | 0.964 | 1273666 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17SP03 | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17SP04 | 58 | 2.029 | 1.541 | 1.219 | 1.163 | 0.964 | 0.964 | 1128945 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD17SP05 | 58 | 1.785 | 1.541 | 1.219 | 1.193 | 0.964 | 0.964 | 1300083 | ------ | --- | --- | --- | --- | 1.219 | -- | 114614 | ----- |
| FD17EL01 | 4 | 3.413 | 2.591 | 1.219 | 1.125 | 0.964 | 0.964 | 542240 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |

===>Grouped by Line: 016-16"-FDW-18, No Sorting.

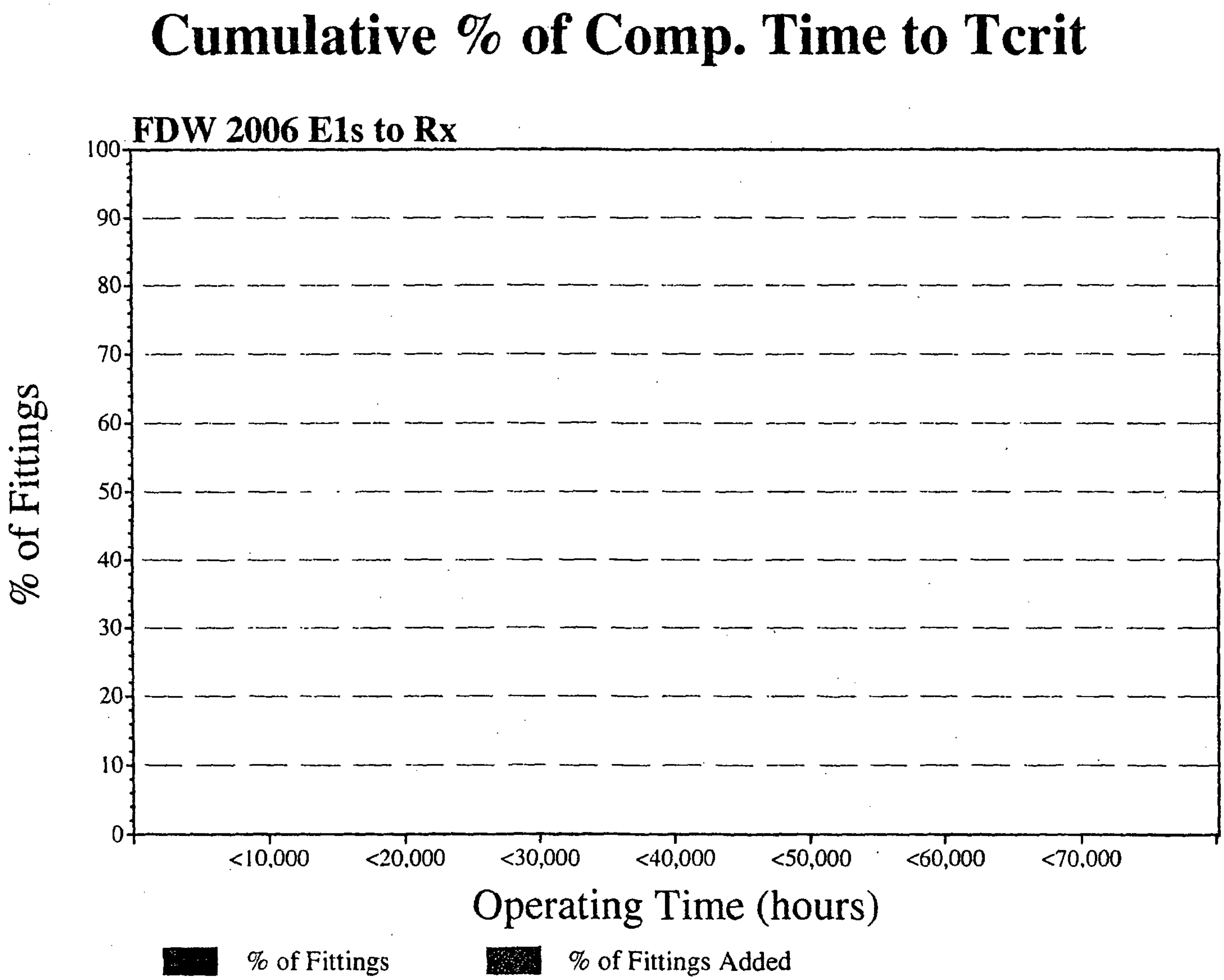
| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD18SP01 US | 58 | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP01 DS | 58 | 1.897 | 1.440 | 0.844 | 0.797 | 0.645 | 0.645 | ------ | 925801 | 46.6 | 73.0 | 46.6 | 73.0 | 0.803 | GW | 207118 | 207118 |
| FD18EL01 | 3 | 3.413 | 2.591 | 1.219 | 1.213 | 0.645 | 0.645 | ------ | 1919003 | 83.9 | 140.0 | 83.9 | 140.0 | 1.223 | US | 207118 | 207118 |
| FD18SP02 US | 52 | 2.155 | 1.636 | 0.844 | 0.793 | 0.645 | 0.645 | ------ | 789150 | 53.0 | 53.0 | 53.0 | 53.0 | 0.799 | US | 207118 | 207118 |
| FD18SP02 DS | 52 | 2.155 | 1.636 | 0.844 | 0.785 | 0.645 | 0.645 | 746318 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18EL02 | 1 | 3.044 | 2.311 | 1.219 | 1.135 | 0.645 | 0.645 | 1856868 | ------ | --- | --- | --- | --- | 1.219 | -- | 0 | ----- |
| FD18SP03 US | 51 | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18SP03 DS | 51 | 1.897 | 1.440 | 0.844 | 0.792 | 0.645 | 0.645 | 891487 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD18TE01(U/S) | 14 | 5.074 | 3.852 | 1.219 | 1.538 | 0.645 | 0.645 | ------ | 2030518 | 117.9 | 82.0 | 117.9 | 82.0 | 1.560 | US | 195618 | 195618 |
| FD18TE01(D/S) | 14 | 3.444 | 2.614 | 1.219 | 1.629 | 0.645 | 0.645 | ------ | 3296613 | 80.0 | 181.0 | 80.0 | 181.0 | 1.644 | US | 195618 | 195618 |
| FD18TE01(BR.) | 14 | 3.639 | 2.763 | 0.844 | 0.744 | 0.433 | 0.433 | 983372 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |

===>Grouped by Line: 016-10"-FDW-20, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FD20RD01(L/E) | 7 | 2.191 | 1.664 | 1.219 | 1.123 | 0.645 | 0.645 | 2518487 | ------ | --- | --- | --- | --- | 1.133 | US | 195618 | ----- |
| FD20RD01(S/E) | 7 | 3.327 | 2.526 | 0.844 | 0.756 | 0.433 | 0.433 | 1116948 | ------ | --- | --- | --- | --- | 0.770 | MT | 195618 | ----- |
| FD20SP01 | 57 | 2.599 | 1.973 | 0.844 | 0.716 | 0.433 | 0.433 | ------ | 1252849 | 60.4 | 123.0 | 60.4 | 123.0 | 0.727 | MT | 195618 | 195618 |
| FD20SP02 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20EL01 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP03 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP03 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20EL02 | 1 | 3.431 | 2.605 | 0.844 | 0.749 | 0.433 | 0.433 | 1062259 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP04 | 51 | 2.288 | 1.737 | 0.844 | 0.781 | 0.433 | 0.433 | 1752520 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP05 | 9 | 1.508 | 1.145 | 0.844 | 0.802 | 0.433 | 0.433 | 2822808 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20EL03 | 2 | 3.847 | 2.921 | 0.844 | 0.738 | 0.433 | 0.433 | 913014 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP06 US | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| FD20SP06 DS | 52 | 2.599 | 1.973 | 0.844 | 0.772 | 0.433 | 0.433 | 1504026 | ------ | --- | --- | --- | --- | 0.844 | -- | 0 | ----- |
| RX NOZZLE 4D | 30 | 0.008 | 0.006 | 0.594 | 0.594 | 0.472 | 0.472 | 99000000 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |

Notes:
(1) Predictions are based on last Tmeas to analysis ending period.
(2) Predictions are for the time of last inspection (last known meas. wear).
(3) GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
    MT = Tmeas is component minimum thickness.
    PW = Tmeas is Tinit - predicted wear.
    US = Tmeas is user specified.
(4) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
    Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

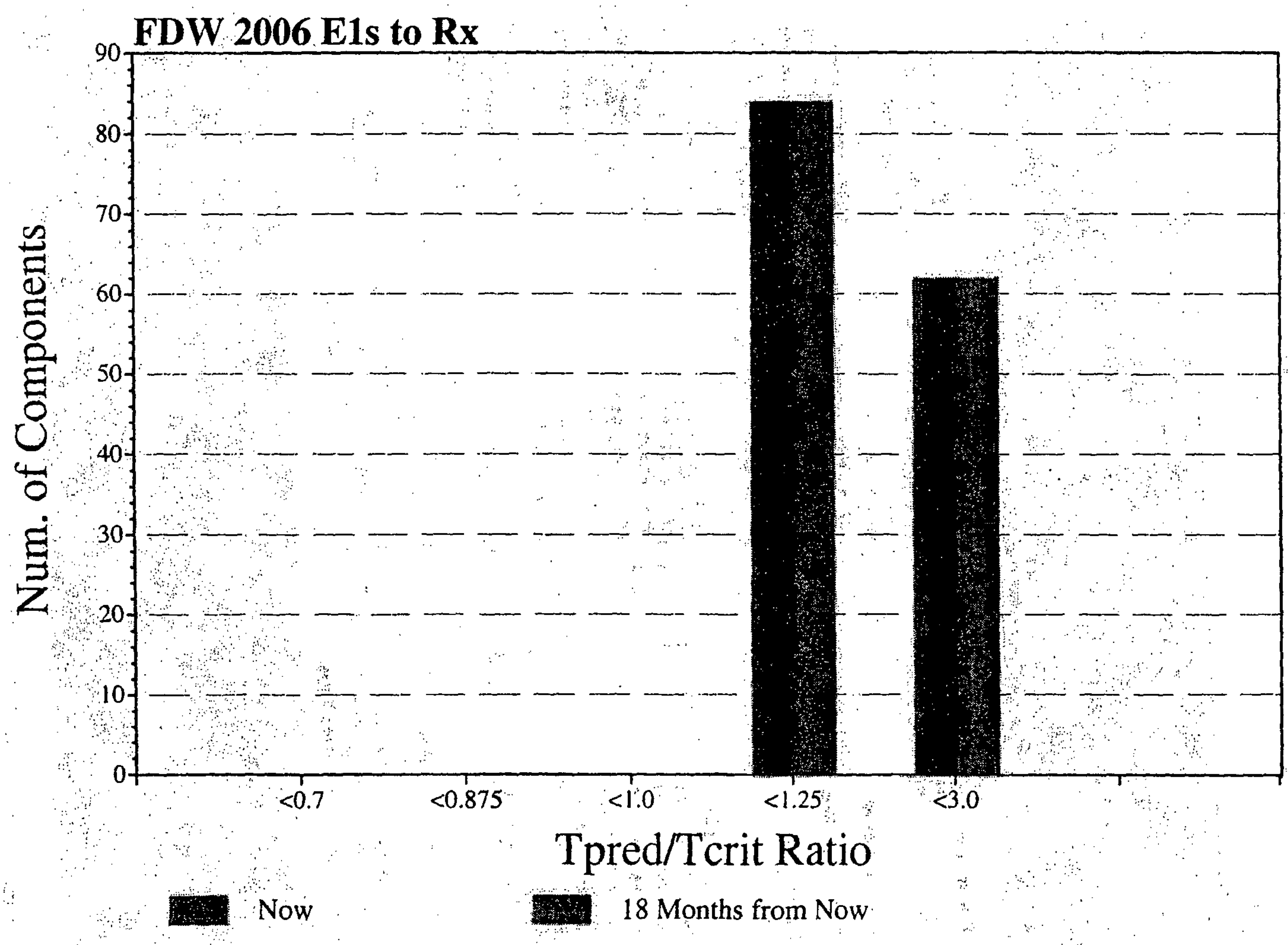
36

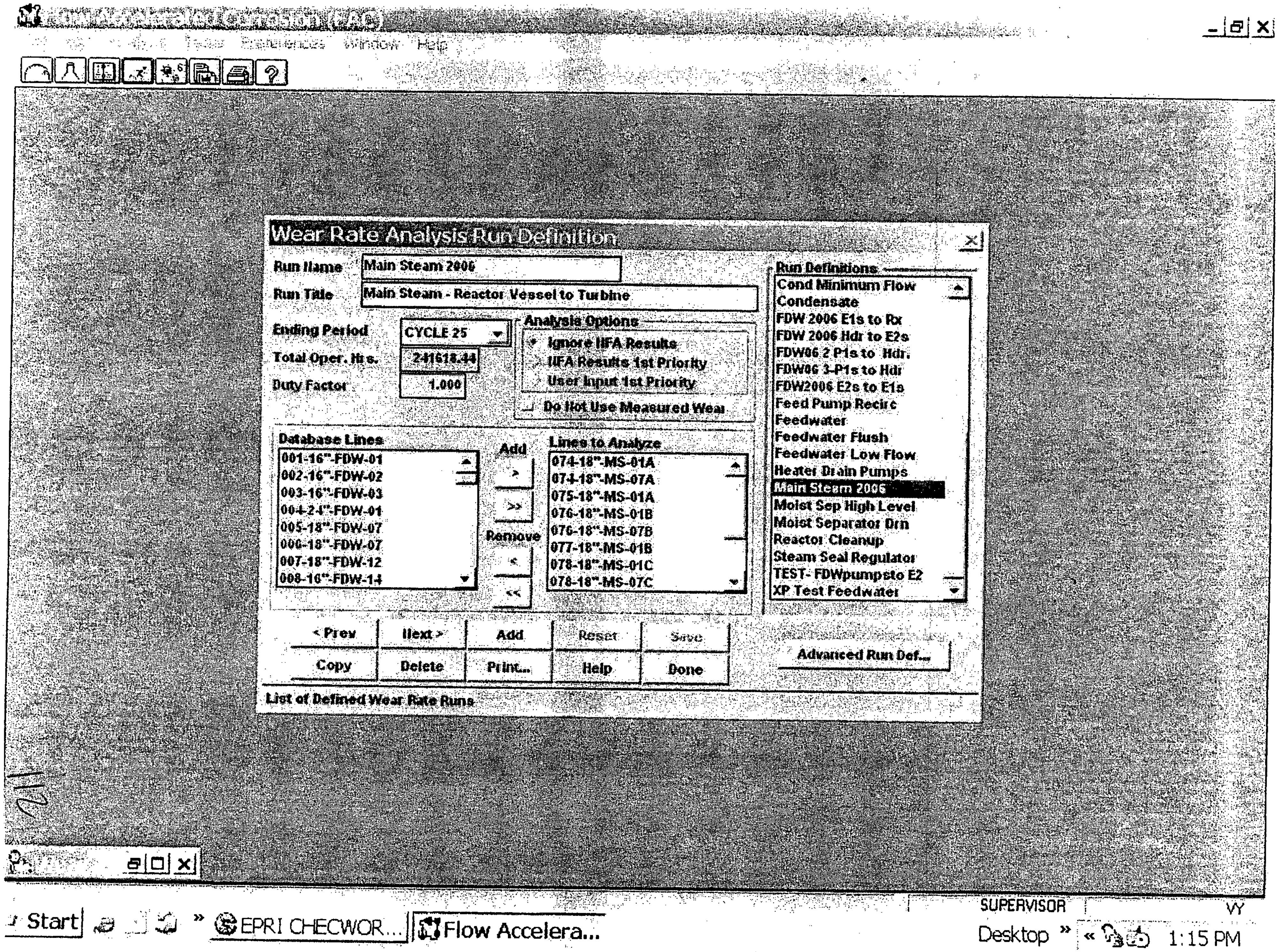


Cumulative % of Comp. Time to Tcrit
FDW 2006 E1s to Rx
100
90
80
70
60
50
40
30
20
10
0
% of Fittings
<10,000
<20,000
<30,000
<40,000
<50,000
<60,000
<70,000
Operating Time (hours)
% of Fittings
% of Fittings Added

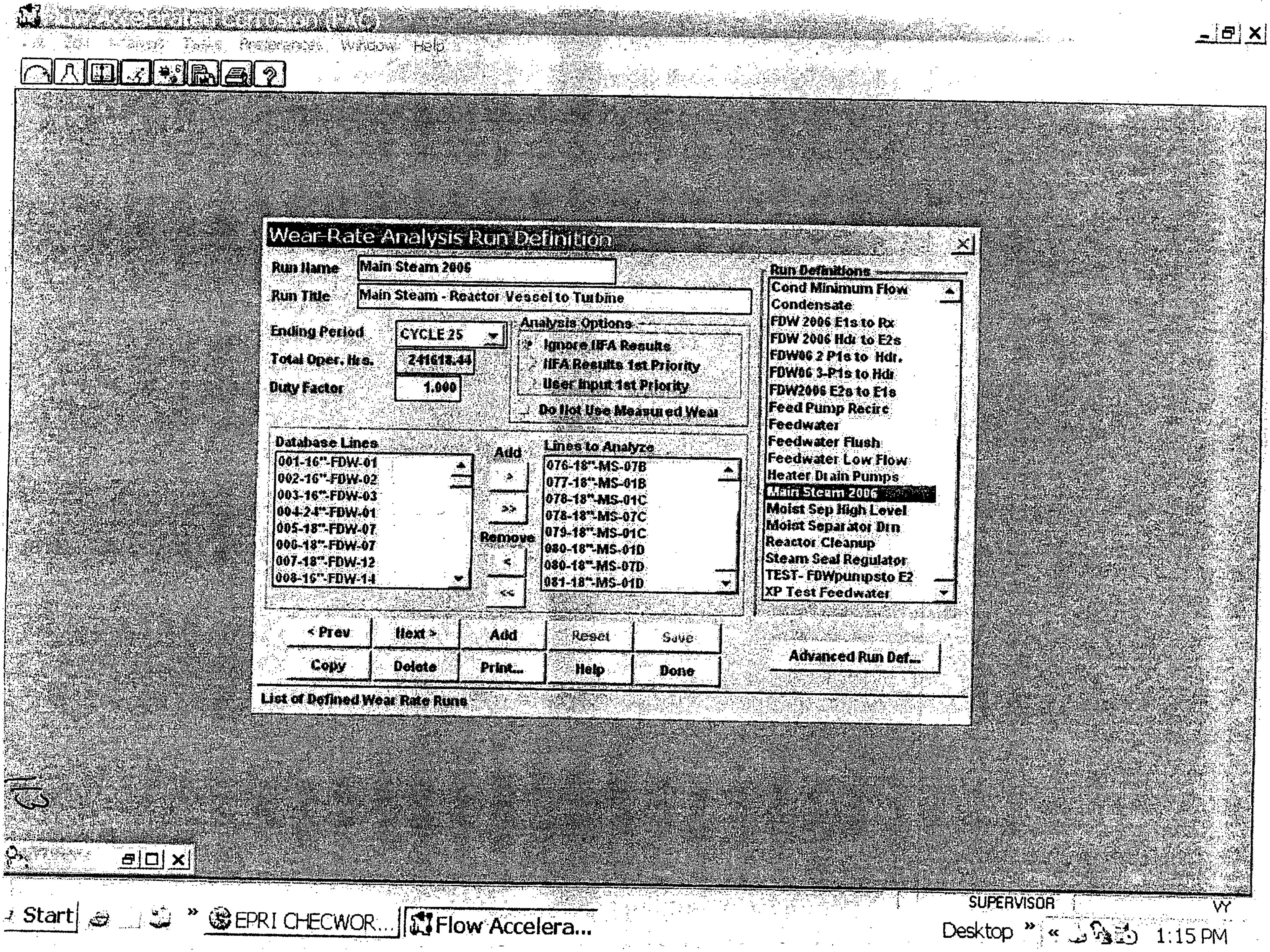

100

# Tpred/Tcrit Ratio Plot

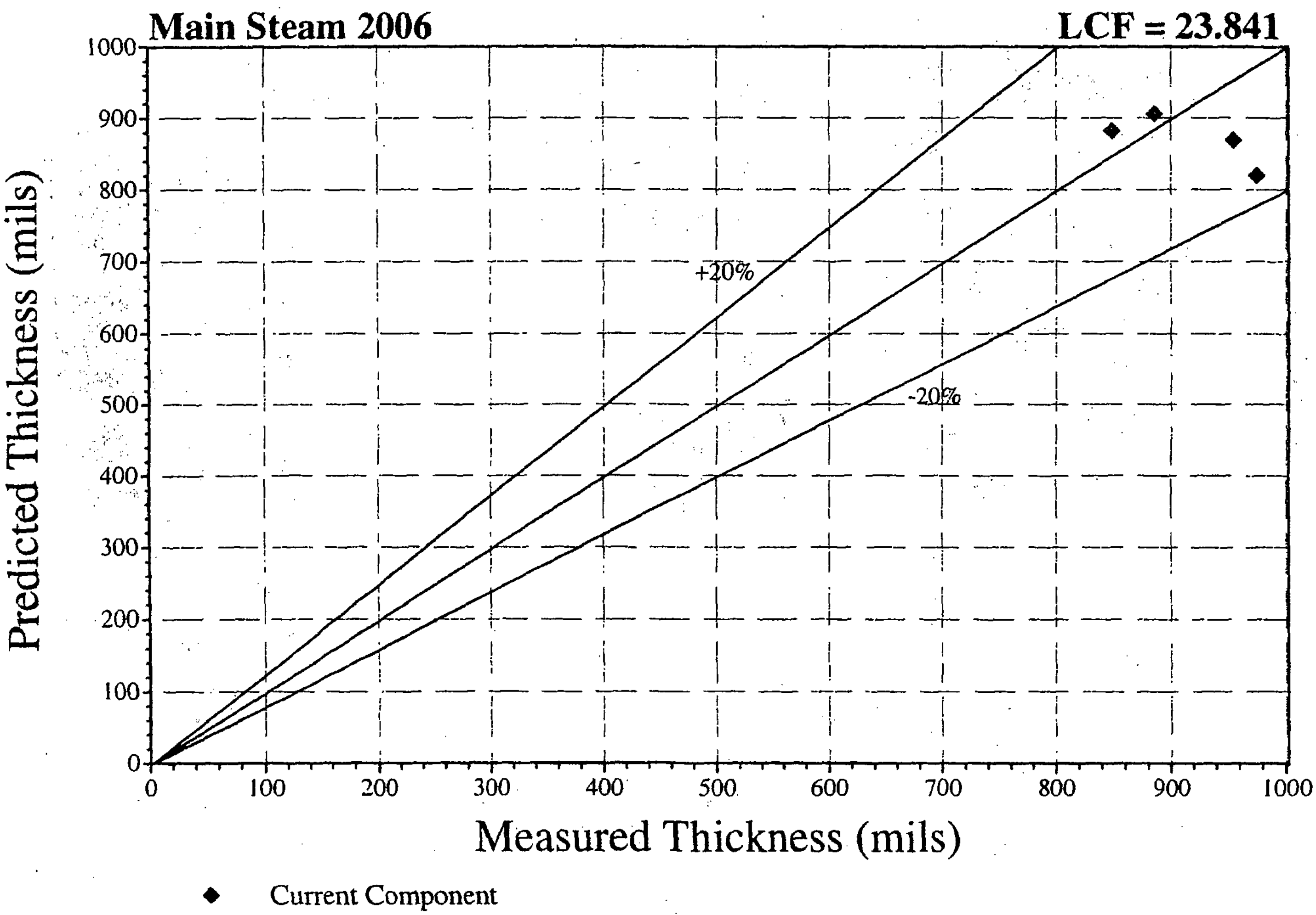




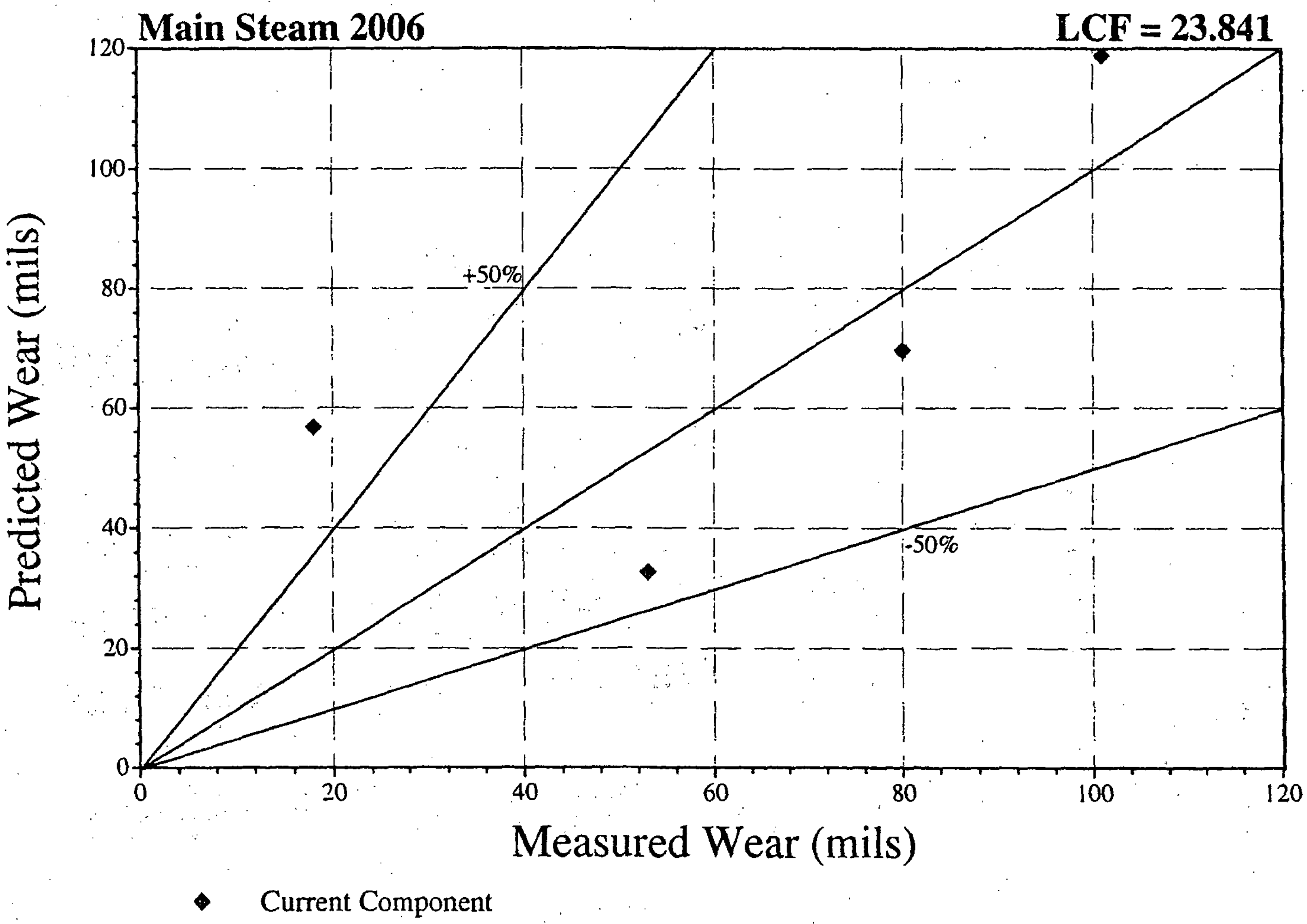
Flow Accelerated Corrosion (FAC)
Wear Rate Analysis Run Definition
Run Name
Main Steam 2006
Run Title
Main Steam - Reactor Vessel to Turbine
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore IIFA Results
IIFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
Add
Remove
Lines to Analyze
074-18"-MS-01A
074-18"-MS-07A
075-18"-MS-01A
076-18"-MS-01B
076-18"-MS-07B
077-18"-MS-01B
078-18"-MS-01C
078-18"-MS-07C
Run Definitions
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
Moist Sep High Level
Moist Separator Drn
Reactor Cleanup
Steam Seal Regulator
TEST- FDWpumpsto E2
XP Test Feedwater
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
1:15 PM
112


Wear-Rate Analysis Run Definition
Run Name
Main Steam 2006
Run Title
Main Steam - Reactor Vessel to Turbine
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore IIFA Results
IIFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
Add
Remove
Lines to Analyze
076-18"-MS-07B
077-18"-MS-01B
078-18"-MS-01C
078-18"-MS-07C
079-18"-MS-01C
080-18"-MS-01D
080-18"-MS-07D
081-18"-MS-01D
Run Definitions
Cond Minimum Flow
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
Moist Sep High Level
Moist Separator Drn
Reactor Cleanup
Steam Seal Regulator
TEST- FDWpumpsto E2
XP Test Feedwater
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
1:15 PM

# Comparison of Thickness Predictions



# Comparison of Wear Predictions



Company: Vermont Yankee Nuclear Power Corporation    Report Date: 13-SEP-2006 Time: 16:20:12
Plant: Vermont Yankee    Analysis Date: 13-SEP-2006 Time: 15:51:16
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 23.841

===>Grouped by Line: 074-18"-MS-01A, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1ASP12 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP12 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP13 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP13 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP14 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 074-18"-MS-07A, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3A | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AEL03 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP05 US | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP05 DS | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP07 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AEL05 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP08 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP09 | 56 | 2.139 | 2.460 | 0.938 | 0.859 | 0.726 | 0.726 | ------ | 473077 | 32.7 | 53.0 | 32.7 | 53.0 | 0.885 | US | 137270 | 137270 |
| MS7AEL06 | 4 | 4.555 | 5.238 | 0.938 | 0.898 | 0.726 | 0.726 | ------ | 287886 | 69.6 | 80.0 | 69.6 | 80.0 | 0.954 | US | 137270 | 137270 |
| MS7ASP10 | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7ASP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7AVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 075-18"-MS-01A, No Sorting.

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1ASP14 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ATE01(U S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ATE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1ASP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1AVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1AEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1AEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1AEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1ASP23 DS | 9 | 1.174 | 1.351 | 1.031 | 0.999 | 0.806 | 0.806 | 1246356 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1AEL15 | 2 | 3.983 | 4.581 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

===>Grouped by Line: 076-18"-MS-01B, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1BSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP12 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP12 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP13 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 076-18"-MS-07B, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3B | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL03 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP05 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP05 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP07 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL05 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP08 US | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP08 DS | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BEL06 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP09 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP10 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BSP10 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7BVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 077-18"-MS-01B, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1BSP14 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1BVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1BSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

===>Grouped by Line: 078-18"-MS-01C, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1CSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP12 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP12 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP13 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 078-18"-MS-07C, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AX NOZZLE N3C | 51 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL03 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP05 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP05 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP07 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL05 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP08 US | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP08 DS | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CEL06 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP09 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP10 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CSP10 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7CVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 079-18"-MS-01C, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1CSP14 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1CVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1BEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1CSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

===>Grouped by Line: 080-18"-MS-01D, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1DSP12 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP12 DS | 58 | 2.177 | 2.504 | 0.938 | 0.845 | 0.726 | 0.726 | ------ | 416019 | 56.8 | 18.0 | 56.8 | 18.0 | 0.848 | MT | 230119 | 230118 |

[redacted]

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1DEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.967 | 0.726 | 0.726 | ------ | 403549 | 118.8 | 101.0 | 118.8 | 101.0 | 0.974 | MT | 230118 | 230118 |
| MS1DSP13 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP13 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP14 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 080-18"-MS-07D, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EX NOZZLE N3D | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL03 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP05 US | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP05 DS | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP07 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL05 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP08 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP09 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DEL06 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP10 | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS7DVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |

===>Grouped by Line: 081-18"-MS-01D, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS1DSP14 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | --- | --- | --- | --- | 0.938 | -- | 0 | ----- |
| MS1DVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| MS1DEL15 | 2 | 3.983 | 4.581 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | --- | --- | --- | --- | 1.031 | -- | 0 | ----- |

Notes:
(1) Predictions are based on last Tmeas to analysis ending period.
(2) Predictions are for the time of last inspection (last known meas. wear).
(3) CW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
(4) If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

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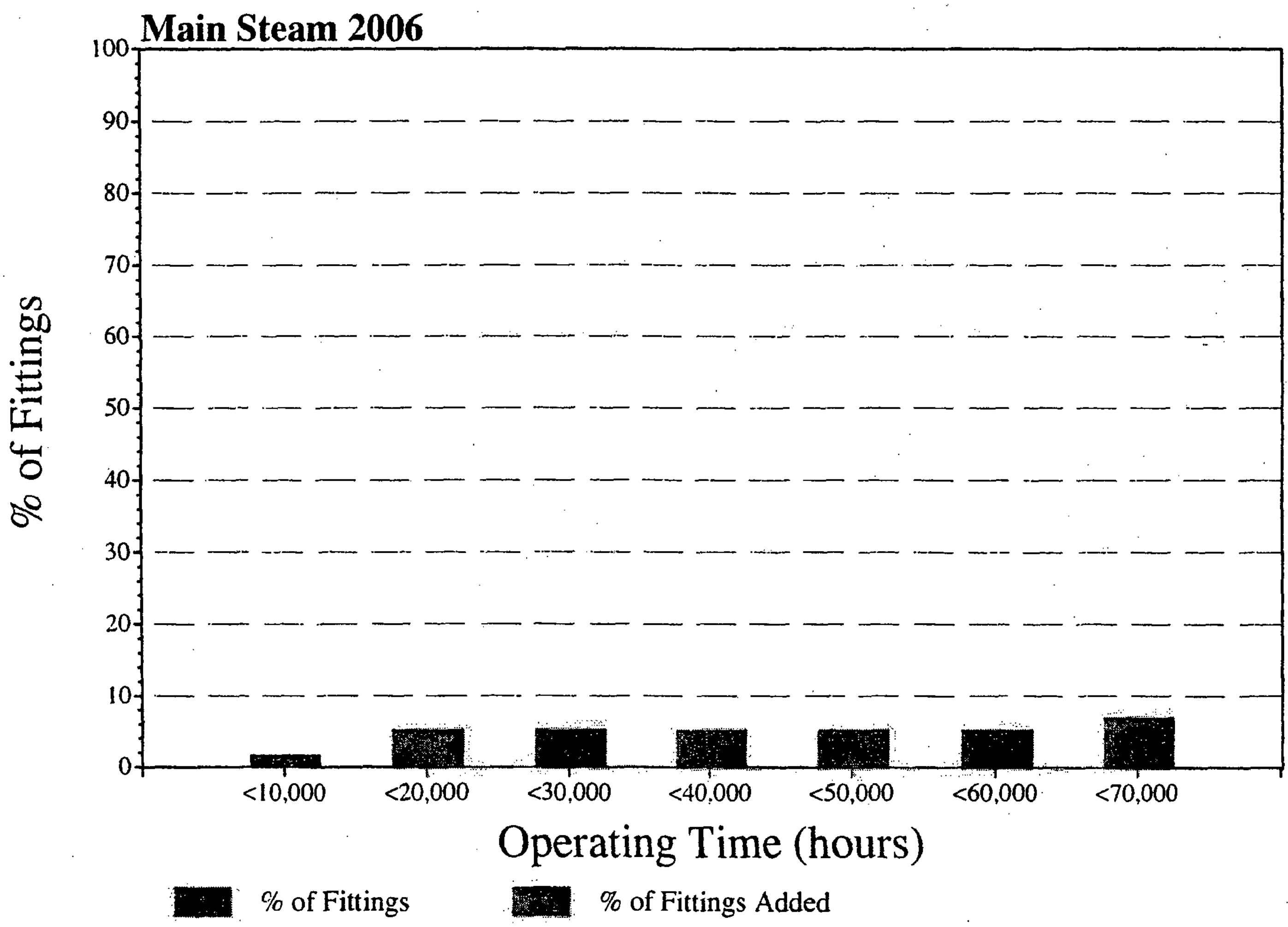
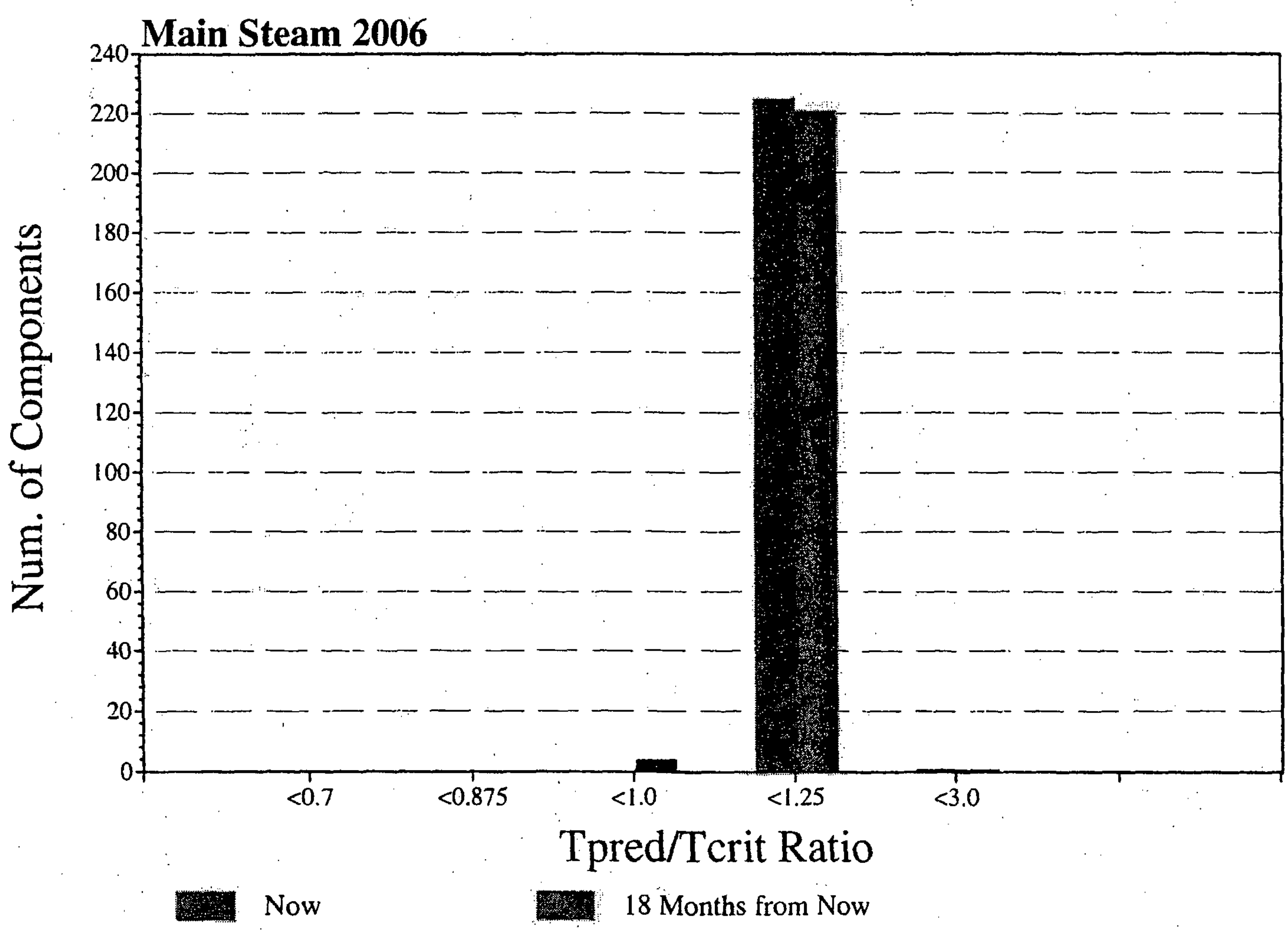
# Cumulative % of Comp. Time to Tcrit



# Tpred/Tcrit Ratio Plot



Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 16:15:16
Analysis Date: 13-SEP-2006 Time: 15:51:16
CHECWORKS FAC Version 1.0F (Build 52)

*******************************************************
*** Wear Rate Analysis: Combined Summary Report ***
*******************************************************

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 23.841

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predic Time to Tcrit (h Non-Insp. | I |
|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 074-18"-MS-01A, No Sorting. | | | | | | | | | |
| MS1ASP12 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1ASP12 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1AEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1ASP13 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1ASP13 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1AEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1ASP14 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| ===>Grouped by Line: 074-18"-MS-07A, No Sorting. | | | | | | | | | |
| RX NOZZLE N3A | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | - |
| MS7ASP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | - |
| MS7AEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | - |
| MS7ASP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | - |
| MS7AEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | - |
| MS7ASP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7ASP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7AEL03 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | - |
| MS7ASP05 US | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7ASP05 DS | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7AEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7ASP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7ASP07 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7AEL05 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7ASP08 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7AFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | - |
| MS7ASP09 | 56 | 2.139 | 2.460 | 0.938 | 0.859 | 0.726 | 0.726 | ------ | 4' |
| MS7AEL06 | 4 | 4.555 | 5.238 | 0.938 | 0.898 | 0.726 | 0.726 | ------ | 2: |
| MS7ASP10 | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7AVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |
| MS7ASP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7ASP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7AVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |
| ===>Grouped by Line: 075-18"-MS-01A, No Sorting. | | | | | | | | | |
| MS1ASP14 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1AEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1ASP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1ASP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1AEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1ASP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1ASP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1AEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1ASP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1ASP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1ATE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | - |
| MS1ATE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | - |
| MS1ASP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | - |
| MS1AVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | - |
| MS1AVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | - |
| MS1ASP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | - |
| MS1AEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | - |
| MS1ASP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1ASP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1AEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1ASP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1ASP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1AEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1ASP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1ASP23 DS | 9 | 1.174 | 1.351 | 1.031 | 0.999 | 0.806 | 0.806 | 1246356 | - |
| MS1AEL15 | 2 | 3.983 | 4.581 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | - |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | - |

===>Grouped by Line: 076-18"-MS-01B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1BSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1BSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1BEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1BSP12 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BSP12 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1BSP13 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |

===>Grouped by Line: 076-18"-MS-07B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3B | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | - |
| MS7BSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | - |
| MS7BEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | - |
| MS7BSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | - |
| MS7BEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | - |
| MS7BSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7BSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7BEL03 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7BSP05 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7BSP05 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7BEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7BSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7BFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | - |
| MS7BSP07 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | - |
| MS7BEL05 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7BSP08 US | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7BSP08 DS | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7BEL06 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | - |
| MS7BSP09 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7BVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |
| MS7BSP10 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7BSP10 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7BVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |

===>Grouped by Line: 077-18"-MS-01B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1BSP14 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1BSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1BEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1BSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1BEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1BSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1BTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | - |
| MS1BTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | - |
| MS1BSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | - |
| MS1BVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | - |
| MS1BVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | - |
| MS1BSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | - |
| MS1BEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | - |
| MS1BSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1BSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1BEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1BSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1BSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1BEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1BSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1BSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | - |

===>Grouped by Line: 078-18"-MS-01C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1CSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1CSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1CEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1CSP12 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CSP12 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1CSP13 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |

===>Grouped by Line: 078-18"-MS-07C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3C | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | - |
| MS7CSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | - |
| MS7CEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | - |
| MS7CSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | - |
| MS7CEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | - |
| MS7CSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7CSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7CEL03 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7CSP05 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7CSP05 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS7CEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7CSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7CFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | - |
| MS7CSP07 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | - |
| MS7CEL05 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7CSP08 US | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7CSP08 DS | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7CEL06 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | - |
| MS7CSP09 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7CVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |
| MS7CSP10 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7CSP10 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7CVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |

===>Grouped by Line: 079-18"-MS-01C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1CSP14 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1CSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1CEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1CSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1CEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1CSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1CTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | - |
| MS1CTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | - |
| MS1CSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | - |
| MS1CVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | - |
| MS1CVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | - |
| MS1CSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | - |
| MS1CEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | - |
| MS1CSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1CSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1BEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1CSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1CSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1CEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1CSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1CSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | - |

===>Grouped by Line: 080-18"-MS-01D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP12 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS1DSP12 DS | 58 | 2.177 | 2.504 | 0.938 | 0.845 | 0.726 | 0.726 | ------ | 4 |
| MS1DEL07 | 2 | 4.555 | 5.238 | 0.938 | 0.967 | 0.726 | 0.726 | ------ | 4 |
| MS1DSP13 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DSP13 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DEL08 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS1DSP14 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |

===>Grouped by Line: 080-18"-MS-07D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3D | 31 | 7.421 | 8.534 | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | - |
| MS7DSP01 | 61 | 5.343 | 6.144 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | - |
| MS7DEL01 | 3 | 4.442 | 5.109 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | - |
| MS7DSP02 | 53 | 3.710 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | - |
| MS7DEL02 | 1 | 4.188 | 4.817 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | - |
| MS7DSP03 | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7DSP04 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7DEL03 | 1 | 3.901 | 4.486 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | - |
| MS7DSP05 US | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7DSP05 DS | 51 | 2.721 | 3.129 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | - |
| MS7DEL04 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7DSP06 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7DSP07 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS7DEL05 | 2 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7DSP08 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS7DFE01 | 6 | 0.031 | 0.036 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | - |
| MS7DSP09 | 56 | 2.139 | 2.460 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | - |
| MS7DEL06 | 4 | 4.555 | 5.238 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | - |
| MS7DSP10 | 54 | 4.749 | 5.462 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | - |
| MS7DVA01 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |
| MS7DSP11 US | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7DSP11 DS | 58 | 2.177 | 2.504 | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | - |
| MS7DVA02 | 22 | 5.443 | 6.259 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | - |

===>Grouped by Line: 081-18"-MS-01D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP14 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DEL09 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1DSP15 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DSP16 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1DEL10 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP17 | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DSP18 | 9 | 1.432 | 1.647 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | - |
| MS1DEL11 | 2 | 3.547 | 4.079 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | - |
| MS1DSP19 US | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DSP19 DS | 52 | 3.092 | 3.556 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | - |
| MS1DTE01(U/S) | 15 | 3.711 | 4.267 | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | - |
| MS1DTE01(D/S) | 15 | 3.266 | 3.756 | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | - |
| MS1DSP19A | 65 | 3.661 | 4.210 | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | - |
| MS1DVA03 | 20 | 3.712 | 4.269 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | - |
| MS1DVA04 | 22 | 4.759 | 5.474 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | - |
| MS1DSP20 | 58 | 1.904 | 2.190 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | - |
| MS1DEL12 | 2 | 3.102 | 3.567 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | - |
| MS1DSP21 US | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1DSP21 DS | 52 | 2.704 | 3.110 | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | - |
| MS1DEL13 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1DSP22 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1DSP22 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1DEL14 | 1 | 2.677 | 3.079 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | - |
| MS1DSP23 US | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1DSP23 DS | 51 | 2.380 | 2.737 | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | - |
| MS1DEL15 | 2 | 3.983 | 4.581 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | - |
| INLET HP TURB | 30 | 4.327 | 4.976 | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | - |

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current compone
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 13-SEP-2006 Time: 16:15:07
Plant: Vermont Yankee Analysis Date: 13-SEP-2006 Time: 15:51:16
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

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

*** Wear Rate Analysis: Wear Predictions Report ***

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

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 23.841

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Tmeas,Method,Time (in)[3] | [2] | (hrs)[3] | In-Service Cmp. Thickness(mils)[4] Tp | Tm | Incremen Wear(mil PRWEA |
|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 074-18"=MS-01A, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 074-18"-MS-07A, No Sorting. | | | | | | | | | | |
| MS7ASP09 | 32.7 | 53.0 | 32.7 | 53.0 | 0.885 | US | 137270 | 905.3 | 885.0 | 26 |
| MS7AEL06 | 69.6 | 80.0 | 69.6 | 80.0 | 0.954 | US | 137270 | 868.4 | 954.0 | 56 |
| ===>Grouped by Line: 075-18"-MS-01A, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 076-18"-MS-01B, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 076-18"-MS-07B, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 077-18"-MS-01B, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 078-18"-MS-01C, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 078-18"-MS-07C, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 079-18"-MS-01C, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 080-18"-MS-01D, No Sorting. | | | | | | | | | | |
| MS1DSP12 DS | 56.8 | 18.0 | 56.8 | 18.0 | 0.848 | MT | 230118 | 881.2 | 848.0 | 3 |
| MS1DEL07 | 118.8 | 101.0 | 118.8 | 101.0 | 0.974 | MT | 230118 | 819.2 | 974.0 | 6 |
| ===>Grouped by Line: 080-18"-MS-07D, No Sorting. | | | | | | | | | | |
| ===>Grouped by Line: 081-18"-MS-01D, No Sorting. | | | | | | | | | | |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current compone
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 15:53:21
Analysis Date: 13-SEP-2006 Time: 15:51:16
CHECWORKS FAC Version 1.0F (Build 52)

**********************************************************
*** Wear Rate Analysis: Wear Rates/Input Data Report ***
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Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 23.841

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 074-18"-MS-01A, No Sorting. | | | | | | | |
| MS1ASP12 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP12 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AEL07 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP13 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP13 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AEL08 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP14 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| ===>Grouped by Line: 074-18"-MS-07A, No Sorting. | | | | | | | |
| RX NOZZLE N3A | 31 | 7.421 | 8.534 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP01 | 61 | 5.343 | 6.144 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AEL01 | 3 | 4.442 | 5.109 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP02 | 53 | 3.710 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AEL02 | 1 | 4.188 | 4.817 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP03 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP04 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AEL03 | 1 | 3.901 | 4.486 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP05 US | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP05 DS | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AEL04 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP06 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP07 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AEL05 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP08 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AFE01 | 6 | 0.031 | 0.036 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7ASP09 | 56 | 2.139 | 2.460 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7AEL06 | 4 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP10 | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AVA01 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP11 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7ASP11 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7AVA02 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |
| ===>Grouped by Line: 075-18"-MS-01A, No Sorting. | | | | | | | |
| MS1ASP14 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AEL09 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP15 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP16 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AEL10 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP17 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP18 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AEL11 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP19 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP19 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ATE01(U/S) | 15 | 3.711 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ATE01(D/S) | 15 | 3.266 | 3.756 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1ASP19A | 65 | 3.661 | 4.210 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AVA03 | 20 | 3.712 | 4.269 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1AVA04 | 22 | 4.759 | 5.474 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP20 | 58 | 1.904 | 2.190 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1AEL12 | 2 | 3.102 | 3.567 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP21 US | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP21 DS | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1AEL13 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP22 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP22 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1AEL14 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP23 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1ASP23 DS | 9 | 1.174 | 1.351 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1AEL15 | 2 | 3.983 | 4.581 | 540.3 | 16.155 | 0.997 | 20.000 |
| INLET HP TURB | 30 | 4.327 | 4.976 | 540.3 | 16.155 | 0.997 | 20.000 |

===>Grouped by Line: 076-18"-MS-01B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1BSP11 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP11 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BEL07 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP12 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP12 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BEL08 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP13 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 076-18"-MS-07B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3B | 31 | 7.421 | 8.534 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP01 | 61 | 5.343 | 6.144 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BEL01 | 3 | 4.442 | 5.109 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP02 | 53 | 3.710 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BEL02 | 1 | 4.188 | 4.817 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP03 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP04 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BEL03 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP05 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP05 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BEL04 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP06 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BFE01 | 6 | 0.031 | 0.036 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7BSP07 | 56 | 2.139 | 2.460 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7BEL05 | 4 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP08 US | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP08 DS | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BEL06 | 1 | 3.901 | 4.486 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP09 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BVA01 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP10 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BSP10 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7BVA02 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 077-18"-MS-01B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1BSP14 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BEL09 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP15 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP16 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BEL10 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP17 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP18 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BEL11 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP19 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP19 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BTE01(U/S) | 15 | 3.711 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BTE01(D/S) | 15 | 3.266 | 3.756 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BSP19A | 65 | 3.661 | 4.210 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BVA03 | 20 | 3.712 | 4.269 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1BVA04 | 22 | 4.759 | 5.474 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP20 | 58 | 1.904 | 2.190 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BEL12 | 2 | 3.102 | 3.567 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP21 US | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP21 DS | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BEL13 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP22 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP22 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BEL14 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP23 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BSP23 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| INLET HP TURB | 30 | 4.327 | 4.976 | 540.3 | 16.155 | 0.997 | 20.000 |

===>Grouped by Line: 078-18"-MS-01C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1CSP11 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP11 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CEL07 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP12 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP12 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CEL08 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP13 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 078-18"-MS-07C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3C | 31 | 7.421 | 8.534 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP01 | 61 | 5.343 | 6.144 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CEL01 | 3 | 4.442 | 5.109 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP02 | 53 | 3.710 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CEL02 | 1 | 4.188 | 4.817 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP03 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP04 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CEL03 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP05 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP05 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS7CEL04 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP06 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CFE01 | 6 | 0.031 | 0.036 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7CSP07 | 56 | 2.139 | 2.460 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7CEL05 | 4 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP08 US | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP08 DS | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CEL06 | 1 | 3.901 | 4.486 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP09 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CVA01 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP10 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CSP10 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7CVA02 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 079-18"-MS-01C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1CSP14 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CEL09 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP15 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP16 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CEL10 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP17 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP18 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CEL11 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP19 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP19 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CTE01(U/S) | 15 | 3.711 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CTE01(D/S) | 15 | 3.266 | 3.756 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CSP19A | 65 | 3.661 | 4.210 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CVA03 | 20 | 3.712 | 4.269 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1CVA04 | 22 | 4.759 | 5.474 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP20 | 58 | 1.904 | 2.190 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CEL12 | 2 | 3.102 | 3.567 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP21 US | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP21 DS | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1BEL13 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP22 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP22 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CEL14 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP23 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1CSP23 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| INLET HP TURB | 30 | 4.327 | 4.976 | 540.3 | 16.155 | 0.997 | 20.000 |

===>Grouped by Line: 080-18"-MS-01D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP12 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP12 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DEL07 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP13 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP13 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DEL08 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP14 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 080-18"-MS-07D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3D | 31 | 7.421 | 8.534 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP01 | 61 | 5.343 | 6.144 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DEL01 | 3 | 4.442 | 5.109 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP02 | 53 | 3.710 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DEL02 | 1 | 4.188 | 4.817 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP03 | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP04 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DEL03 | 1 | 3.901 | 4.486 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP05 US | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP05 DS | 51 | 2.721 | 3.129 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DEL04 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP06 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP07 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DEL05 | 2 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP08 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DFE01 | 6 | 0.031 | 0.036 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7DSP09 | 56 | 2.139 | 2.460 | 540.3 | 68.113 | 0.997 | 18.000 |
| MS7DEL06 | 4 | 4.555 | 5.238 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP10 | 54 | 4.749 | 5.462 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DVA01 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP11 US | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DSP11 DS | 58 | 2.177 | 2.504 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS7DVA02 | 22 | 5.443 | 6.259 | 540.3 | 19.994 | 0.997 | 18.000 |

===>Grouped by Line: 081-18"-MS-01D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP14 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DEL09 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP15 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP16 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DEL10 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP17 | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP18 | 9 | 1.432 | 1.647 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DEL11 | 2 | 3.547 | 4.079 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP19 US | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP19 DS | 52 | 3.092 | 3.556 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DTE01(U/S) | 15 | 3.711 | 4.267 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DTE01(D/S) | 15 | 3.266 | 3.756 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DSP19A | 65 | 3.661 | 4.210 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DVA03 | 20 | 3.712 | 4.269 | 540.3 | 19.994 | 0.997 | 18.000 |
| MS1DVA04 | 22 | 4.759 | 5.474 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP20 | 58 | 1.904 | 2.190 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DEL12 | 2 | 3.102 | 3.567 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP21 US | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP21 DS | 52 | 2.704 | 3.110 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DEL13 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP22 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP22 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DEL14 | 1 | 2.677 | 3.079 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP23 US | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DSP23 DS | 51 | 2.380 | 2.737 | 540.3 | 16.155 | 0.997 | 20.000 |
| MS1DEL15 | 2 | 3.983 | 4.581 | 540.3 | 16.155 | 0.997 | 20.000 |
| INLET HP TURB | 30 | 4.327 | 4.976 | 540.3 | 16.155 | 0.997 | 20.000 |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 16:07:37
Analysis Date: 13-SEP-2006 Time: 15:51:16
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Inspection History Report ***

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 23.841

Duty Factor (Global): 1.000
Exclude Measure Wear: No

===>Grouped by Line: 074-18"-MS-01A, No Sorting.

| Component Name | Geom. Code | No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| MS1ASP12 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP12 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP13 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP13 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP14 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 074-18"-MS-07A, No Sorting.

| Component Name | Geom. Code | No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP01 | 61 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AEL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AEL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AEL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP05 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP05 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AEL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP07 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AEL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AFE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 13325 | ----- | ----- | | --- |
| MS7ASP09 | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 137270 | ----- | | 53 |
| MS7AEL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 137270 | ----- | | 80 |
| MS7ASP10 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AVA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| MS7ASP11 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7ASP11 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS7AVA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |

===>Grouped by Line: 075-18"-MS-01A, No Sorting.

| Component Name | Geom. Code | No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| MS1ASP14 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL09 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP15 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP16 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL10 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP17 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP18 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL11 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP19 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP19 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ATE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ATE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP19A | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AVA03 | 20 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| MS1AVA04 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| MS1ASP20 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL12 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP21 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP21 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL13 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP22 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP22 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL14 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP23 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1ASP23 DS | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| MS1AEL15 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| INLET HP TURB | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 076-18" MS-01B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1BSP11 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP11 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP12 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP12 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP13 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 076-18"-MS-07B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP01 | 61 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BFE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 13325 | ----- | ----- | --- |
| MS7BSP07 | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP08 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP08 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BEL06 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP09 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BVA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS7BSP10 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BSP10 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7BVA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |

===>Grouped by Line: 077-18"-MS-01B, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1BSP14 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL09 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP15 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP16 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL10 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP17 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP18 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL11 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP19 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP19 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BTE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BTE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP19A | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BVA03 | 20 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1BVA04 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1BSP20 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL12 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP21 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP21 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL13 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP22 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP22 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL14 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP23 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BSP23 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET HP TURB | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 078-18"-MS-01C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1CSP11 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP11 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP12 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP12 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP13 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 078-18"-MS-07C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3C | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP01 | 61 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CEL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CEL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CEL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP05 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP05 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS7CEL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CFE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 13325 | ----- | ----- | --- |
| MS7CSP07 | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CEL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP08 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP08 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CEL06 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP09 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CVA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS7CSP10 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CSP10 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7CVA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |

===>Grouped by Line: 079-18"-MS-01C, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1CSP14 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL09 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP15 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP16 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL10 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP17 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP18 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL11 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP19 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP19 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CTE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CTE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP19A | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CVA03 | 20 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1CVA04 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1CSP20 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL12 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP21 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP21 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1BEL13 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP22 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP22 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CEL14 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP23 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1CSP23 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET HP TURB | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 080-18"-MS-01D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP12 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP12 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 18 |
| MS1DEL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 101 |
| MS1DSP13 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP13 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP14 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 080-18"-MS-07D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RX NOZZLE N3D | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP01 | 61 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL02 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP03 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP04 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL03 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP05 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP05 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP07 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DFE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 13325 | ----- | ----- | --- |
| MS7DSP09 | 56 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DEL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP10 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DVA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS7DSP11 US | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DSP11 DS | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS7DVA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |

===>Grouped by Line: 081-18"-MS-01D, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP14 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL09 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP15 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP16 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL10 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | [illegible] | [illegible] | [illegible] |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MS1DSP17 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP18 | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL11 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP19 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP19 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DTE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DTE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP19A | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DVA03 | 20 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1DVA04 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| MS1DSP20 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL12 | 2 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP21 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP21 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL13 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP22 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP22 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL14 | 1 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP23 US | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DSP23 DS | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| MS1DEL15 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET HP TURB | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 16:11:25
Analysis Date: 13-SEP-2006 Time: 15:51:16
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 23.841

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| MS7AEL01 | 3 | 4.442 | 153769 | ------ |
| MS7CEL05 | 4 | 4.555 | 144749 | ------ |
| MS7DFE01 | 6 | 0.031 | 30037228 | ------ |
| MS7DVA02 | 22 | 5.443 | 16821 | ------ |
| MS7ASP01 | 61 | 5.343 | 92438 | ------ |
| RX NOZZLE N3C | 31 | 7.421 | 7710 | ------ |
| RX NOZZLE N3A | 31 | 7.421 | 7710 | ------ |
| RX NOZZLE N3B | 31 | 7.421 | 7710 | ------ |
| RX NOZZLE N3D | 31 | 7.421 | 7710 | ------ |
| MS7BVA01 | 22 | 5.443 | 16821 | ------ |
| MS7BVA02 | 22 | 5.443 | 16821 | ------ |
| MS7CVA02 | 22 | 5.443 | 16821 | ------ |
| MS7CVA01 | 22 | 5.443 | 16821 | ------ |
| MS7AVA01 | 22 | 5.443 | 16821 | ------ |
| MS7DVA01 | 22 | 5.443 | 16821 | ------ |
| MS7AVA02 | 22 | 5.443 | 16821 | ------ |
| MS7CSP01 | 61 | 5.343 | 92438 | ------ |
| MS1DVA04 | 22 | 4.759 | 60263 | ------ |
| MS7BSP01 | 61 | 5.343 | 92438 | ------ |
| MS1CVA04 | 22 | 4.759 | 60263 | ------ |
| MS1BVA04 | 22 | 4.759 | 60263 | ------ |
| MS7DSP01 | 61 | 5.343 | 92438 | ------ |
| MS1AVA04 | 22 | 4.759 | 60263 | ------ |
| MS7DSP10 | 54 | 4.749 | 130227 | ------ |
| MS1BVA03 | 20 | 3.712 | 122646 | ------ |
| MS7CSP08 US | 54 | 4.749 | 130227 | ------ |
| MS1AVA03 | 20 | 3.712 | 122646 | ------ |
| MS7ASP10 | 54 | 4.749 | 130227 | ------ |
| MS1DVA03 | 20 | 3.712 | 122646 | ------ |
| MS7BSP08 DS | 54 | 4.749 | 130227 | ------ |
| MS1CVA03 | 20 | 3.712 | 122646 | ------ |
| MS7CSP08 DS | 54 | 4.749 | 130227 | ------ |
| MS7BSP08 US | 54 | 4.749 | 130227 | ------ |
| MS7CEL03 | 2 | 4.555 | 144749 | ------ |
| MS7BEL04 | 2 | 4.555 | 144749 | ------ |
| MS1AEL08 | 2 | 4.555 | 144749 | ------ |
| MS1BEL08 | 2 | 4.555 | 144749 | ------ |
| MS7CEL04 | 2 | 4.555 | 144749 | ------ |
| MS1DEL08 | 2 | 4.555 | 144749 | ------ |
| MS7AEL06 | 4 | 4.555 | ------ | 287886 |
| MS1BEL07 | 2 | 4.555 | 144749 | ------ |
| MS7DEL06 | 4 | 4.555 | 144749 | ------ |
| MS7AEL05 | 2 | 4.555 | 144749 | ------ |
| MS1CEL08 | 2 | 4.555 | 144749 | ------ |
| MS1CEL07 | 2 | 4.555 | 144749 | ------ |
| MS7AEL04 | 2 | 4.555 | 144749 | ------ |
| MS7BEL03 | 2 | 4.555 | 144749 | ------ |
| MS7DEL05 | 2 | 4.555 | 144749 | ------ |
| MS1DEL07 | 2 | 4.555 | ------ | 403549 |
| MS7DEL04 | 2 | 4.555 | 144749 | ------ |
| MS7BEL05 | 4 | 4.555 | 144749 | ------ |
| MS1AEL07 | 2 | 4.555 | 144749 | ------ |
| MS7CEL01 | 3 | 4.442 | 153769 | ------ |
| MS7DEL01 | 3 | 4.442 | 153769 | ------ |
| MS7BEL01 | 3 | 4.442 | 153769 | ------ |
| INLET HP TURB | 30 | 4.327 | 185233 | ------ |
| INLET HP TURB | 30 | 4.327 | 185233 | ------ |
| INLET HP TURB | 30 | 4.327 | 185233 | ------ |
| MS7BEL02 | 1 | 4.188 | 175822 | ------ |
| INLET HP TURB | 30 | 4.327 | 185233 | ------ |
| MS7AEL02 | 1 | 4.188 | 175822 | ------ |
| MS7CEL02 | 1 | 4.188 | 175822 | ------ |
| MS7DEL02 | 1 | 4.188 | 175822 | ------ |
| MS1AEL15 | 2 | 3.983 | 219306 | ------ |
| MS1DEL15 | 2 | 3.983 | 219306 | ------ |
| MS7BEL06 | 1 | 3.901 | 204277 | ------ |
| MS7CEL06 | 1 | 3.901 | 204277 | ------ |
| MS7DEL03 | 1 | 3.901 | 204277 | ------ |

| | | | | |
|---|---|---|---|---|
| MS7AEL03 | 1 | 3.901 | 204277 | ------ |
| MS1BTE01(U/S) | 15 | 3.711 | 225488 | ------ |
| MS1ATE01(U/S) | 15 | 3.711 | 225488 | ------ |
| MS1CTE01(U/S) | 15 | 3.711 | 225488 | ------ |
| MS1DTE01(U/S) | 15 | 3.711 | 225488 | ------ |
| MS7CSP02 | 53 | 3.710 | 225517 | ------ |
| MS7BSP02 | 53 | 3.710 | 225517 | ------ |
| MS7DSP02 | 53 | 3.710 | 225517 | ------ |
| MS7ASP02 | 53 | 3.710 | 225517 | ------ |
| MS1CSP19A | 65 | 3.661 | 231432 | ------ |
| MS1ASP19A | 65 | 3.661 | 231432 | ------ |
| MS1BSP19A | 65 | 3.661 | 231432 | ------ |
| MS1DSP19A | 65 | 3.661 | 231432 | ------ |
| MS1BEL09 | 2 | 3.547 | 245599 | ------ |
| MS1BEL10 | 2 | 3.547 | 245599 | ------ |
| MS1CEL09 | 2 | 3.547 | 245599 | ------ |
| MS1AEL11 | 2 | 3.547 | 245599 | ------ |
| MS1AEL10 | 2 | 3.547 | 245599 | ------ |
| MS1CEL10 | 2 | 3.547 | 245599 | ------ |
| MS1CEL11 | 2 | 3.547 | 245599 | ------ |
| MS1BEL11 | 2 | 3.547 | 245599 | ------ |
| MS1DEL10 | 2 | 3.547 | 245599 | ------ |
| MS1DEL11 | 2 | 3.547 | 245599 | ------ |
| MS1AEL09 | 2 | 3.547 | 245599 | ------ |
| MS1DEL09 | 2 | 3.547 | 245599 | ------ |
| MS1CTE01(D/S) | 15 | 3.266 | 284860 | ------ |
| MS1ATE01(D/S) | 15 | 3.266 | 284860 | ------ |
| MS1BTE01(D/S) | 15 | 3.266 | 284860 | ------ |
| MS1DTE01(D/S) | 15 | 3.266 | 284860 | ------ |
| MS1BSP15 | 52 | 3.092 | 312606 | ------ |
| MS1BEL12 | 2 | 3.102 | 341346 | ------ |
| MS7BSP06 | 52 | 3.092 | 312606 | ------ |
| MS1CEL12 | 2 | 3.102 | 341346 | ------ |
| MS7CSP06 | 52 | 3.092 | 312606 | ------ |
| MS1DEL12 | 2 | 3.102 | 341346 | ------ |
| MS7ASP06 | 52 | 3.092 | 312606 | ------ |
| MS1AEL12 | 2 | 3.102 | 341346 | ------ |
| MS7DSP06 | 52 | 3.092 | 312606 | ------ |
| MS1ASP13 DS | 52 | 3.092 | 312606 | ------ |
| MS7DSP08 | 52 | 3.092 | 312606 | ------ |
| MS7ASP08 | 52 | 3.092 | 312606 | ------ |
| MS1ASP14 US | 52 | 3.092 | 312606 | ------ |
| MS1BSP12 DS | 52 | 3.092 | 312606 | ------ |
| MS1BSP12 US | 52 | 3.092 | 312606 | ------ |
| MS1CSP15 | 52 | 3.092 | 312606 | ------ |
| MS1ASP14 DS | 52 | 3.092 | 312606 | ------ |
| MS1CSP13 | 52 | 3.092 | 312606 | ------ |
| MS1BSP17 | 52 | 3.092 | 312606 | ------ |
| MS1CSP12 DS | 52 | 3.092 | 312606 | ------ |
| MS1BSP19 DS | 52 | 3.092 | 312606 | ------ |
| MS7BSP05 DS | 52 | 3.092 | 312606 | ------ |
| MS1CSP17 | 52 | 3.092 | 312606 | ------ |
| MS7CSP05 DS | 52 | 3.092 | 312606 | ------ |
| MS1ASP17 | 52 | 3.092 | 312606 | ------ |
| MS1CSP12 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP15 | 52 | 3.092 | 312606 | ------ |
| MS7BSP05 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP14 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP17 | 52 | 3.092 | 312606 | ------ |
| MS1CSP19 DS | 52 | 3.092 | 312606 | ------ |
| MS1ASP19 US | 52 | 3.092 | 312606 | ------ |
| MS1ASP19 DS | 52 | 3.092 | 312606 | ------ |
| MS7CSP05 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP13 DS | 52 | 3.092 | 312606 | ------ |
| MS1ASP13 US | 52 | 3.092 | 312606 | ------ |
| MS1ASP15 | 52 | 3.092 | 312606 | ------ |
| MS1BSP13 | 52 | 3.092 | 312606 | ------ |
| MS1DSP19 DS | 52 | 3.092 | 312606 | ------ |
| MS1CSP14 | 52 | 3.092 | 312606 | ------ |
| MS1BSP19 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP13 US | 52 | 3.092 | 312606 | ------ |
| MS1CSP19 US | 52 | 3.092 | 312606 | ------ |
| MS1DSP14 DS | 52 | 3.092 | 312606 | ------ |
| MS1DSP19 US | 52 | 3.092 | 312606 | ------ |
| MS1BSP14 | 52 | 3.092 | 312606 | ------ |
| MS7CSP03 | 51 | 2.721 | 383883 | ------ |
| MS7DSP05 US | 51 | 2.721 | 383883 | ------ |
| MS7ASP05 US | 51 | 2.721 | 383883 | ------ |
| MS7BSP03 | 51 | 2.721 | 383883 | ------ |
| MS7ASP05 DS | 51 | 2.721 | 383883 | ------ |
| MS7DSP03 | 51 | 2.721 | 383883 | ------ |
| MS7BSP09 | 51 | 2.721 | 383883 | ------ |
| MS7CSP09 | 51 | 2.721 | 383883 | ------ |
| MS7DSP05 DS | 51 | 2.721 | 383883 | ------ |
| MS7ASP03 | 51 | 2.721 | 383883 | ------ |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | |
|---|---|---|---|---|
| MS1DSP12 DS | 58 | 2.177 | ------ | 416019 |
| MS1DSP21 DS | 52 | 2.704 | 422431 | ------ |
| MS1BSP21 US | 52 | 2.704 | 422431 | ------ |
| MS1ASP21 DS | 52 | 2.704 | 422431 | ------ |
| MS1CSP21 DS | 52 | 2.704 | 422431 | ------ |
| MS1DSP21 US | 52 | 2.704 | 422431 | ------ |
| MS1CSP21 US | 52 | 2.704 | 422431 | ------ |
| MS1ASP21 US | 52 | 2.704 | 422431 | ------ |
| MS1BEL13 | 1 | 2.677 | 428784 | ------ |
| MS1AEL13 | 1 | 2.677 | 428784 | ------ |
| MS1DEL14 | 1 | 2.677 | 428784 | ------ |
| MS1DEL13 | 1 | 2.677 | 428784 | ------ |
| MS1BEL13 | 1 | 2.677 | 428784 | ------ |
| MS1BEL14 | 1 | 2.677 | 428784 | ------ |
| MS1CEL14 | 1 | 2.677 | 428784 | ------ |
| MS1AEL14 | 1 | 2.677 | 428784 | ------ |
| MS1BSP22 US | 51 | 2.380 | 508685 | ------ |
| MS1BSP23 DS | 51 | 2.380 | 508685 | ------ |
| MS7ASP09 | 56 | 2.139 | ------ | 473077 |
| MS1ASP22 DS | 51 | 2.380 | 508685 | ------ |
| MS1ASP22 US | 51 | 2.380 | 508685 | ------ |
| MS1CSP22 US | 51 | 2.380 | 508685 | ------ |
| MS1DSP22 US | 51 | 2.380 | 508685 | ------ |
| MS1DSP23 DS | 51 | 2.380 | 508685 | ------ |
| MS1CSP22 DS | 51 | 2.380 | 508685 | ------ |
| MS1DSP22 DS | 51 | 2.380 | 508685 | ------ |
| MS1CSP23 DS | 51 | 2.380 | 508685 | ------ |
| MS1BSP23 US | 51 | 2.380 | 508685 | ------ |
| MS1CSP23 US | 51 | 2.380 | 508685 | ------ |
| MS1DSP23 US | 51 | 2.380 | 508685 | ------ |
| MS1ASP23 US | 51 | 2.380 | 508685 | ------ |
| MS1BSP22 DS | 51 | 2.380 | 508685 | ------ |
| MS1ASP12 DS | 58 | 2.177 | 532305 | ------ |
| MS7CSP10 US | 58 | 2.177 | 532305 | ------ |
| MS7ASP11 DS | 58 | 2.177 | 532305 | ------ |
| MS7BSP10 US | 58 | 2.177 | 532305 | ------ |
| MS7ASP11 US | 58 | 2.177 | 532305 | ------ |
| MS1BSP11 US | 58 | 2.177 | 532305 | ------ |
| MS1CSP11 DS | 58 | 2.177 | 532305 | ------ |
| MS7DSP11 US | 58 | 2.177 | 532305 | ------ |
| MS7CSP10 DS | 58 | 2.177 | 532305 | ------ |
| MS1CSP11 US | 58 | 2.177 | 532305 | ------ |
| MS7BSP10 DS | 58 | 2.177 | 532305 | ------ |
| MS1ASP12 US | 58 | 2.177 | 532305 | ------ |
| MS7DSP11 DS | 58 | 2.177 | 532305 | ------ |
| MS1BSP11 DS | 58 | 2.177 | 532305 | ------ |
| MS1DSP12 US | 58 | 2.177 | 532305 | ------ |
| MS7CSP07 | 56 | 2.139 | 545399 | ------ |
| MS7DSP09 | 56 | 2.139 | 545399 | ------ |
| MS7BSP07 | 56 | 2.139 | 545399 | ------ |
| MS1DSP20 | 58 | 1.904 | 688291 | ------ |
| MS1ASP20 | 58 | 1.904 | 688291 | ------ |
| MS1BSP20 | 58 | 1.904 | 688291 | ------ |
| MS1CSP20 | 58 | 1.904 | 688291 | ------ |
| MS1CSP16 | 9 | 1.432 | 918655 | ------ |
| MS7DSP07 | 9 | 1.432 | 918655 | ------ |
| MS1BSP16 | 9 | 1.432 | 918655 | ------ |
| MS1CSP18 | 9 | 1.432 | 918655 | ------ |
| MS1DSP16 | 9 | 1.432 | 918655 | ------ |
| MS7ASP04 | 9 | 1.432 | 918655 | ------ |
| MS7CSP04 | 9 | 1.432 | 918655 | ------ |
| MS1DSP18 | 9 | 1.432 | 918655 | ------ |
| MS1ASP16 | 9 | 1.432 | 918655 | ------ |
| MS7ASP07 | 9 | 1.432 | 918655 | ------ |
| MS7DSP04 | 9 | 1.432 | 918655 | ------ |
| MS1ASP18 | 9 | 1.432 | 918655 | ------ |
| MS7BSP04 | 9 | 1.432 | 918655 | ------ |
| MS1BSP18 | 9 | 1.432 | 918655 | ------ |
| MS1ASP23 DS | 9 | 1.174 | 1246356 | ------ |
| MS7AFE01 | 6 | 0.031 | 30037228 | ------ |
| MS7CFE01 | 6 | 0.031 | 30037228 | ------ |
| MS7BFE01 | 6 | 0.031 | 30037228 | ------ |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 13-SEP-2006 Time: 16:11:16
Analysis Date: 13-SEP-2006 Time: 15:51:16
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: Main Steam 2006
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 23.841

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 074-18"-MS-01A, No Sorting. | | | | | | | |
| MS1ASP12 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1ASP12 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1AEL07 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1ASP13 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1ASP13 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1AEL08 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1ASP14 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| ===>Grouped by Line: 074-18"-MS-07A, No Sorting. | | | | | | | |
| RX NOZZLE N3A | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | 241618 |
| MS7ASP01 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | 241618 |
| MS7AEL01 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | 241618 |
| MS7ASP02 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | 241618 |
| MS7AEL02 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | 241618 |
| MS7ASP03 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7ASP04 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7AEL03 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | 241618 |
| MS7ASP05 US | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7ASP05 DS | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7AEL04 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7ASP06 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7ASP07 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7AEL05 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7ASP08 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7AFE01 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | 241618 |
| MS7ASP09 | 0.938 | 0.859 | 0.726 | 0.726 | ------ | 473077 | 241618 |
| MS7AEL06 | 0.938 | 0.898 | 0.726 | 0.726 | ------ | 287886 | 241618 |
| MS7ASP10 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7AVA01 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |
| MS7ASP11 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7ASP11 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7AVA02 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |
| ===>Grouped by Line: 075-18"-MS-01A, No Sorting. | | | | | | | |
| MS1ASP14 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1AEL09 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1ASP15 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1ASP16 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1AEL10 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1ASP17 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1ASP18 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1AEL11 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1ASP19 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1ASP19 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1ATE01(U/S) | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | 241618 |
| MS1ATE01(D/S) | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | 241618 |
| MS1ASP19A | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | 241618 |
| MS1AVA03 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | 241618 |
| MS1AVA04 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | 241618 |
| MS1ASP20 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | 241618 |
| MS1AEL12 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | 241618 |
| MS1ASP21 US | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1ASP21 DS | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1AEL13 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1ASP22 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1ASP22 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1AEL14 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1ASP23 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1ASP23 DS | 1.031 | 0.999 | 0.806 | 0.806 | 1246356 | ------ | 241618 |
| MS1AEL15 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | ------ | 241618 |
| INLET HP TURB | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | 241618 |

===>Grouped by Line: 076-18" MS-01B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1BSP11 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1BSP11 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1BEL07 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1BSP12 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BSP12 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BEL08 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1BSP13 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |

===>Grouped by Line: 076-18"-MS-07B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3B | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | 241618 |
| MS7BSP01 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | 241618 |
| MS7BEL01 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | 241618 |
| MS7BSP02 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | 241618 |
| MS7BEL02 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | 241618 |
| MS7BSP03 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7BSP04 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7BEL03 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7BSP05 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7BSP05 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7BEL04 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7BSP06 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7BFE01 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | 241618 |
| MS7BSP07 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | 241618 |
| MS7BEL05 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7BSP08 US | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7BSP08 DS | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7BEL06 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | 241618 |
| MS7BSP09 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7BVA01 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |
| MS7BSP10 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7BSP10 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7BVA02 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |

===>Grouped by Line: 077-18"-MS-01B, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1BSP14 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BEL09 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1BSP15 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BSP16 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1BEL10 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1BSP17 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BSP18 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1BEL11 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1BSP19 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BSP19 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1BTE01(U/S) | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | 241618 |
| MS1BTE01(D/S) | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | 241618 |
| MS1BSP19A | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | 241618 |
| MS1BVA03 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | 241618 |
| MS1BVA04 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | 241618 |
| MS1BSP20 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | 241618 |
| MS1BEL12 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | 241618 |
| MS1BSP21 US | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1BSP21 DS | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1BEL13 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1BSP22 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1BSP22 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1BEL14 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1BSP23 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1BSP23 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| INLET HP TURB | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | 241618 |

===>Grouped by Line: 078-18"-MS-01C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1CSP11 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1CSP11 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1CEL07 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1CSP12 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CSP12 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CEL08 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1CSP13 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |

===>Grouped by Line: 078-18"-MS-07C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3C | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | 241618 |
| MS7CSP01 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | 241618 |
| MS7CEL01 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | 241618 |
| MS7CSP02 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | 241618 |
| MS7CEL02 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | 241618 |
| MS7CSP03 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7CSP04 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7CEL03 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7CSP05 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7CSP05 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS7CEL04 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7CSP06 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7CFE01 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | 241618 |
| MS7CSP07 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | 241618 |
| MS7CEL05 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7CSP08 US | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7CSP08 DS | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7CEL06 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | 241618 |
| MS7CSP09 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7CVA01 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |
| MS7CSP10 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7CSP10 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7CVA02 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |

===>Grouped by Line: 079-18"-MS-01C, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1CSP14 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CEL09 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1CSP15 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CSP16 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1CEL10 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1CSP17 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CSP18 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1CEL11 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1CSP19 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CSP19 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1CTE01(U/S) | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | 241618 |
| MS1CTE01(D/S) | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | 241618 |
| MS1CSP19A | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | 241618 |
| MS1CVA03 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | 241618 |
| MS1CVA04 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | 241618 |
| MS1CSP20 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | 241618 |
| MS1CEL12 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | 241618 |
| MS1CSP21 US | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1CSP21 DS | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1BEL13 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1CSP22 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1CSP22 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1CEL14 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1CSP23 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1CSP23 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| INLET HP TURB | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | 241618 |

===>Grouped by Line: 080-18"-MS-01D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP12 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS1DSP12 DS | 0.938 | 0.845 | 0.726 | 0.726 | ------ | 416019 | 241618 |
| MS1DEL07 | 0.938 | 0.967 | 0.726 | 0.726 | ------ | 403549 | 241618 |
| MS1DSP13 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DSP13 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DEL08 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS1DSP14 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |

===>Grouped by Line: 080-18"-MS-07D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RX NOZZLE N3D | 0.938 | 0.733 | 0.726 | 0.726 | 7710 | ------ | 241618 |
| MS7DSP01 | 0.938 | 0.791 | 0.726 | 0.726 | 92438 | ------ | 241618 |
| MS7DEL01 | 0.938 | 0.815 | 0.726 | 0.726 | 153769 | ------ | 241618 |
| MS7DSP02 | 0.938 | 0.836 | 0.726 | 0.726 | 225517 | ------ | 241618 |
| MS7DEL02 | 0.938 | 0.822 | 0.726 | 0.726 | 175822 | ------ | 241618 |
| MS7DSP03 | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7DSP04 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7DEL03 | 0.938 | 0.830 | 0.726 | 0.726 | 204277 | ------ | 241618 |
| MS7DSP05 US | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7DSP05 DS | 0.938 | 0.863 | 0.726 | 0.726 | 383883 | ------ | 241618 |
| MS7DEL04 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7DSP06 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7DSP07 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS7DEL05 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7DSP08 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS7DFE01 | 0.938 | 0.937 | 0.814 | 0.814 | 30037228 | ------ | 241618 |
| MS7DSP09 | 0.938 | 0.879 | 0.726 | 0.726 | 545399 | ------ | 241618 |
| MS7DEL06 | 0.938 | 0.812 | 0.726 | 0.726 | 144749 | ------ | 241618 |
| MS7DSP10 | 0.938 | 0.807 | 0.726 | 0.726 | 130227 | ------ | 241618 |
| MS7DVA01 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |
| MS7DSP11 US | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7DSP11 DS | 0.938 | 0.878 | 0.726 | 0.726 | 532305 | ------ | 241618 |
| MS7DVA02 | 0.938 | 0.788 | 0.776 | 0.776 | 16821 | ------ | 241618 |

===>Grouped by Line: 081-18"-MS-01D, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP14 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DEL09 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1DSP15 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DSP16 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1DEL10 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS1DSP17 | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DSP18 | 0.938 | 0.899 | 0.726 | 0.726 | 918655 | ------ | 241618 |
| MS1DEL11 | 0.938 | 0.840 | 0.726 | 0.726 | 245599 | ------ | 241618 |
| MS1DSP19 US | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DSP19 DS | 0.938 | 0.853 | 0.726 | 0.726 | 312606 | ------ | 241618 |
| MS1DTE01(U/S) | 0.938 | 0.836 | 0.726 | 0.726 | 225488 | ------ | 241618 |
| MS1DTE01(D/S) | 0.938 | 0.848 | 0.726 | 0.726 | 284860 | ------ | 241618 |
| MS1DSP19A | 0.938 | 0.837 | 0.726 | 0.726 | 231432 | ------ | 241618 |
| MS1DVA03 | 0.938 | 0.836 | 0.776 | 0.776 | 122646 | ------ | 241618 |
| MS1DVA04 | 1.031 | 0.900 | 0.862 | 0.862 | 60263 | ------ | 241618 |
| MS1DSP20 | 1.031 | 0.978 | 0.806 | 0.806 | 688291 | ------ | 241618 |
| MS1DEL12 | 1.031 | 0.945 | 0.806 | 0.806 | 341346 | ------ | 241618 |
| MS1DSP21 US | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1DSP21 DS | 1.031 | 0.956 | 0.806 | 0.806 | 422431 | ------ | 241618 |
| MS1DEL13 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1DSP22 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1DSP22 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1DEL14 | 1.031 | 0.957 | 0.806 | 0.806 | 428784 | ------ | 241618 |
| MS1DSP23 US | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1DSP23 DS | 1.031 | 0.965 | 0.806 | 0.806 | 508685 | ------ | 241618 |
| MS1DEL15 | 1.031 | 0.921 | 0.806 | 0.806 | 219306 | ------ | 241618 |
| INLET HP TURB | 1.031 | 0.912 | 0.806 | 0.806 | 185233 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

Flow Accelerated Corrosion (FAC)

Preferences Window Help

## Wear Rate Analysis Run Definition

Run Name: Cond2006 E4to E3

Run Title: Condensate Htrs E4A,B to E3A,B

Ending Period: CYCLE 25

Total Oper. Hrs.: 241618.44

Duty Factor: 1.000

Analysis Options
- Ignore NFA Results
- NFA Results 1st Priority
- User Input 1st Priority

Do Not Use Measured Wear

Database Lines
- 001-16"-FDW-01
- 002-16"-FDW-02
- 003-16"-FDW-03
- 004-24"-FDW-01
- 005-18"-FDW-07
- 006-18"-FDW-07
- 007-18"-FDW-12
- 008-16"-FDW-14

Add > >>

Remove < <<

Lines to Analyze
- 032-20"-C-27
- 033-20"-C-28

Run Definitions
- 36" MS Inlet piping
- 3rd Pt Extract Steam
- 3rd Pt Heater Drain
- 3rd Pt High Level
- 4th Pt Extract Steam
- 4th Pt Heater Drain
- 4th Pt High Level
- 5th Pt Extract Steam
- 5th Pt Heater Drains
- Cond LP Htr Bypass
- Cond Minimum Flow
- Cond2006 E3 to 3 FWP
- Cond2006 E4 to E3
- Condensate
- FDW 2006 E1s to Rx
- FDW 2006 Hdr to E2s
- FDW06 2 P1s to Hdr.
- FDW06 3-P1s to Hdr
- FDW2006 E2s to E1s

< Prev | Next > | Add | Reset | Save

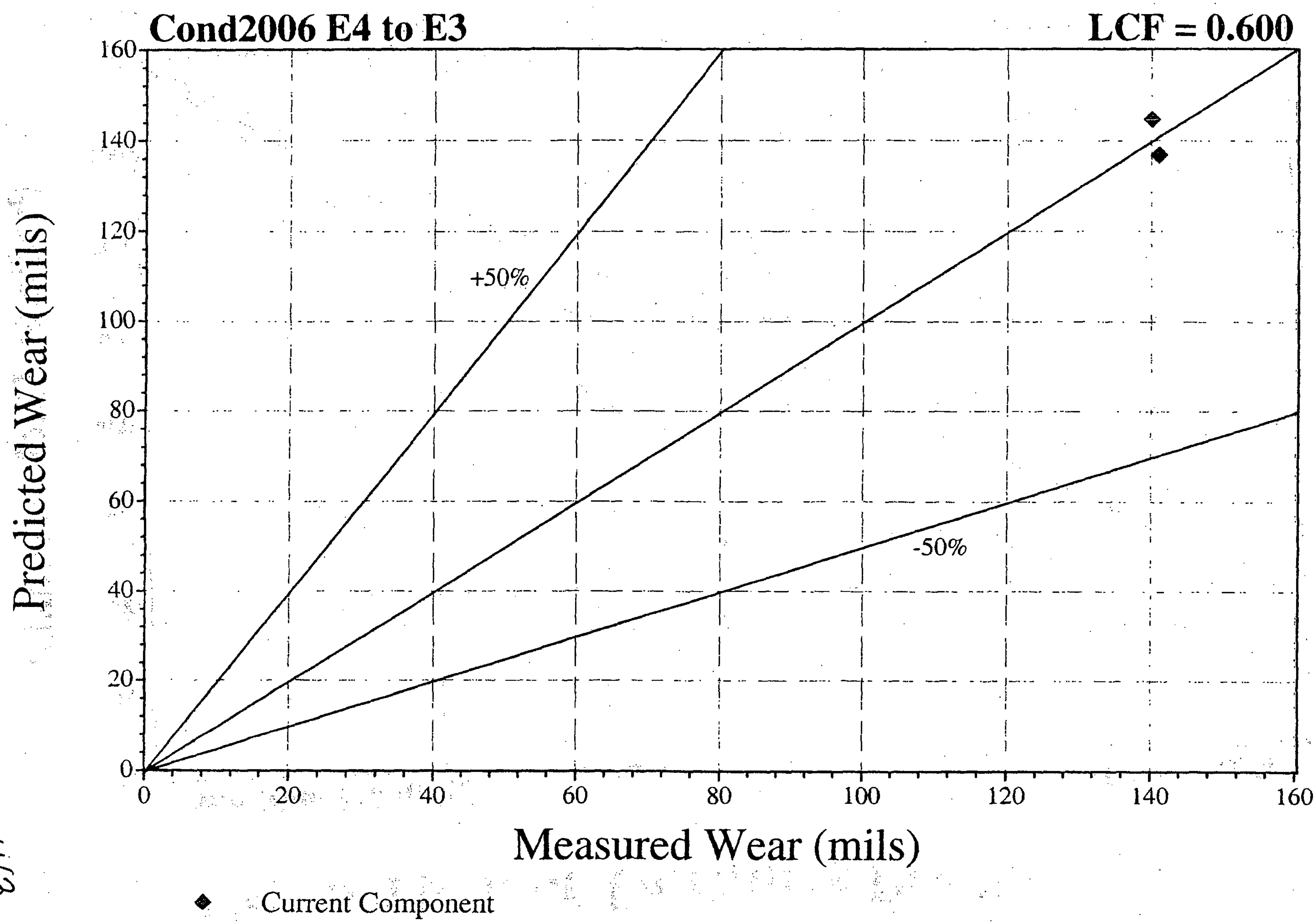
Copy | Delete | Print... | Help | Done

Advanced Run Def...

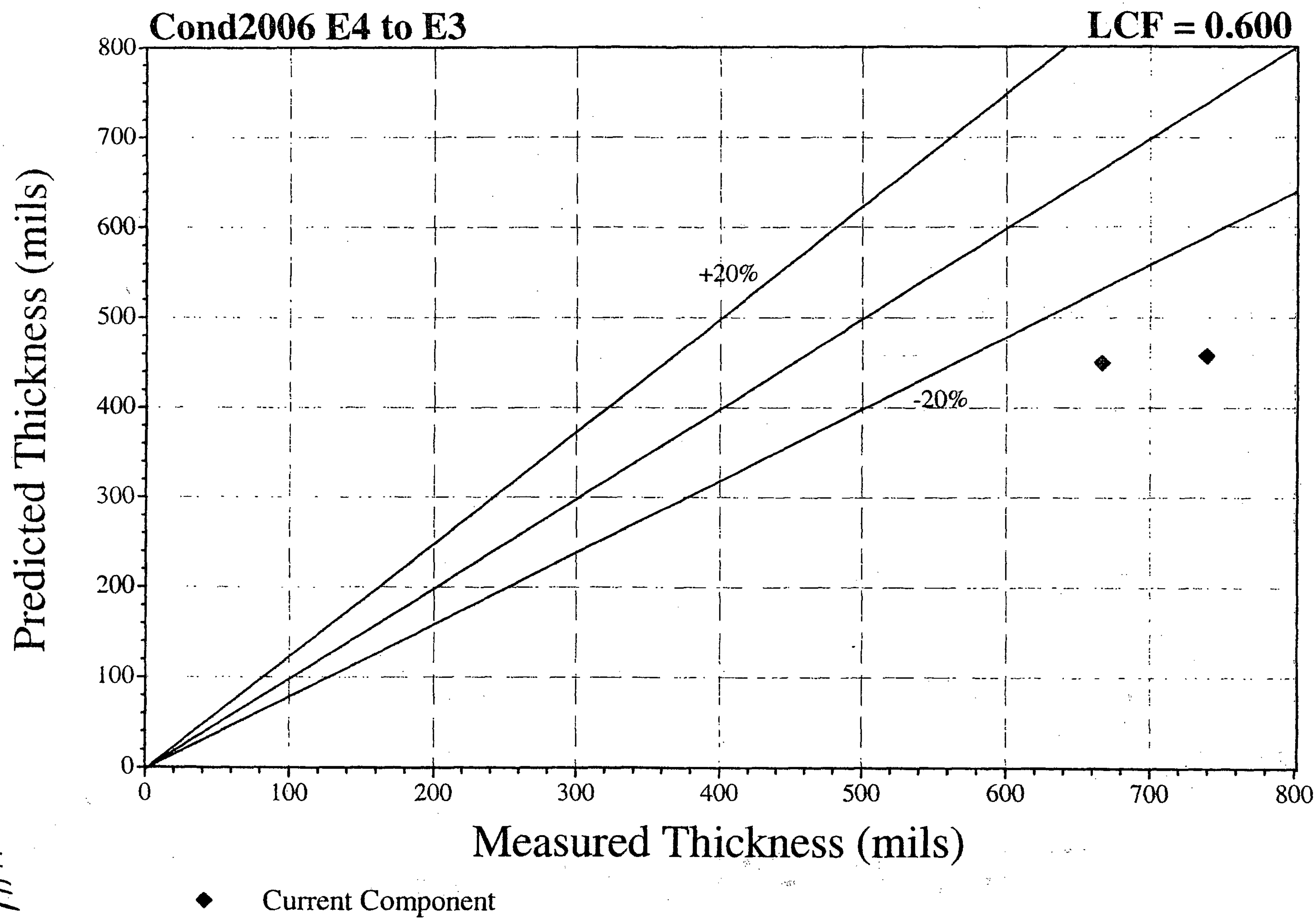
List of Defined Wear Rate Runs

Start | EPRI CHECWOR... | Flow Accelera... SUPERVISOR VY Desktop 8:36 AM

# Comparison of Wear Predictions



# Comparison of Thickness Predictions




144

Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006  Time: 08:32:16
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006  Time: 08:29:41
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
Db Name: VY

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: Cond1606 E4 to E3
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.566

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | In-Service Cmp. Method [3] | In-Service Cmp. Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Grouped by Line: 033-20"-C-27, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-4-1A | 31 | 7.134 | 6.571 | 0.812 | 0.727 | 0.394 | 0.394 | 444354 | ------ | --- | --- | --- | --- | 0.812 | -- | 137270 | ----- |
| CD27EL01 | 3 | 5.883 | 4.466 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP01 | 53 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL02 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP02 | 54 | 5.378 | 4.083 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL03 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP03 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP03A | 9 | 1.888 | 1.433 | 0.594 | 0.542 | 0.394 | 0.394 | 906060 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL04 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP04 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL05 | 1 | 5.546 | 4.211 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL06 | 3 | 5.883 | 4.466 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP05 | 53 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL07 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP06 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL08 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL09 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP07 | 54 | 5.378 | 4.083 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL10 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27SP08 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL11 | 1 | 5.546 | 4.211 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD27EL12 | 4 | 6.219 | 4.721 | 0.594 | 0.639 | 0.394 | 0.394 | ------ | 455148 | 144.5 | 140.0 | 144.5 | 140.0 | 0.666 | GW | 195618 | 195618 |
| CD27EL13 | 3 | 5.883 | 4.466 | 0.594 | 0.713 | 0.394 | 0.394 | ------ | 627208 | 136.7 | 141.0 | 136.7 | 141.0 | 0.739 | GW | 195618 | 195618 |
| INLET NOZZLE E-3-1A | 30 | 5.746 | 5.104 | 0.594 | 0.518 | 0.394 | 0.394 | 213519 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |
| ***Grouped by Line: 033-20"-C-28, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-4-1B | 31 | 7.134 | 6.571 | 0.812 | 0.727 | 0.394 | 0.394 | 444354 | ------ | --- | --- | --- | --- | 0.812 | -- | 137270 | ----- |
| CD28SP01 | 61 | 4.538 | 3.445 | 0.594 | 0.469 | 0.394 | 0.394 | 191034 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL01 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL02 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP02 | 54 | 5.378 | 4.083 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP02A | 9 | 1.888 | 1.433 | 0.594 | 0.542 | 0.394 | 0.394 | 906060 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL03 | 2 | 6.219 | 4.721 | 0.594 | 0.432 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL04 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP03 | 54 | 5.378 | 4.083 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL05 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP04 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL06 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP05 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL07 | 2 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28SP06 | 52 | 4.202 | 3.190 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL08 | 1 | 5.546 | 4.211 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL09 | 4 | 6.219 | 4.721 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD28EL10 | 3 | 5.883 | 4.466 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| INLET NOZZLE E-3-1B | 30 | 5.746 | 5.104 | 0.594 | 0.518 | 0.394 | 0.394 | 213519 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |

SCHEDULED FOR INSPECTION IN RFO26

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

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Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006 Time: 08:32:11
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006 Time: 08:29:41
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
Db Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: Cond2006 E4 to E3
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
NFA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.600

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Wear (mils) Prd.[1] | Meas. | In-Service Cmp. Tmeas (in)[3] | Method [2] | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | Tm | Incremental Wear(mils)[5] PRWEAR | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Grouped by Line: 032-20"-C-27, No Sorting. | | | | | | | | | | | |
| CD27EL12 | 144.5 | 140.0 | 144.5 | 140.0 | 0.666 | GW | 195618 | 449.5 | 666.0 | 27.0 | 195618 |
| CD27EL13 | 136.7 | 141.0 | 136.7 | 141.0 | 0.739 | GW | 195618 | 457.3 | 739.0 | 25.5 | 195618 |
| ***Grouped by Line: 033-20"-C-28, No Sorting. | | | | | | | | | | | |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW - Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm - Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

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Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:32:07
Analysis Date: 28-SEP-2006 Time: 08:29:41
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: Cond2006 E4 to E3
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NRA Data Option: Ignore NFA
Line Correction Factor: 0.600

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| CD28EL10 | 3 | 5.883 | 74624 | ------ |
| CD28EL06 | 2 | 6.219 | 53387 | ------ |
| CD27SP07 | 54 | 5.378 | 111457 | ------ |
| OUTLET NOZZLE E-4-1B | 31 | 7.134 | 444354 | ------ |
| OUTLET NOZZLE E-4-1A | 31 | 7.134 | 444354 | ------ |
| CD28EL04 | 4 | 6.219 | 53387 | ------ |
| CD28EL02 * | 4 | 6.219 | 53387 | ------ |
| CD28EL05 | 2 | 6.219 | 53387 | ------ |
| CD27EL12 | 4 | 6.219 | ------ | 455148 |
| CD27FL01 | 4 | 6.219 | 53387 | ------ |
| CD27EL03 | 2 | 6.219 | 53387 | ------ |
| CD27EL05 | 4 | 6.219 | 53387 | ------ |
| CD28EL07 | 2 | 6.219 | 53387 | ------ |
| CD27EL04 | 2 | 6.219 | 53387 | ------ |
| CD28EL03 | 2 | 6.219 | 53387 | ------ |
| CD27EL08 | 2 | 6.219 | 53387 | ------ |
| CD28EL01 | 4 | 6.219 | 53387 | ------ |
| CD28EL09 | 4 | 6.219 | 53387 | ------ |
| CD27EL07 | 2 | 6.219 | 53387 | ------ |
| CD27EL10 | 2 | 6.219 | 53387 | ------ |
| CD27EL01 | 3 | 5.883 | 74624 | ------ |
| CD27EL06 | 3 | 5.883 | 74624 | ------ |
| CD27EL13 | 3 | 5.883 | ------ | 627208 |
| CD27EL09 | 1 | 5.546 | 98435 | ------ |
| CD28EL08 * | 1 | 5.546 | 98435 | ------ |
| CD27EL11 | 1 | 5.546 | 98435 | ------ |
| CD28SP03 | 54 | 5.378 | 111457 | ------ |
| INLET NOZZLE E-3-1A | 30 | 5.746 | 213519 | ------ |
| INLET NOZZLE E-3-1B | 30 | 5.746 | 213519 | ------ |
| CD28SP02 | 54 | 5.378 | 111457 | ------ |
| CD27SP02 | 54 | 5.378 | 111457 | ------ |
| CD28SP01 | 61 | 4.538 | 191034 | ------ |
| CD28SP06 | 52 | 4.202 | 231778 | ------ |
| CD27SP01 | 53 | 4.202 | 231778 | ------ |
| CD27SP04 | 52 | 4.202 | 231778 | ------ |
| CD28SP04 | 52 | 4.202 | 231778 | ------ |
| CD27SP03 | 52 | 4.202 | 231778 | ------ |
| CD27SP05 | 53 | 4.202 | 231778 | ------ |
| CD28SP05 | 52 | 4.202 | 231778 | ------ |
| CD27SP06 | 52 | 4.202 | 231778 | ------ |
| CD27SP08 | 52 | 4.202 | 231778 | ------ |
| CD28SP02A | 9 | 1.888 | 906060 | ------ |
| CD27SP03A | 9 | 1.888 | 906060 | ------ |

* SCHEDULED FOR INSPECTION IN RFO26

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
Db Name: VY

Report Date: 28-SEP-2006 Time: 08:32:03
Analysis Date: 28-SEP-2006 Time: 08:29:41
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: Cnd2006 E4 to E5
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NFA Data Option: Ignore NFA
Line Correction Factor: 0.600

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Thickness (in) Init. | Prd.(1) | Thoop | Tcrit | Component Predicted(1) Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ***Grouped by Line: 032-20"-C-27, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-4-1A | 0.812 | 0.727 | 0.394 | 0.394 | 444354 | ------ | 104347 |
| CD27EL01 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | 241618 |
| CD27SP01 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27EL02 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP02 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | 241618 |
| CD27EL03 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP03 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27SP03A | 0.594 | 0.542 | 0.394 | 0.394 | 906060 | ------ | 241618 |
| CD27EL04 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP04 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27EL05 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | 241618 |
| CD27EL06 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | 241618 |
| CD27SP05 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27EL07 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP06 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27EL08 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27EL09 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP07 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | 241618 |
| CD27EL10 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD27SP08 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD27EL11 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | 241618 |
| CD27EL12 | 0.594 | 0.639 | 0.394 | 0.394 | ------ | 455148 | 241618 |
| CD27EL13 | 0.594 | 0.713 | 0.394 | 0.394 | ------ | 627208 | 241618 |
| INLET NOZZLE E-3 1A | 0.594 | 0.518 | 0.394 | 0.394 | 213519 | ------ | 115707 |
| ***Grouped by Line: 033-20"-C-28, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-4-1B | 0.812 | 0.727 | 0.394 | 0.394 | 444354 | ------ | 104347 |
| CD28SP01 | 0.594 | 0.469 | 0.394 | 0.394 | 191034 | ------ | 241618 |
| CD28EL01 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28EL02 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28SP02 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | 241618 |
| CD28SP02A | 0.594 | 0.542 | 0.394 | 0.394 | 906060 | ------ | 241618 |
| CD28EL03 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28EL04 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28SP03 | 0.594 | 0.446 | 0.394 | 0.394 | 111457 | ------ | 241618 |
| CD28EL05 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28SP04 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD28EL06 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28SP05 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD28EL07 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28SP06 | 0.594 | 0.478 | 0.394 | 0.394 | 231778 | ------ | 241618 |
| CD28EL08 | 0.594 | 0.441 | 0.394 | 0.394 | 98435 | ------ | 241618 |
| CD28EL09 | 0.594 | 0.422 | 0.394 | 0.394 | 53387 | ------ | 241618 |
| CD28EL10 | 0.594 | 0.432 | 0.394 | 0.394 | 74624 | ------ | 241618 |
| INLET NOZZLE E-3 1B | 0.594 | 0.518 | 0.394 | 0.394 | 213519 | ------ | 115707 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

SCHEDULED FOR INSPECTION IN RFO26

Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006 Time: 08:31:59
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006 Time: 08:29:41
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: Cond2006 E4 to E3
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
NRA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.600

| Component Name | Geom. Code | Material No. | Cr. (%) | Cu. (%) | Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| === Grouped by Line: 032-20"-C-27, No Sorting. | | | | | | | | | | |
| OUTLET NOZZLE E-4-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 137270 | | --- |
| CD27EL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP01 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP02 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP03 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP03A | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP04 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL05 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL06 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP05 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL08 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP07 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL10 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27SP08 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL11 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD27EL12 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 140 |
| CD27EL13 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 141 |
| INLET NOZZLE E-3-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |
| === Grouped by Line: 033-20"-C-28, No Sorting. | | | | | | | | | | |
| OUTLET NOZZLE E-4-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 137270 | | --- |
| CD28SP01 | 61 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP02 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP02A | 9 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL03 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL04 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP03 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL05 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP04 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL06 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP05 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL07 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28SP06 | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL08 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL09 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD28EL10 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| INLET NOZZLE E-3-1B | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |

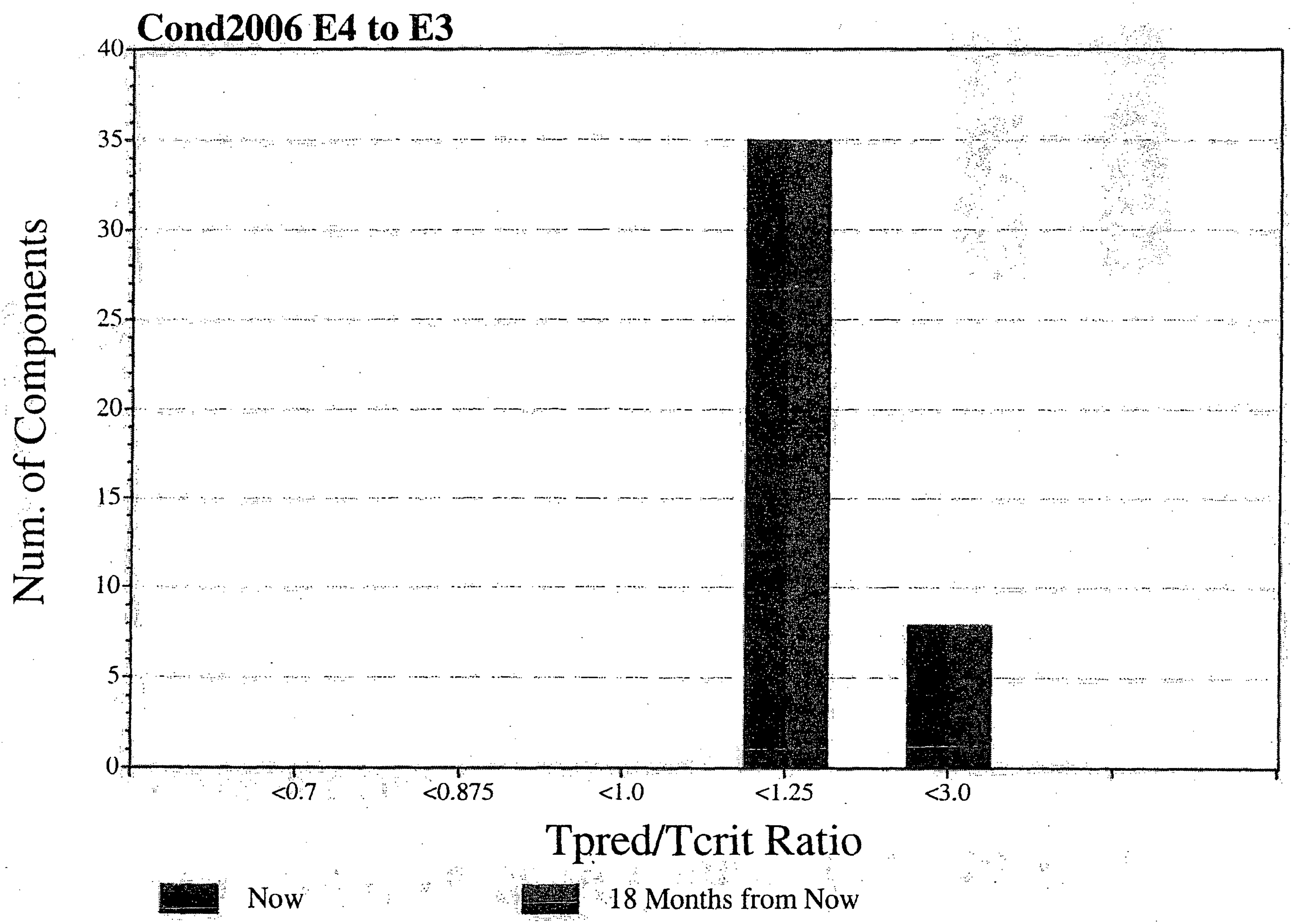
Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 08:31:50
Plant: Vermont Yankee 'Analysis Date: 28-SEP-2006 Time: 08:29:41
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: Trend_006 S4 to B3
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
NFA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.600

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ***>Grouped by Line: 032-20"-C-27, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-4-1A | 31 | 7.134 | 6.571 | 229.0 | 8.138 | 0.000 | 20.000 |
| CD27EL01 | 3 | 5.883 | 4.466 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP01 | 53 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL02 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP02 | 54 | 5.378 | 4.083 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL03 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP03 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP03A | 9 | 1.888 | 1.433 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL04 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP04 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL05 | 1 | 5.546 | 4.211 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL06 | 3 | 5.883 | 4.466 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP05 | 53 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL07 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP06 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL08 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL09 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP07 | 54 | 5.378 | 4.083 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL10 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27SP08 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL11 | 1 | 5.546 | 4.211 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL12 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD27EL13 | 3 | 5.883 | 4.466 | 229.0 | 7.765 | 0.000 | 20.000 |
| INLET NOZZLE E-3-1A | 30 | 5.746 | 5.104 | 229.0 | 7.765 | 0.000 | 20.000 |
| ***>Grouped by Line: 033-20"-C-28, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-4-1B | 31 | 7.134 | 6.571 | 229.0 | 8.138 | 0.000 | 20.000 |
| CD28SP01 | 61 | 4.538 | 3.445 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL01 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL02 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP02 | 54 | 5.378 | 4.083 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP02A | 9 | 1.888 | 1.433 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL03 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL04 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP03 | 54 | 5.378 | 4.083 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL05 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP04 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL06 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP05 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL07 | 2 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28SP06 | 52 | 4.202 | 3.190 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL08 | 1 | 5.546 | 4.211 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL09 | 4 | 6.219 | 4.721 | 229.0 | 7.765 | 0.000 | 20.000 |
| CD28EL10 | 3 | 5.883 | 4.466 | 229.0 | 7.765 | 0.000 | 20.000 |
| INLET NOZZLE E-3-1B | 30 | 5.746 | 5.104 | 229.0 | 7.765 | 0.000 | 20.000 |

# Tpred/Tcrit Ratio Plot

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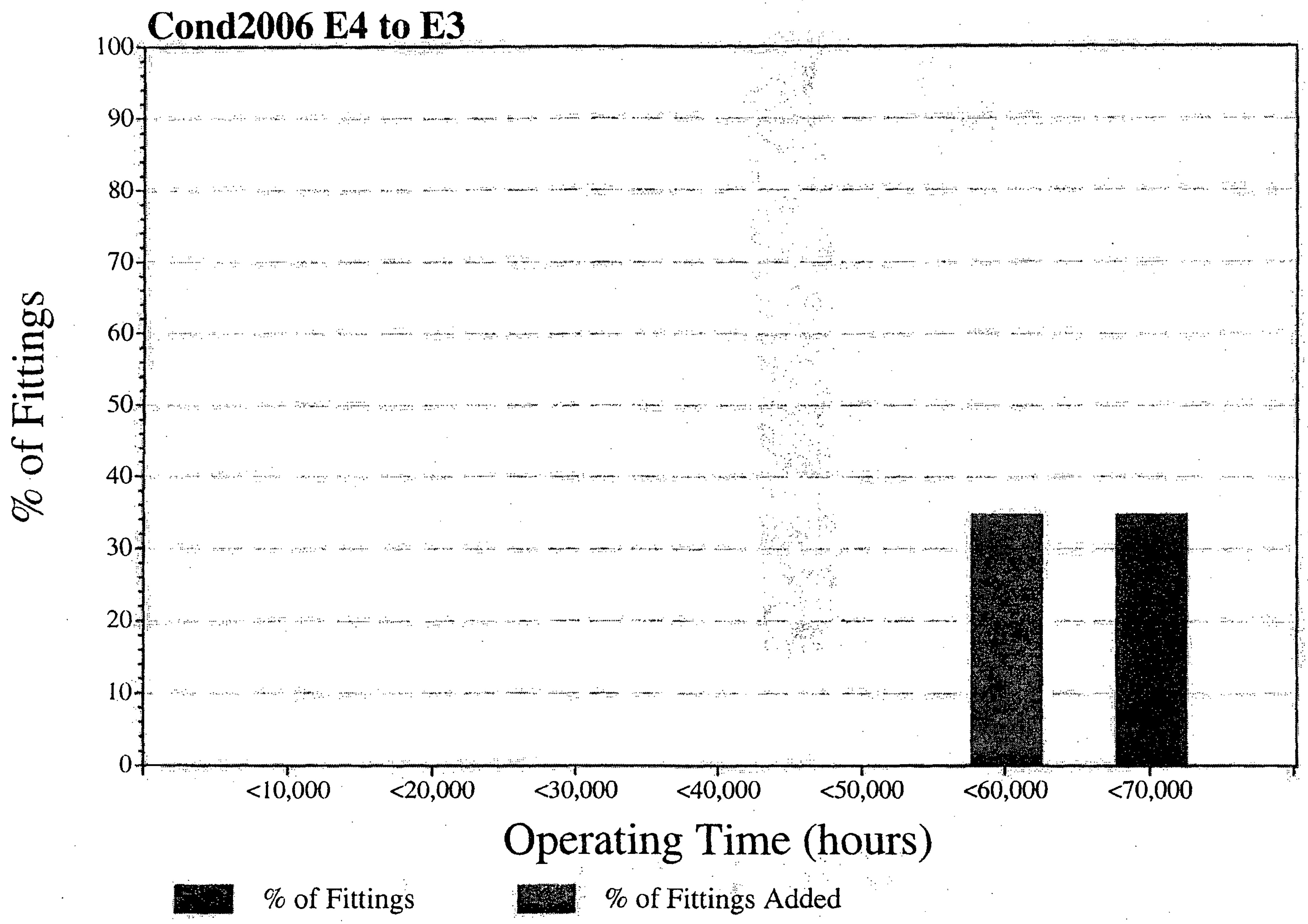
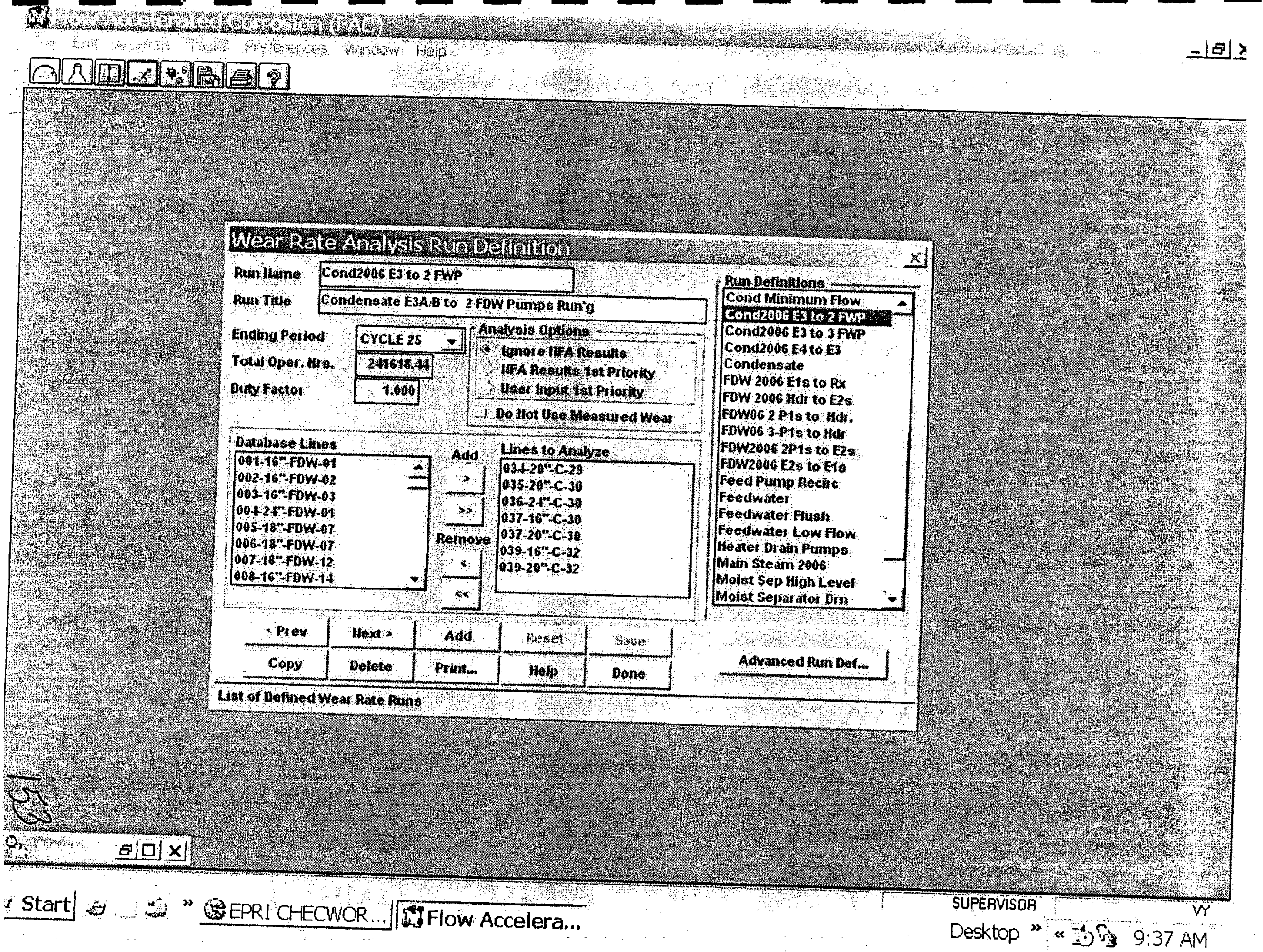
# Cumulative % of Comp. Time to Tcrit





Wear Rate Analysis Run Definition
Run Name
Cond2006 E3 to 2 FWP
Run Title
Condensate E3A/B to 2 FDW Pumps Run'g
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore IIFA Results
IIFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
Add
>
>>
Remove
<
<<
Lines to Analyze
034-20"-C-29
035-20"-C-30
036-24"-C-30
037-16"-C-30
037-20"-C-30
039-16"-C-32
039-20"-C-32
Run Definitions
Cond Minimum Flow
Cond2006 E3 to 2 FWP
Cond2006 E3 to 3 FWP
Cond2006 E4 to E3
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 2P1s to E2s
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
Moist Sep High Level
Moist Separator Drn
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
9:37 AM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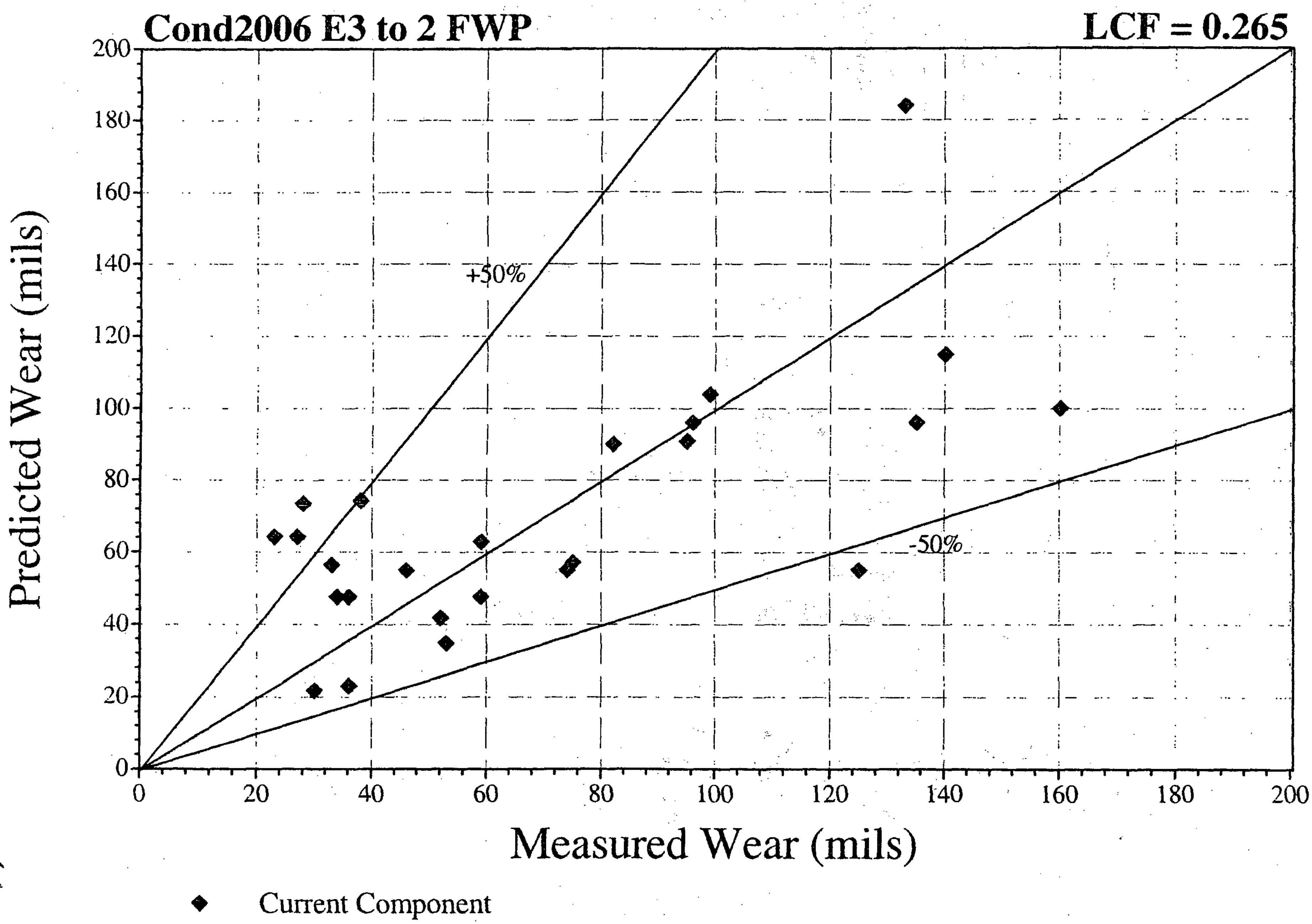
# Comparison of Wear Predictions

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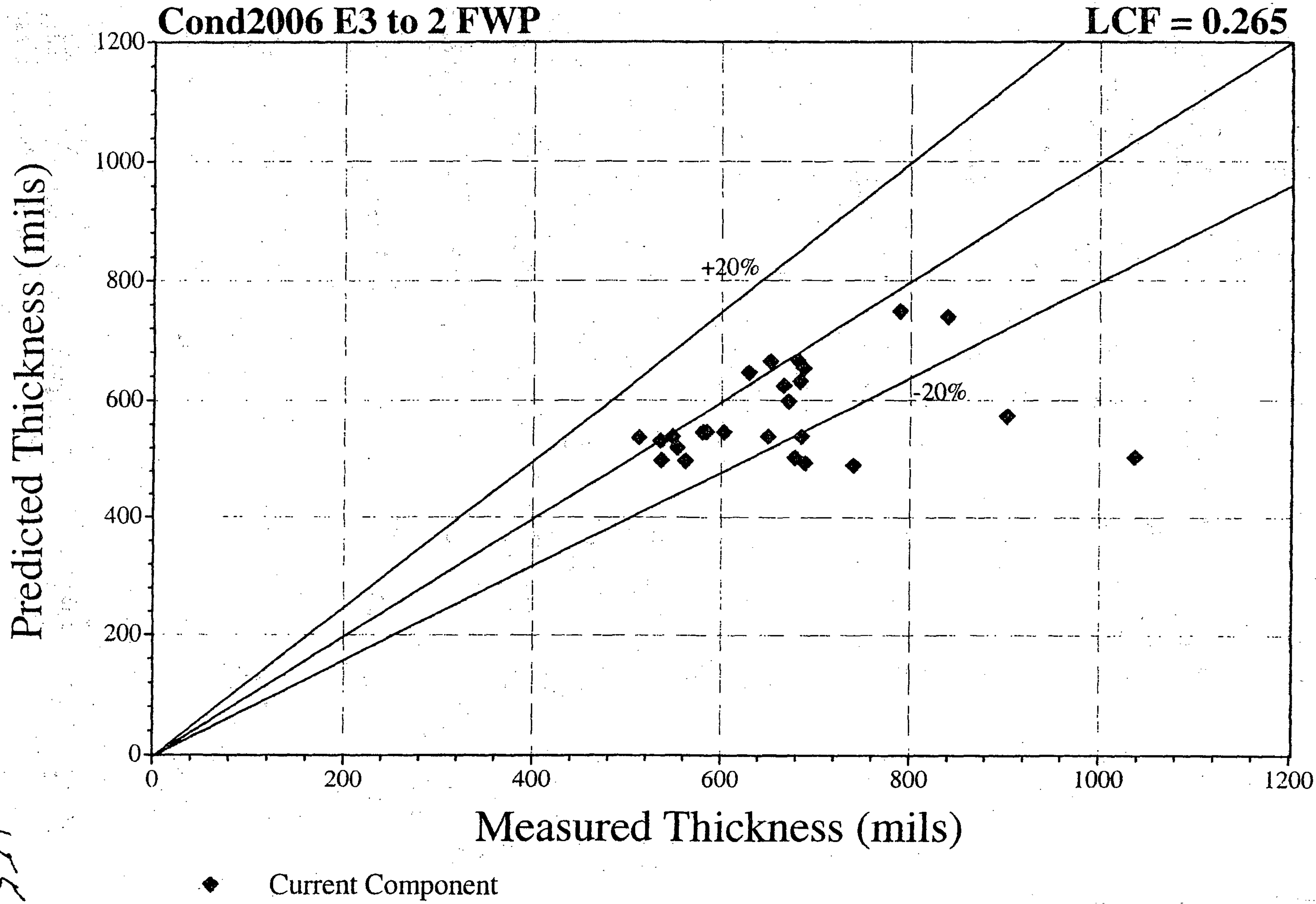
# Comparison of Thickness Predictions

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Company: Vermont Yankee Nuclear Power Corporation  Report  Date: 28-SEP-2006  Time: 09:29:20
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006  Time: 09:09:53
Unit:  CHECWORKS FAC Version 1.0F (Build 53)
DB Name: VY

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.265

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.(1) | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict(1) Time to Tcrit (hrs) Non-Insp. | Component Predict(1) Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.(2) | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.(2) | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas. (in)(4) | Method (3) | Time (hrs)(4) | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-3-1A | 31 | 4.771 | 4.238 | 0.594 | 0.531 | 0.394 | 0.394 | 283788 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |
| CD29EL01 | 4 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29SP01 | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29VA01 | 22 | 5.513 | 4.185 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29EL02 | 4 | 4.131 | 3.136 | 0.594 | 0.473 | 0.394 | 0.394 | 222443 | ------ | --- | --- | --- | --- | 0.526 | MT | 114614 | ----- |
| CD29SP02 US | 54 | 3.572 | 2.712 | 0.594 | 0.529 | 0.394 | 0.394 | ------ | 437223 | 47.6 | 34.0 | 47.6 | 34.0 | 0.580 | MT | 102975 | 102975 |
| CD29SP02 DS | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29EL03 | 4 | 4.131 | 3.136 | 0.594 | 0.626 | 0.394 | 0.394 | ------ | 649218 | 55.0 | 125.0 | 55.0 | 125.0 | 0.685 | GW | 102975 | 102975 |
| CD29SP03 US | 54 | 3.572 | 2.712 | 0.594 | 0.533 | 0.394 | 0.394 | ------ | 450143 | 47.6 | 36.0 | 47.6 | 36.0 | 0.584 | GW | 102975 | 102975 |
| CD29SP03 DS | 54 | 3.572 | 2.712 | 0.594 | 0.552 | 0.394 | 0.394 | ------ | 511511 | 47.6 | 59.0 | 47.6 | 59.0 | 0.603 | GW | 102975 | 102975 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-3-1B | 31 | 4.771 | 4.238 | 0.594 | 0.531 | 0.394 | 0.394 | 283788 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |
| CD30EL01 | 4 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30VA01 | 22 | 5.513 | 4.185 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL02 | 4 | 4.131 | 3.136 | 0.594 | 0.544 | 0.394 | 0.394 | ------ | 420036 | 96.0 | 96.0 | 96.0 | 96.0 | 0.562 | GW | 195618 | 195618 |
| CD30EL03 | 4 | 4.131 | 3.136 | 0.594 | 0.518 | 0.394 | 0.394 | ------ | 347407 | 96.0 | 135.0 | 96.0 | 135.0 | 0.536 | GW | 195618 | 195618 |
| CD30SP01 US | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP01 DS | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL04 | 2 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP02 US | 52 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP02 DS | 52 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| CD30SP03DS | 9 | 0.898 | 0.682 | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 2283118 | 23.0 | 36.0 | 23.0 | 36.0 | 0.652 | MT | 218618 | 218618 |
| CD30RD01(L/E) | 18 | 2.450 | 1.860 | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30RD01(S/E) | 18 | 3.126 | 2.373 | 0.594 | 0.508 | 0.394 | 0.394 | 421103 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30TE01(U/S) | 15 | 2.450 | 1.860 | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE01(D/S) | 15 | 2.450 | 1.860 | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30SP03 | 65 | 1.634 | 1.240 | 0.688 | 0.643 | 0.472 | 0.472 | 1204399 | ------ | --- | --- | --- | --- | 0.686 | -- | 0 | ----- |
| CD30TE02(U/S) | 14 | 4.492 | 3.410 | 0.688 | 0.893 | 0.472 | 0.472 | ------ | 1080385 | 114.9 | 140.0 | 114.9 | 140.0 | 0.902 | MT | 218618 | 218618 |
| CD30TE02(D/S) | 14 | 7.191 | 5.459 | 0.688 | 1.023 | 0.472 | 0.472 | ------ | 882906 | 184.0 | 133.0 | 184.0 | 133.0 | 1.037 | GW | 218618 | 218618 |
| CD30TE02(BR.) | 14 | 3.907 | 2.966 | 0.594 | 0.682 | 0.394 | 0.394 | 851983 | ------ | --- | --- | --- | --- | 0.690 | GW | 218618 | ----- |
| CD30SP04 US | 64 | 1.634 | 1.240 | 0.688 | 0.626 | 0.472 | 0.472 | ------ | 1082898 | 41.8 | 52.0 | 41.8 | 52.0 | 0.629 | MT | 218618 | 218618 |
| CD30SP04 DS | 64 | 1.634 | 1.240 | 0.688 | 0.658 | 0.472 | 0.472 | ------ | 1308712 | 21.8 | 30.0 | 21.8 | 30.0 | 0.681 | MT | 102975 | 102975 |
| CD30TE03(U/S) | 12 | 3.349 | 2.542 | 0.688 | 0.874 | 0.472 | 0.472 | 1384564 | ------ | --- | --- | --- | --- | 0.922 | MT | 102975 | ----- |
| CD30TE03(D/S) | 12 | 5.347 | 4.059 | 0.688 | 0.883 | 0.472 | 0.472 | 885578 | ------ | --- | --- | --- | --- | 0.959 | MT | 102975 | ----- |
| CD30TE03(BR.) | 12 | 3.796 | 2.882 | 0.594 | 0.489 | 0.394 | 0.394 | 290627 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP05 US | 64 | 2.608 | 1.980 | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 784763 | 34.8 | 53.0 | 34.8 | 53.0 | 0.687 | GW | 102975 | 102975 |
| CD30SP05 DS | 64 | 2.608 | 1.980 | 0.688 | 0.616 | 0.472 | 0.472 | 635438 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30EL05 | 1 | 4.303 | 3.267 | 0.688 | 0.569 | 0.472 | 0.472 | 259732 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30SP06 | 51 | 2.869 | 2.178 | 0.688 | 0.660 | 0.472 | 0.472 | ------ | 755904 | 56.5 | 33.0 | 56.5 | 33.0 | 0.683 | GW | 160352 | 160352 |
| CD30EL06 | 3 | 4.564 | 3.465 | 0.688 | 0.635 | 0.472 | 0.472 | ------ | 411011 | 89.9 | 82.0 | 89.9 | 82.0 | 0.671 | MT | 160352 | 160352 |
| CD30SP07 | 53 | 3.260 | 2.475 | 0.688 | 0.640 | 0.472 | 0.472 | ------ | 594109 | 64.2 | 27.0 | 64.2 | 27.0 | 0.666 | MT | 160352 | 160352 |
| CD30TE04(U/S) | 14 | 7.172 | 5.445 | 0.688 | 0.490 | 0.472 | 0.472 | 28535 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE04(D.S) | 14 | 4.492 | 3.410 | 0.688 | 0.564 | 0.472 | 0.472 | 235433 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE04(BR.) | 14 | 3.907 | 2.966 | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD02(L/E) | 7 | 2.859 | 2.170 | 0.688 | 0.837 | 0.472 | 0.472 | 1473385 | ------ | --- | --- | --- | --- | 0.860 | MT | 160352 | ----- |
| CD30RD02(S/E) | 7 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.524 | PW | 160352 | ----- |
| ===>Grouped by Line: 037-16"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| CD30EL13 | 4 | 5.492 | 4.170 | 0.500 | 0.349 | 0.315 | 0.315 | 70500 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| INLET NOZZLE P-1-1A | 30 | 5.937 | 4.508 | 0.500 | 0.336 | 0.315 | 0.315 | 41343 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

157

[redacted]

===Grouped by Line: 037-20"-C-30, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD30SP08 US | 57 | 2.791 | 2.119 | 0.594 | 0.526 | 0.394 | 0.394 | ------ | 546937 | 55.0 | 46.0 | 55.0 | 46.0 | 0.548 | MT | 160352 | 160352 |
| CD30SP08 DS | 57 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL07 | 2 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30VA02 | 22 | 5.513 | 4.185 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP09 | 58 | 2.456 | 1.865 | 0.594 | 0.526 | 0.394 | 0.394 | 622747 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL08 | 3 | 3.907 | 2.966 | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL09 | 3 | 3.907 | 2.966 | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP10 | 55 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL10 | 4 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP11 | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30FE01 | 6 | 0.054 | 0.041 | 0.594 | 0.593 | 0.420 | 0.420 | 36983356 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30FE01A | 56 | 2.762 | 2.097 | 0.812 | 0.836 | 0.460 | 0.460 | ------ | 1571069 | 73.4 | 28.0 | 73.4 | 28.0 | 0.839 | MT | 230118 | 230118 |
| CD30EL11 | 3 | 3.907 | 2.966 | 0.594 | 0.736 | 0.394 | 0.394 | ------ | 1011135 | 103.9 | 99.0 | 103.9 | 99.0 | 0.740 | GW | 230118 | 230118 |
| CD30SP12 | 53 | 2.791 | 2.119 | 0.594 | 0.550 | 0.394 | 0.394 | ------ | 647083 | 74.2 | 38.0 | 74.2 | 38.0 | 0.553 | MT | 230118 | 230118 |
| CD30EL12 | 4 | 4.131 | 3.136 | 0.594 | 0.591 | 0.394 | 0.394 | ------ | 551448 | 55.0 | 74.0 | 55.0 | 74.0 | 0.650 | GW | 102975 | 102975 |
| CD30SP13 | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD03(L/E) | 17 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD03(S/E) | 17 | 2.672 | 2.028 | 0.500 | 0.426 | 0.315 | 0.315 | 480859 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| ===Grouped by Line: 039-16"-C-32, No Sorting. | | | | | | | | | | | | | | | | | |
| CD32EL06 | 4 | 5.492 | 4.170 | 0.500 | 0.349 | 0.315 | 0.315 | 70500 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| INLET NOZZLE P-1-1C | 30 | 5.937 | 4.508 | 0.500 | 0.336 | 0.315 | 0.315 | 41343 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| ===Grouped by Line: 039-20"-C-32, No Sorting. | | | | | | | | | | | | | | | | | |
| CD32SP05 | 51 | 2.456 | 1.865 | 0.594 | 0.530 | 0.394 | 0.394 | ------ | 640826 | 62.8 | 59.0 | 62.8 | 59.0 | 0.535 | MT | 218618 | 218618 |
| CD32SP04 | 64 | 2.233 | 1.695 | 0.594 | 0.508 | 0.394 | 0.394 | ------ | 588349 | 57.1 | 75.0 | 57.1 | 75.0 | 0.512 | MT | 218618 | 218618 |
| CD32EL02 | 3 | 3.907 | 2.966 | 0.594 | 0.681 | 0.394 | 0.394 | ------ | 849030 | 100.0 | 160.0 | 100.0 | 160.0 | 0.689 | GW | 218618 | 218618 |
| CD32VA01 | 22 | 5.513 | 4.185 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32EL03 | 4 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32SP01 | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32FE01 | 6 | 0.054 | 0.041 | 0.594 | 0.593 | 0.420 | 0.420 | 36983356 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32FE01A | 56 | 2.762 | 2.097 | 0.812 | 0.736 | 0.460 | 0.460 | ------ | 1151529 | 64.2 | 23.0 | 64.2 | 23.0 | 0.748 | PW | 195618 | 195618 |
| CD32EL04 | 3 | 3.907 | 2.966 | 0.594 | 0.661 | 0.394 | 0.394 | ------ | 789453 | 90.8 | 95.0 | 90.8 | 95.0 | 0.678 | GW | 195618 | 195618 |
| CD32SP02 | 53 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32EL05 | 4 | 4.131 | 3.136 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32SP03 | 54 | 3.572 | 2.712 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32RD01(L/E) | 17 | 2.791 | 2.119 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32RD01(S/E) | 17 | 2.672 | 2.028 | 0.500 | 0.426 | 0.315 | 0.315 | 480859 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
    MT = Tmeas is component minimum thickness.
    PW = Tmeas is Tinit - predicted wear.
    US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
    Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

15

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 09:39:02
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 09:09:53
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Inspection History Report ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.265

===>Grouped by Line: 034-20"-C-29, No Sorting.

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET NOZZLE E-3-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |
| CD29EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29SP01 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| CD29EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD29SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 34 |
| CD29SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 125 |
| CD29SP03 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 36 |
| CD29SP03 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 59 |

===>Grouped by Line: 035-20"-C-30, No Sorting.

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| OUTLET NOZZLE E-3-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |
| CD30EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| CD30EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 96 |
| CD30EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 135 |
| CD30SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 036-24"-C-30, No Sorting.

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| CD30SP03DS | 9 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 36 |
| CD30RD01(L/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP03 | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE02(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 140 |
| CD30TE02(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 133 |
| CD30TE02(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP04 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 52 |
| CD30SP04 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 30 |
| CD30TE03(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30TE03(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30TE03(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30SP05 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 53 |
| CD30SP05 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL05 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP06 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 33 |
| CD30EL06 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 82 |
| CD30SP07 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 27 |
| CD30TE04(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE04(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE04(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 037-16"-C-30, No Sorting.

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| CD30EL13 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| INLET NOZZLE P-1-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 037-20"-C-30, No Sorting.

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| CD30SP08 US | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 45 |
| CD30SP08 DS | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL07 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30VA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| CD30SP09 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL08 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL09 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP10 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL10 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30FE01 | [illegible] | 61 | 14.00 | 0.00 | 0.00 | 14050 | ----- | ----- | | --- |
| CD30FE01A | 56 | 3 | 0.00 | 0.00 | 0.00 | 12900 | 230118 | ----- | | 28 |
| CD30EL11 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 39 |
| CD30SP12 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | | 37 |
| CD30EL12 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 74 |
| CD30SP13 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD03(L/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD03(S/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |

===>Grouped by Line: 039-16"-C-32, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD32EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET NOZZLE P-1-1C | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD30SP05 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 58 |
| CD32SP04 | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 74 |
| CD32EL02 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 160 |
| CD32VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14500 | ----- | ----- | --- |
| CD32EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32SP01 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32FE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 14050 | ----- | ----- | --- |
| CD32FE01A | 56 | 2 | 0.00 | 0.00 | 0.00 | 12800 | 195618 | ----- | 23 |
| CD32EL04 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 95 |
| CD32SP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32SP03 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32RD01(L/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32RD01(S/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 09:28:58
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 09:09:53
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
NPA Data Option: Ignore NPA Exclude Measure Wear: No
Line Correction Factor: 0.265

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1A | 31 | 4.771 | 4.238 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29EL01 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP01 | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29VA01 | 22 | 5.513 | 4.185 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD29EL02 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP02 US | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP02 DS | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29EL03 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP03 US | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP03 DS | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1B | 31 | 4.771 | 4.238 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL01 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30VA01 | 22 | 5.513 | 4.185 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD30EL02 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL03 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP01 US | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP01 DS | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL04 | 2 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP02 US | 52 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP02 DS | 52 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | |
| CD30SP03DS | 9 | 0.898 | 0.682 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD01(L/E) | 18 | 2.450 | 1.860 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD01(S/E) | 18 | 3.126 | 2.373 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30TE01(U/S) | 15 | 2.450 | 1.860 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE01(D/S) | 15 | 2.450 | 1.860 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30SP03 | 65 | 1.634 | 1.240 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE02(U/S) | 14 | 4.492 | 3.410 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE02(D/S) | 14 | 7.191 | 5.459 | 294.7 | 11.146 | 0.000 | 24.000 |
| CD30TE02(BR.) | 14 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP04 US | 64 | 1.634 | 1.240 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30SP04 DS | 64 | 1.634 | 1.240 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE03(U/S) | 12 | 3.349 | 2.542 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE03(D/S) | 12 | 5.347 | 4.059 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE03(BR.) | 12 | 3.796 | 2.882 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP05 US | 64 | 2.608 | 1.980 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP05 DS | 64 | 2.608 | 1.980 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30EL05 | 1 | 4.303 | 3.267 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP06 | 51 | 2.869 | 2.178 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30EL06 | 3 | 4.564 | 3.465 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP07 | 53 | 3.260 | 2.475 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE04(U/S) | 14 | 7.172 | 5.445 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE04(D/S) | 14 | 4.492 | 3.410 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE04(BR.) | 14 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD02(L/E) | 7 | 2.859 | 2.170 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD02(S/E) | 7 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 037-16"-C-30, No Sorting. | | | | | | | |
| CD30EL13 | 4 | 5.492 | 4.170 | 294.7 | 12.619 | 0.000 | 16.000 |
| INLET NOZZLE P-1-1A | 30 | 5.937 | 4.508 | 294.7 | 12.619 | 0.000 | 16.000 |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | |
| CD30SP08 US | 57 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP08 DS | 57 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL07 | 2 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30VA02 | 22 | 5.513 | 4.185 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD30SP09 | 58 | 2.456 | 1.865 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL08 | 3 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL09 | 3 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP10 | 53 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL10 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP11 | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30FE01 | 6 | 0.351 | 0.241 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD30FE01A | 56 | 2.762 | 2.097 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD30EL11 | 3 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP12 | 53 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL12 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP13 | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD03(L/E) | 17 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD03(S/E) | 17 | 2.672 | 2.028 | 294.7 | 12.619 | 0.000 | 16.000 |
| ===>Grouped by Line: 039-16"-C-32, No Sorting. | | | | | | | |
| CD32EL05 | 4 | 5.492 | 4.170 | 294.7 | 12.619 | 0.000 | 16.000 |
| INLET NOZZLE P-1-1C | 30 | 5.937 | 4.508 | 294.7 | 12.619 | 0.000 | 16.000 |

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===>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30SP05 | 51 | 2.456 | 1.865 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP04 | 64 | 2.233 | 1.695 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32EL02 | 3 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32VA01 | 22 | 5.513 | 4.185 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD32EL03 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP01 | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32FE01 | 6 | 0.054 | 0.041 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD32FE01A | 56 | 2.762 | 2.097 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD32EL04 | 3 | 3.907 | 2.966 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP02 | 53 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32EL05 | 4 | 4.131 | 3.136 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP03 | 54 | 3.572 | 2.712 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32RD01(L/E) | 17 | 2.791 | 2.119 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32RD01(S/E) | 17 | 2.672 | 2.028 | 294.7 | 12.619 | 0.000 | 16.000 |

Company: Vermont Yankee Nuclear Power Corporation      Report   Date: 28-SEP-2006   Time: 09:29:16
Plant: Vermont Yankee      Analysis Date: 28-SEP-2006   Time: 09:09:53
Unit:      CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618      Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA      Exclude Measure Wear: No
Line Correction Factor: 0.265

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | Method [2] | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | In-Service Cmp. Thickness (mils)[4] Tm | Incremental Wear (mils)[5] PRWEAR | Time (hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | | | | | |
| CD29SP02 US | 47.6 | 34.0 | 47.6 | 34.0 | 0.580 | MT | 102975 | 546.4 | 580.0 | 50.9 | 102975 |
| CD29EL03 | 55.0 | 125.0 | 55.0 | 125.0 | 0.685 | GW | 102975 | 539.0 | 685.0 | 58.9 | 102975 |
| CD29SP03 US | 47.6 | 36.0 | 47.6 | 36.0 | 0.584 | GW | 102975 | 546.4 | 584.0 | 50.9 | 102975 |
| CD29SP03 DS | 47.6 | 59.0 | 47.6 | 59.0 | 0.603 | GW | 102975 | 546.4 | 603.0 | 50.9 | 102975 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | | | | | |
| CD30EL02 | 96.0 | 96.0 | 96.0 | 96.0 | 0.562 | GW | 195618 | 498.0 | 562.0 | 17.9 | 195618 |
| CD30EL03 | 96.0 | 135.0 | 96.0 | 135.0 | 0.536 | GW | 195618 | 498.0 | 536.0 | 17.9 | 195618 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | | | | | |
| CD30SP03DS | 23.0 | 36.0 | 23.0 | 36.0 | 0.652 | MT | 218618 | 665.0 | 652.0 | 1.8 | 218618 |
| CD30TE02(U/S) | 114.9 | 140.0 | 114.9 | 140.0 | 0.902 | MT | 218618 | 573.1 | 902.0 | 9.0 | 218618 |
| CD30TE02(D/S) | 184.0 | 133.0 | 184.0 | 133.0 | 1.037 | GW | 218618 | 504.0 | 1037.0 | 14.3 | 218618 |
| CD30SP04 US | 41.8 | 52.0 | 41.8 | 52.0 | 0.629 | MT | 218618 | 646.2 | 629.0 | 3.3 | 218618 |
| CD30SP04 DS | 21.8 | 30.0 | 21.8 | 30.0 | 0.681 | MT | 102975 | 666.2 | 681.0 | 23.3 | 102975 |
| CD30SP05 US | 34.8 | 53.0 | 34.8 | 53.0 | 0.687 | GW | 102975 | 653.2 | 687.0 | 37.2 | 102975 |
| CD30SP06 | 56.5 | 33.0 | 56.5 | 33.0 | 0.683 | GW | 160352 | 631.5 | 683.0 | 22.6 | 160352 |
| CD30EL06 | 89.9 | 82.0 | 89.9 | 82.0 | 0.671 | MT | 160352 | 598.1 | 671.0 | 36.0 | 160352 |
| CD30SP07 | 64.2 | 27.0 | 64.2 | 27.0 | 0.666 | MT | 160352 | 623.8 | 666.0 | 25.7 | 160352 |
| ===>Grouped by Line: 037-16"-C-30, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | | | | | |
| CD30SP08 US | 55.0 | 46.0 | 55.0 | 46.0 | 0.548 | MT | 160352 | 539.0 | 548.0 | 22.0 | 160352 |
| CD30FE01A | 73.4 | 28.0 | 73.4 | 28.0 | 0.839 | MT | 230118 | 738.6 | 839.0 | 2.8 | 230118 |
| CD30EL11 | 103.9 | 99.0 | 103.9 | 99.0 | 0.740 | GW | 230118 | 490.1 | 740.0 | 3.9 | 230118 |
| CD30SP12 | 74.2 | 38.0 | 74.2 | 38.0 | 0.553 | MT | 230118 | 519.8 | 553.0 | 2.8 | 230118 |
| CD30EL12 | 55.0 | 74.0 | 55.0 | 74.0 | 0.650 | GW | 102975 | 539.0 | 650.0 | 58.9 | 102975 |
| ===>Grouped by Line: 039-16"-C-32, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 039-20"-C-32, No Sorting. | | | | | | | | | | | |
| CD30SP05 | 62.8 | 59.0 | 62.8 | 59.0 | 0.535 | MT | 218618 | 531.2 | 535.0 | 4.9 | 218618 |
| CD32SP04 | 57.1 | 75.0 | 57.1 | 75.0 | 0.512 | MT | 218618 | 536.9 | 512.0 | 4.5 | 218618 |
| CD32EL02 | 100.0 | 160.0 | 100.0 | 160.0 | 0.689 | GW | 218618 | 494.0 | 689.0 | 7.8 | 218618 |
| CD32FE01A | 64.2 | 23.0 | 64.2 | 23.0 | 0.748 | PW | 195618 | 747.8 | 747.8 | 12.0 | 195618 |
| CD32EL04 | 90.8 | 95.0 | 90.8 | 95.0 | 0.678 | GW | 195618 | 503.2 | 678.0 | 17.0 | 195618 |

Notes:
[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp = Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 03:29:12
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 09:09:53
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618 Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA Exclude Measure Wear: No
Line Correction Factor: 0.265

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Inspected |
|---|---|---|---|---|
| CD30EL06 | 1 | 4.564 | ------ | 411011 |
| CD30EL13 | 4 | 5.492 | 70500 | ------ |
| CD32FE01 | 6 | 0.054 | 36983356 | ------ |
| CD30RD02(S/E) | 7 | 3.572 | 328682 | ------ |
| CD30VA02 | 22 | 5.513 | 43124 | ------ |
| CD29SP02 DS | 54 | 3.572 | 328682 | ------ |
| CD30TE02(D/S) | 14 | 7.191 | ------ | 882906 |
| CD30TE04(U/S) | 14 | 7.172 | 28535 | ------ |
| INLET NOZZLE P-1-1A | 30 | 5.937 | 41343 | ------ |
| INLET NOZZLE P-1-1C | 30 | 5.937 | 41343 | ------ |
| CD29VA01 | 22 | 5.513 | 43124 | ------ |
| CD30VA01 | 22 | 5.513 | 43124 | ------ |
| CD32VA01 | 22 | 5.513 | 43124 | ------ |
| CD32EL06 | 4 | 5.492 | 70500 | ------ |
| CD29EL02 | 4 | 4.131 | 222443 | ------ |
| CD30TE03(D/S) | 12 | 5.347 | 885578 | ------ |
| CD30TE04(D/S) | 14 | 4.492 | 235433 | ------ |
| OUTLET NOZZLE E-3-1A | 31 | 4.771 | 283788 | ------ |
| CD30EL04 | 2 | 4.131 | 241257 | ------ |
| OUTLET NOZZLE E-3-1B | 31 | 4.771 | 283788 | ------ |
| CD32EL05 | 4 | 4.131 | 241257 | ------ |
| CD30EL07 | 2 | 4.131 | 241257 | ------ |
| CD30EL01 | 4 | 4.131 | 241257 | ------ |
| CD30TE02(U/S) | 14 | 4.492 | ------ | 1080385 |
| CD29EL01 | 4 | 4.131 | 241257 | ------ |
| CD30EL05 | 1 | 4.303 | 259732 | ------ |
| CD32EL03 | 4 | 4.131 | 241257 | ------ |
| CD30EL10 | 4 | 4.131 | 241257 | ------ |
| CD30EL02 | 4 | 4.131 | ------ | 420036 |
| CD30EL09 | 3 | 3.907 | 273230 | ------ |
| CD30EL03 | 4 | 4.131 | ------ | 347407 |
| CD30EL08 | 3 | 3.907 | 273230 | ------ |
| CD30TE04(BR.) | 14 | 3.907 | 273230 | ------ |
| CD29EL03 | 4 | 4.131 | ------ | 649218 |
| CD30TE03(BR.) | 12 | 3.736 | 290627 | ------ |
| CD30EL12 | 4 | 4.131 | ------ | 551448 |
| CD32SP03 | 54 | 3.572 | 328682 | ------ |
| CD29SP01 | 54 | 3.572 | 328682 | ------ |
| CD30SP13 | 54 | 3.572 | 328682 | ------ |
| CD30SP01 DS | 54 | 3.572 | 328682 | ------ |
| CD30TE02(BR.) | 14 | 3.907 | 851983 | ------ |
| CD32SP01 | 54 | 3.572 | 328682 | ------ |
| CD32EL02 | 3 | 3.907 | ------ | 843030 |
| CD30SP01 US | 54 | 3.572 | 328682 | ------ |
| CD30EL11 | 3 | 3.907 | ------ | 1011135 |
| CD30SP11 | 54 | 3.572 | 328682 | ------ |
| CD32EL04 | 3 | 3.907 | ------ | 789453 |
| CD30RD01(S/E) | 18 | 3.126 | 421103 | ------ |
| CD29SP03 DS | 54 | 3.572 | ------ | 511511 |
| CD29SP02 US | 54 | 3.572 | ------ | 437223 |
| CD29SP03 US | 54 | 3.572 | ------ | 450143 |
| CD30RD03(S/E) | 17 | 2.672 | 480859 | ------ |
| CD32RD01(S/E) | 17 | 2.672 | 480859 | ------ |
| CD30SP02 DS | 52 | 2.791 | 509826 | ------ |
| CD30SP10 | 53 | 2.791 | 509826 | ------ |
| CD32RD01(L/E) | 17 | 2.791 | 509826 | ------ |
| CD30RD03(L/E) | 17 | 2.791 | 509826 | ------ |
| CD30SP08 DS | 57 | 2.791 | 509826 | ------ |
| CD32SP02 | 53 | 2.791 | 509826 | ------ |
| CD30SP02 US | 52 | 2.791 | 509826 | ------ |
| CD30TE03(U/S) | 12 | 3.349 | 1384564 | ------ |
| CD30SP07 | 53 | 3.260 | ------ | 594109 |
| CD30SP08 US | 57 | 2.791 | ------ | 546937 |
| CD30SP06 | 51 | 2.869 | ------ | 755904 |
| CD32SP04 | 64 | 2.233 | ------ | 588349 |
| CD30RD02(L E) | 7 | 2.859 | 1473385 | ------ |
| CD30SP09 | 58 | 2.456 | 622747 | ------ |
| CD30SP05 DS | 64 | 2.608 | 635428 | ------ |
| CD30SP05 | 51 | 2.456 | ------ | 640826 |
| CD30SP12 | 53 | 2.791 | ------ | 647083 |
| CD30TE01(D/S) | 15 | 2.450 | 696846 | ------ |
| CD30TE01(U/S) | 15 | 2.450 | 696846 | ------ |
| CD30RD01(L E) | 18 | 2.450 | 696846 | ------ |
| CD32FE01A | 56 | 2.762 | ------ | 1151539 |
| CD30SP05 US | 64 | 1.608 | ------ | 784763 |
| CD30FE01A | 56 | 2.762 | ------ | 1571069 |
| CD32SP04 US | 64 | 1.634 | ------ | 1082838 |
| CD30SP03 | 55 | 1.634 | 1204393 | ------ |
| CD30SP04 DS | 64 | 1.634 | ------ | 1309712 |
| CD30SP03SS | 9 | 0.498 | ------ | 2283118 |
| CD30FE01 | 6 | 0.054 | 36983356 | ------ |

Company: Vermont Yankee Nuclear Power Corporation Report Date: 28-SEP-2006 Time: 09:23:07
Plant: Vermont Yankee Analysis Date: 28-SEP-2006 Time: 09:09:53
Unit: CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Thickness Service Time Report ***

Run Name: Cond2006 E3 to 2 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NFA
Line Correction Factor: 0.265

Duty Factor (Global): 1.000
Exclude Measure Wear: No

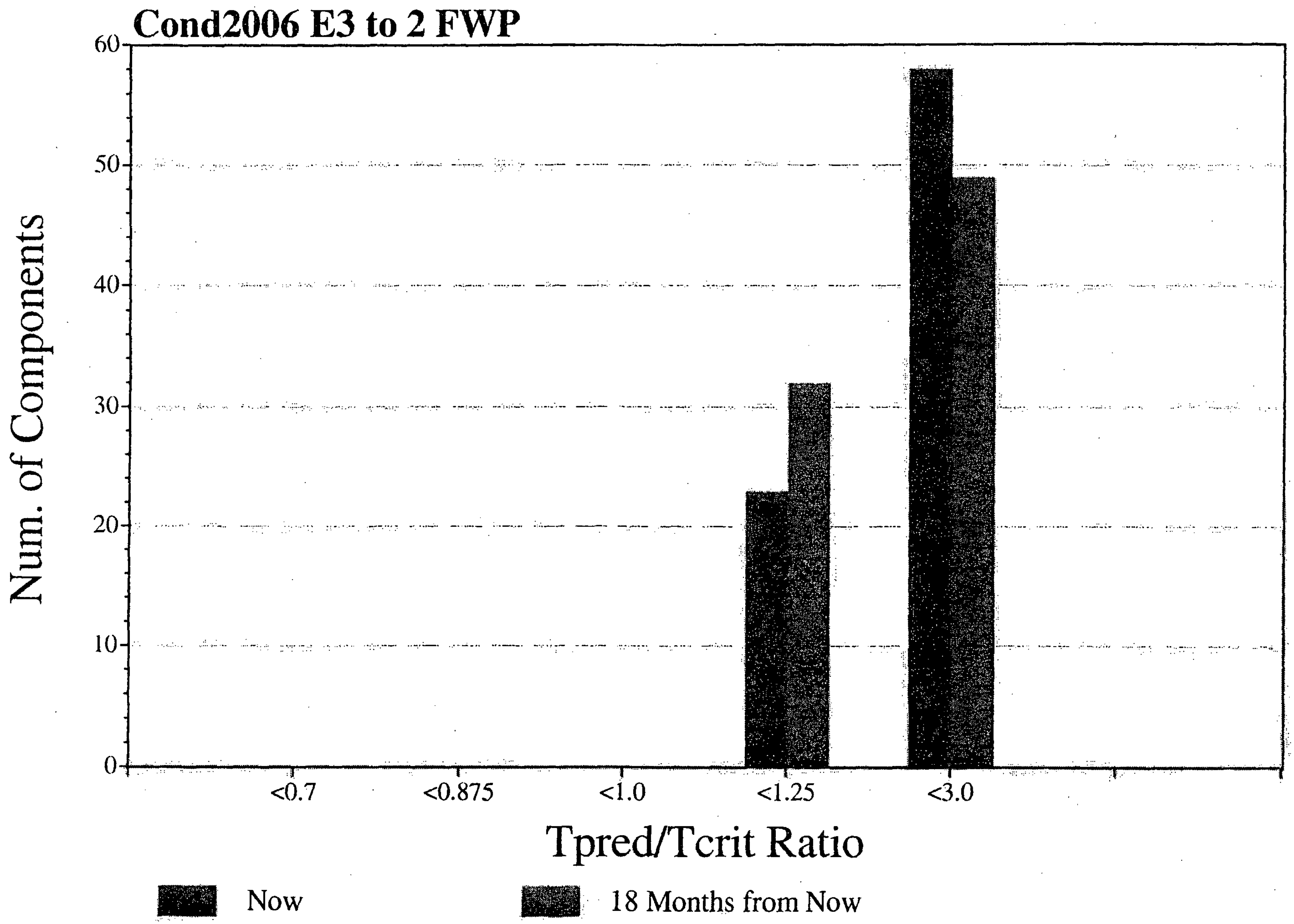
| Component Name | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Component Predicted[1] Time to Tcrit (hrs) Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1A | 0.594 | 0.531 | 0.394 | 0.394 | 283788 | ------ | 115707 |
| CD29EL01 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD29SP01 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD29VA01 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | 241618 |
| CD29EL02 | 0.594 | 0.473 | 0.394 | 0.394 | 222443 | ------ | 241618 |
| CD29SP02 US | 0.594 | 0.529 | 0.394 | 0.394 | ------ | 437223 | 241618 |
| CD29SP02 DS | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD29EL03 | 0.594 | 0.626 | 0.394 | 0.394 | ------ | 649218 | 241618 |
| CD29SP03 US | 0.594 | 0.533 | 0.394 | 0.394 | ------ | 450143 | 241618 |
| CD29SP03 DS | 0.594 | 0.552 | 0.394 | 0.394 | ------ | 511511 | 241618 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1B | 0.594 | 0.531 | 0.394 | 0.394 | 283788 | ------ | 115707 |
| CD30EL01 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD30VA01 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | 241618 |
| CD30EL02 | 0.594 | 0.544 | 0.394 | 0.394 | ------ | 420036 | 241618 |
| CD30EL03 | 0.594 | 0.518 | 0.394 | 0.394 | ------ | 347407 | 241618 |
| CD30SP01 US | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD30SP01 DS | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD30EL04 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD30SP02 US | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD30SP02 DS | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | |
| CD30SP03DS | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 2283118 | 241618 |
| CD30RD01(L/E) | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | 241618 |
| CD30RD01(S/E) | 0.594 | 0.508 | 0.394 | 0.394 | 421103 | ------ | 241618 |
| CD30TE01(U/S) | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | 241618 |
| CD30TE01(D/S) | 0.688 | 0.620 | 0.472 | 0.472 | 696846 | ------ | 241618 |
| CD30SP03 | 0.688 | 0.643 | 0.472 | 0.472 | 1204399 | ------ | 241618 |
| CD30TE02(U/S) | 0.688 | 0.893 | 0.472 | 0.472 | ------ | 1080385 | 241618 |
| CD30TE02(D/S) | 0.688 | 1.023 | 0.472 | 0.472 | ------ | 882906 | 241618 |
| CD30TE02(BR.) | 0.594 | 0.682 | 0.394 | 0.394 | 851983 | ------ | 241618 |
| CD30SP04 US | 0.688 | 0.626 | 0.472 | 0.472 | ------ | 1082898 | 241618 |
| CD30SP04 DS | 0.688 | 0.658 | 0.472 | 0.472 | ------ | 1308712 | 241618 |
| CD30TE03(U/S) | 0.688 | 0.874 | 0.472 | 0.472 | 1384564 | ------ | 241618 |
| CD30TE03(D/S) | 0.688 | 0.883 | 0.472 | 0.472 | 885578 | ------ | 241618 |
| CD30TE03(BR.) | 0.594 | 0.489 | 0.394 | 0.394 | 290627 | ------ | 241618 |
| CD30SP05 US | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 784763 | 241618 |
| CD30SP05 DS | 0.688 | 0.616 | 0.472 | 0.472 | 635428 | ------ | 241618 |
| CD30EL05 | 0.688 | 0.569 | 0.472 | 0.472 | 259732 | ------ | 241618 |
| CD30SP06 | 0.688 | 0.660 | 0.472 | 0.472 | ------ | 755904 | 241618 |
| CD30EL06 | 0.688 | 0.635 | 0.472 | 0.472 | ------ | 411011 | 241618 |
| CD30SP07 | 0.688 | 0.640 | 0.472 | 0.472 | ------ | 594109 | 241618 |
| CD30TE04(U/S) | 0.688 | 0.490 | 0.472 | 0.472 | 28535 | ------ | 241618 |
| CD30TE04(D/S) | 0.688 | 0.564 | 0.472 | 0.472 | 235433 | ------ | 241618 |
| CD30TE04(BR.) | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | 241618 |
| CD30RD02(L/E) | 0.688 | 0.837 | 0.472 | 0.472 | 1473385 | ------ | 241618 |
| CD30RD02(S/E) | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| ===>Grouped by Line: 037-16"-C-30, No Sorting. | | | | | | | |
| CD30EL13 | 0.500 | 0.349 | 0.315 | 0.315 | 70500 | ------ | 241618 |
| INLET NOZZLE P-1-1A | 0.500 | 0.336 | 0.315 | 0.315 | 41343 | ------ | 241618 |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | |
| CD30SP08 US | 0.594 | 0.526 | 0.394 | 0.394 | ------ | 546937 | 241618 |
| CD30SP08 DS | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD30EL07 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD30VA02 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | 241618 |
| CD30SP09 | 0.594 | 0.526 | 0.394 | 0.394 | 622747 | ------ | 241618 |
| CD30EL08 | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | 241618 |
| CD30EL09 | 0.594 | 0.486 | 0.394 | 0.394 | 273230 | ------ | 241618 |
| CD30SP10 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD30EL10 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD30SP11 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD30FE01 | 0.594 | 0.593 | 0.420 | 0.420 | 36983356 | ------ | 241618 |
| CD30FE01A | 0.812 | 0.836 | 0.460 | 0.460 | ------ | 1571069 | 241618 |
| CD30EL11 | 0.594 | 0.736 | 0.394 | 0.394 | ------ | 1011135 | 241618 |
| CD30SP12 | 0.594 | 0.550 | 0.394 | 0.394 | ------ | 647083 | 241618 |
| CD30EL12 | 0.594 | 0.591 | 0.394 | 0.394 | ------ | 551449 | 241618 |
| CD30SP13 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD30RD03(L/E) | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD30RD03(S/E) | 0.500 | 0.426 | 0.315 | 0.315 | 440859 | ------ | 241618 |
| ===>Grouped by Line: 039-16"-C-32, No Sorting. | | | | | | | |
| CD32EL06 | 0.500 | 0.349 | 0.315 | 0.315 | 70500 | ------ | 241618 |
| INLET NOZZLE [illegible] | 0.500 | 0.336 | 0.315 | 0.315 | 41343 | ------ | 241618 |

===>Grouped by Line: 039-20?-C-32, No Sorting.

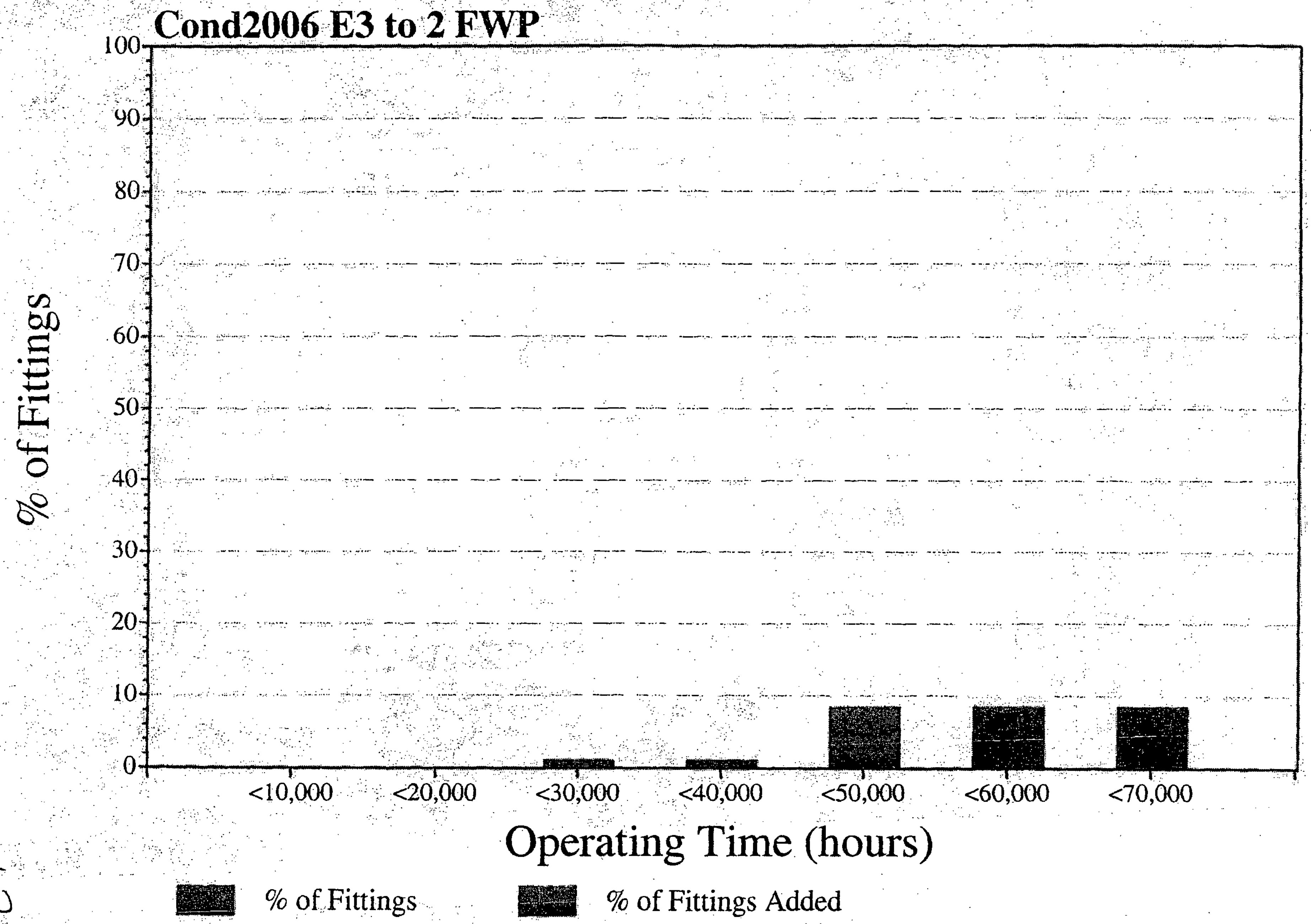
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30SP05 | 0.594 | 0.530 | 0.394 | 0.394 | ------ | 640826 | 241618 |
| CD32SP04 | 0.594 | 0.508 | 0.394 | 0.394 | ------ | 588349 | 241618 |
| CD32EL02 | 0.594 | 0.681 | 0.394 | 0.394 | ------ | 849030 | 241618 |
| CD32VA01 | 0.594 | 0.442 | 0.421 | 0.421 | 43124 | ------ | 241618 |
| CD32EL03 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD32SP01 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD32FE01 | 0.594 | 0.593 | 0.420 | 0.420 | 36983356 | ------ | 241618 |
| CD32FE01A | 0.812 | 0.736 | 0.460 | 0.460 | ------ | 1151929 | 241618 |
| CD32EL04 | 0.594 | 0.661 | 0.394 | 0.394 | ------ | 789453 | 241618 |
| CD32SP02 | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD32EL05 | 0.594 | 0.480 | 0.394 | 0.394 | 241257 | ------ | 241618 |
| CD32SP03 | 0.594 | 0.495 | 0.394 | 0.394 | 328682 | ------ | 241618 |
| CD32RD01(L/E) | 0.594 | 0.517 | 0.394 | 0.394 | 509826 | ------ | 241618 |
| CD32RD01(S/E) | 0.500 | 0.426 | 0.315 | 0.315 | 480859 | ------ | 241618 |

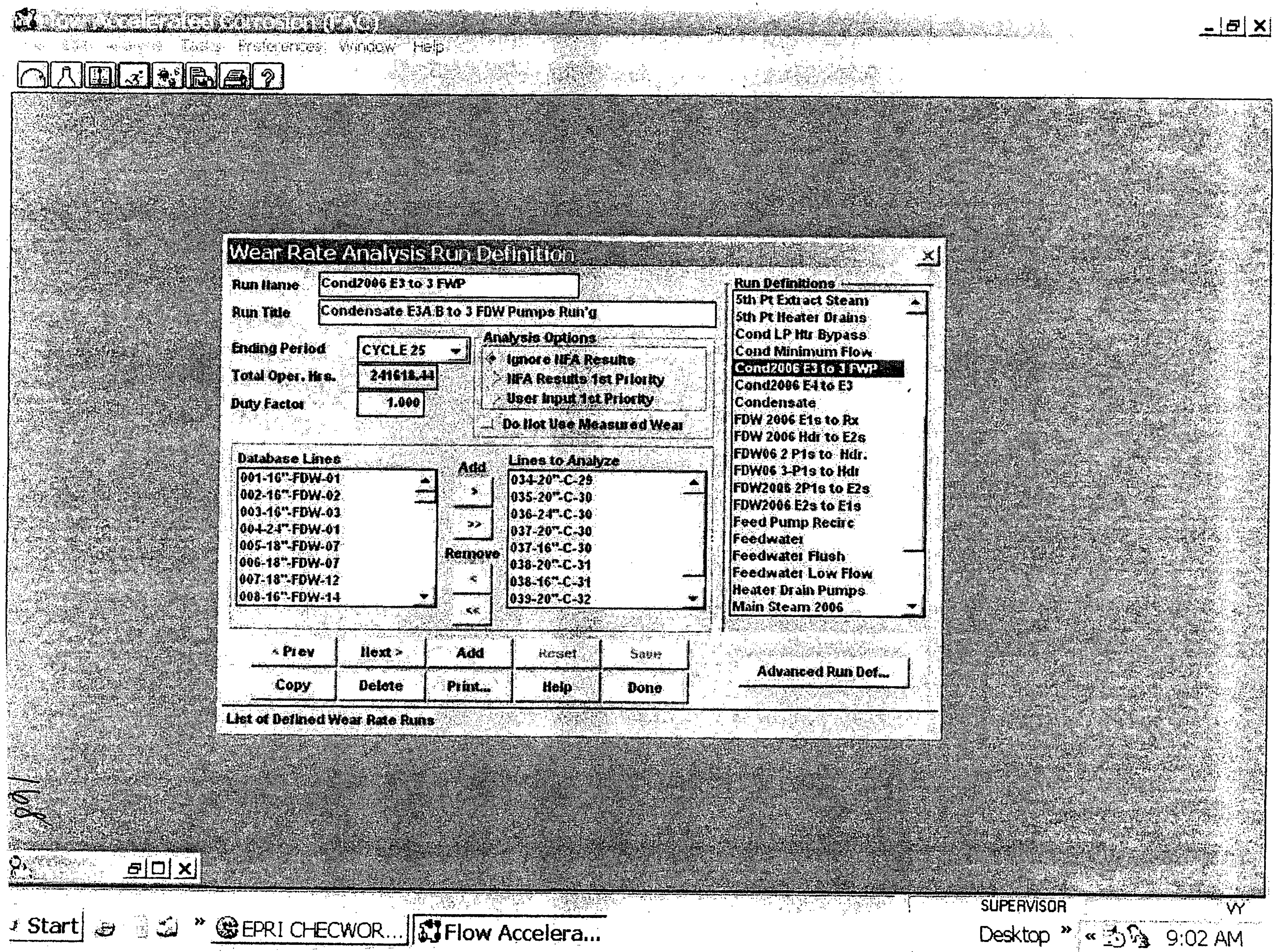
Note:
(1) Predictions are based on last Tmeas to analysis ending period.

# Tpred/Tcrit Ratio Plot



# Cumulative % of Comp. Time to Tcrit




Flow Accelerated Corrosion (FAC)
Tasks Preferences Window Help
Wear Rate Analysis Run Definition
Run Name
Cond2006 E3 to 3 FWP
Run Title
Condensate E3A,B to 3 FDW Pumps Run'g
Ending Period
CYCLE 25
Total Oper. Hrs.
241618.44
Duty Factor
1.000
Analysis Options
Ignore NFA Results
NFA Results 1st Priority
User Input 1st Priority
Do Not Use Measured Wear
Database Lines
001-16"-FDW-01
002-16"-FDW-02
003-16"-FDW-03
004-24"-FDW-01
005-18"-FDW-07
006-18"-FDW-07
007-18"-FDW-12
008-16"-FDW-14
Add
Remove
Lines to Analyze
034-20"-C-29
035-20"-C-30
036-24"-C-30
037-20"-C-30
037-16"-C-30
038-20"-C-31
038-16"-C-31
039-20"-C-32
Run Definitions
5th Pt Extract Steam
5th Pt Heater Drains
Cond LP Htr Bypass
Cond Minimum Flow
Cond2006 E3 to 3 FWP
Cond2006 E4 to E3
Condensate
FDW 2006 E1s to Rx
FDW 2006 Hdr to E2s
FDW06 2 P1s to Hdr.
FDW06 3-P1s to Hdr
FDW2006 2P1s to E2s
FDW2006 E2s to E1s
Feed Pump Recirc
Feedwater
Feedwater Flush
Feedwater Low Flow
Heater Drain Pumps
Main Steam 2006
< Prev
Next >
Add
Reset
Save
Copy
Delete
Print...
Help
Done
Advanced Run Def...
List of Defined Wear Rate Runs
Start
EPRI CHECWOR...
Flow Accelera...
SUPERVISOR
Desktop
9:02 AM

Flow Accelerated Corrosion (FAC)

File Edit Analysis Tools Preferences Window Help

## Wear Rate Analysis Run Definition

Run Name: Cond2006 E3 to 3 FWP

Run Title: Condensate E3A,B to 3 FDW Pumps Run'g

Ending Period: CYCLE 25

Total Oper. Hrs.: 241618.44

Duty Factor: 1.000

**Analysis Options**

- Ignore IIFA Results
- IIFA Results 1st Priority
- User Input 1st Priority
- Do Not Use Measured Wear

**Database Lines**

- 001-16"-FDW-01
- 002-16"-FDW-02
- 003-16"-FDW-03
- 004-24"-FDW-01
- 005-18"-FDW-07
- 006-18"-FDW-07
- 007-18"-FDW-12
- 008-16"-FDW-14

Add > >> Remove < <<

**Lines to Analyze**

- 035-20"-C-30
- 036-24"-C-30
- 037-20"-C-30
- 037-16"-C-30
- 038-20"-C-31
- 038-16"-C-31
- 039-20"-C-32
- 039-16"-C-32

**Run Definitions**

- 5th Pt Extract Steam
- 5th Pt Heater Drains
- Cond LP Htr Bypass
- Cond Minimum Flow
- Cond2006 E3 to 3 FWP
- Cond2006 E4 to E3
- Condensate
- FDW 2006 E1s to Rx
- FDW 2006 Hdr to E2s
- FDW06 2 P1s to Hdr.
- FDW06 3-P1s to Hdr
- FDW2006 2P1s to E2s
- FDW2006 E2s to E1s
- Feed Pump Recirc
- Feedwater
- Feedwater Flush
- Feedwater Low Flow
- Heater Drain Pumps
- Main Steam 2006

< Prev | Next > | Add | Reset | Save

Copy | Delete | Print... | Help | Done

Advanced Run Def...

List of Defined Wear Rate Runs

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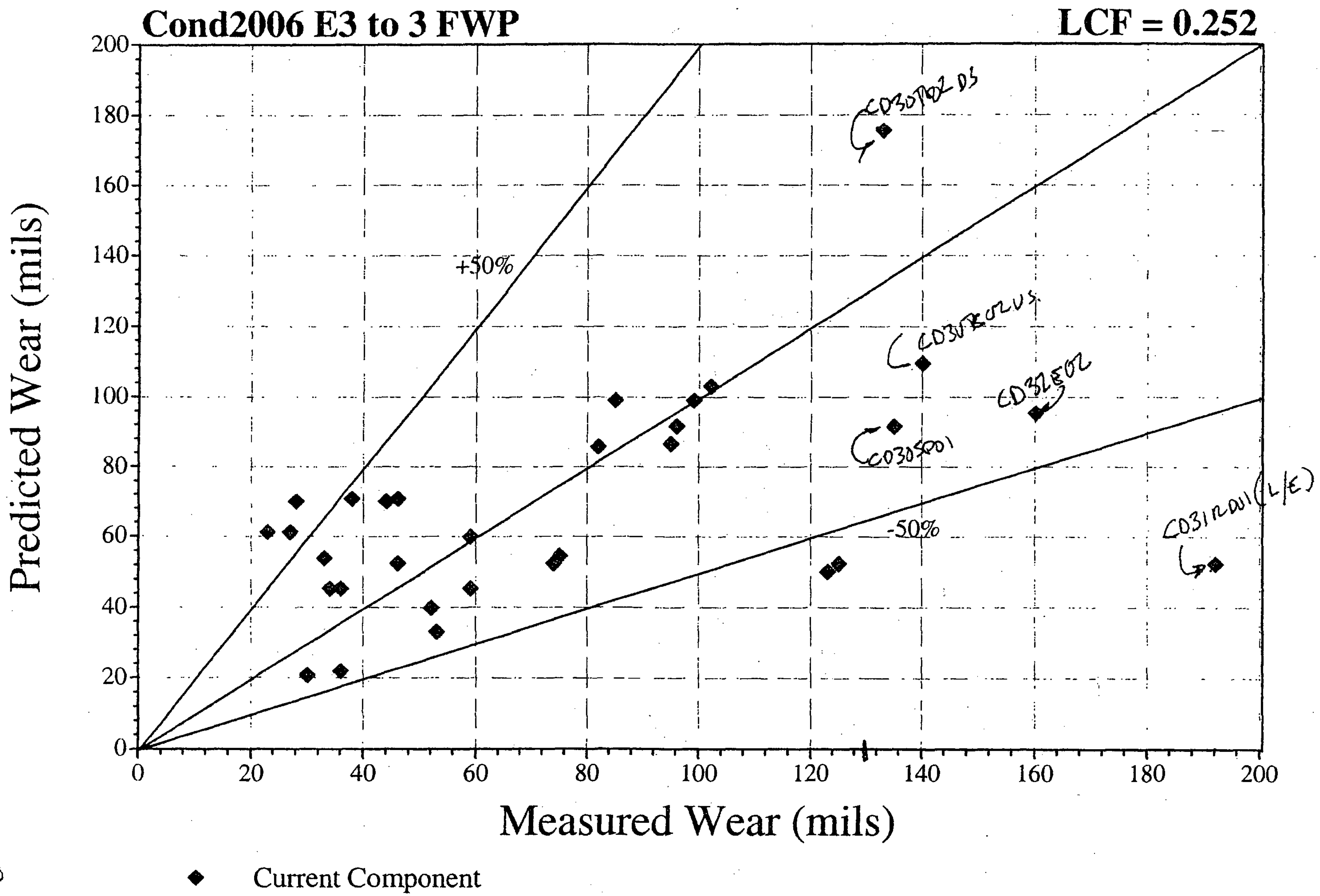
Start | EPRI CHECWOR... | Flow Accelera...

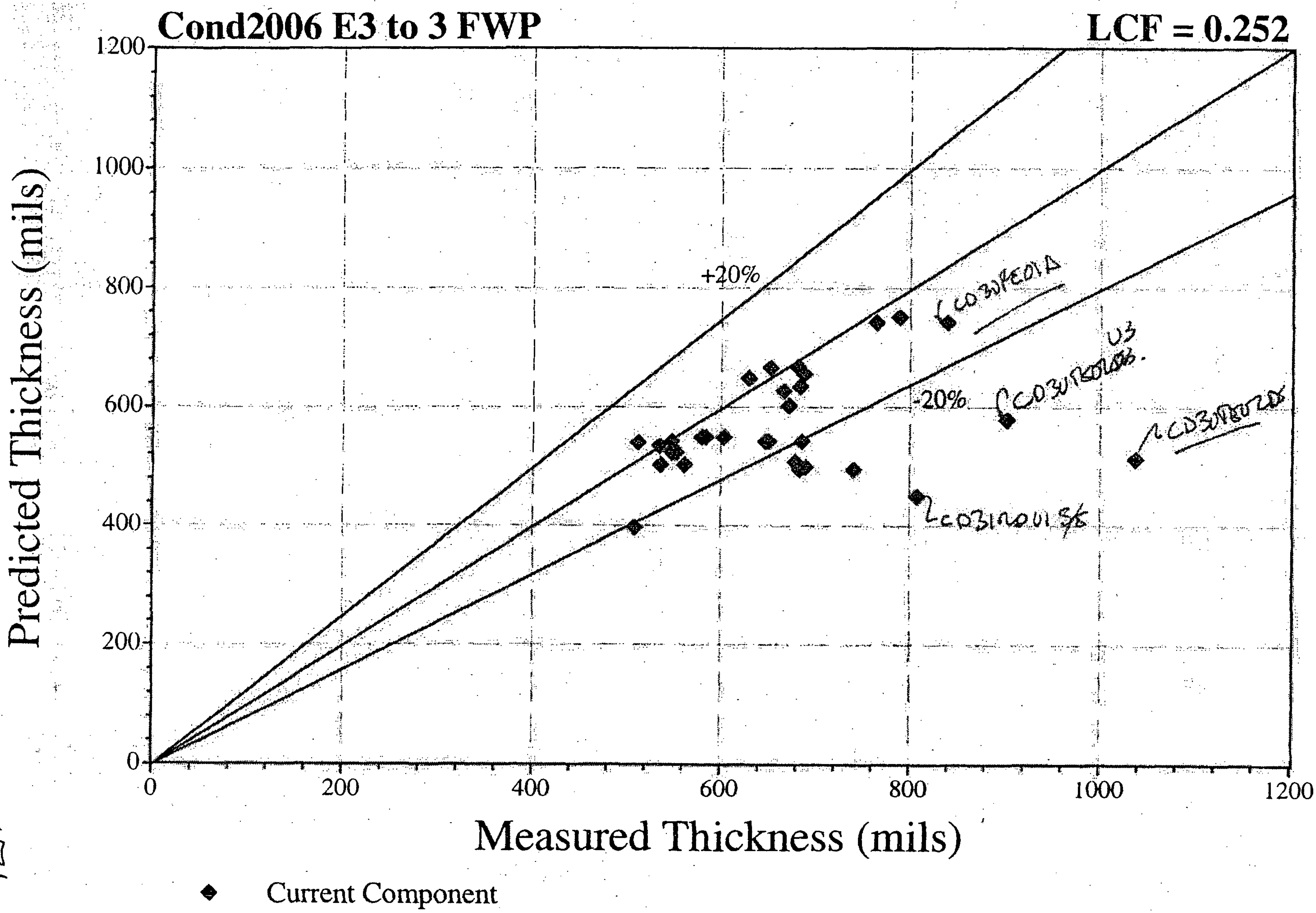
SUPERVISOR VY

Desktop 9:02 AM

# Comparison of Wear Predictions



# Comparison of Thickness Predictions

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Company: Vermont Yankee Nuclear Power Corporation  Report Date: 28-SEP-2006 Time: 08:51:41
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006 Time: 08:47:32
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Combined Summary Report ***

Run Name: Cond2006 E3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
WRA Data Option: Ignore NFA  Exclude Measure Wear: No
Line Correction Factor: 0.252

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Thickness (in) Init. | Thickness (in) Prd.[1] | Thickness (in) Thoop | Thickness (in) Tcrit | Component Predict[1] Time to Tcrit (hrs) Non-Insp. | Component Predict[1] Time to Tcrit (hrs) Insp. | Total Lifetime Wear (mils) Prd.[2] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[2] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[4] | Method [3] | Time (hrs)[4] | Time(hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-3-1A | 31 | 4.546 | 4.039 | 0.594 | 0.534 | 0.394 | 0.394 | 304197 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |
| CD29EL01 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29SP01 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29VA01 | 22 | 5.254 | 3.988 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29EL02 | 4 | 3.937 | 2.989 | 0.594 | 0.476 | 0.394 | 0.394 | 240659 | ------ | --- | --- | --- | --- | 0.526 | MT | 114614 | ----- |
| CD29SP02 US | 54 | 3.405 | 2.585 | 0.594 | 0.531 | 0.394 | 0.394 | ------ | 466883 | 45.4 | 34.0 | 45.4 | 34.0 | 0.580 | MT | 102975 | 102975 |
| CD29SP02 DS | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD29EL03 | 4 | 3.937 | 2.989 | 0.594 | 0.629 | 0.394 | 0.394 | ------ | 689327 | 52.5 | 125.0 | 52.5 | 125.0 | 0.685 | GW | 102975 | 102975 |
| CD29SP03 US | 54 | 3.405 | 2.585 | 0.594 | 0.535 | 0.394 | 0.394 | ------ | 480439 | 45.4 | 36.0 | 45.4 | 36.0 | 0.584 | GW | 102975 | 102975 |
| CD29SP03 DS | 54 | 3.405 | 2.585 | 0.594 | 0.554 | 0.394 | 0.394 | ------ | 544832 | 45.4 | 59.0 | 45.4 | 59.0 | 0.603 | GW | 102975 | 102975 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| OUTLET NOZZLE E-3-1B | 31 | 4.546 | 4.039 | 0.594 | 0.534 | 0.394 | 0.394 | 304197 | ------ | --- | --- | --- | --- | 0.594 | -- | 125911 | ----- |
| CD30EL01 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30VA01 | 22 | 5.254 | 3.988 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL02 | 4 | 3.937 | 2.989 | 0.594 | 0.545 | 0.394 | 0.394 | ------ | 443209 | 91.5 | 96.0 | 91.5 | 96.0 | 0.562 | GW | 195618 | 195618 |
| CD30EL03 | 4 | 3.937 | 2.989 | 0.594 | 0.519 | 0.394 | 0.394 | ------ | 367000 | 91.5 | 135.0 | 91.5 | 135.0 | 0.536 | GW | 195618 | 195618 |
| CD30SP01 US | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP01 DS | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL04 | 2 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP02 US | 52 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP02 DS | 52 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| CD30SP03DS | 9 | 0.856 | 0.650 | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 2396788 | 21.9 | 36.0 | 21.9 | 36.0 | 0.652 | MT | 218618 | 218618 |
| CD30RD01(L/E) | 18 | 2.335 | 1.773 | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30RD01(S/E) | 18 | 2.979 | 2.262 | 0.594 | 0.512 | 0.394 | 0.394 | 457547 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30TE01(U/S) | 15 | 2.335 | 1.773 | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE01(D/S) | 15 | 2.335 | 1.773 | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30SP03 | 65 | 1.557 | 1.182 | 0.688 | 0.645 | 0.472 | 0.472 | 1279453 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE02(U/S) | 14 | 4.281 | 3.250 | 0.688 | 0.893 | 0.472 | 0.472 | ------ | 1134771 | 109.5 | 140.0 | 109.5 | 140.0 | 0.902 | MT | 218618 | 218618 |
| CD30TE02(D/S) | 14 | 6.853 | 5.203 | 0.688 | 1.023 | 0.472 | 0.472 | ------ | 927559 | 175.4 | 133.0 | 175.4 | 133.0 | 1.037 | GW | 218618 | 218618 |
| CD30TE02(BR.) | 14 | 3.724 | 2.827 | 0.594 | 0.683 | 0.394 | 0.394 | 895111 | ------ | --- | --- | --- | --- | 0.690 | GW | 218618 | ----- |
| CD30SP04 US | 64 | 1.557 | 1.182 | 0.688 | 0.626 | 0.472 | 0.472 | ------ | 1137408 | 39.8 | 52.0 | 39.8 | 52.0 | 0.629 | MT | 218618 | 218618 |
| CD30SP04 DS | 64 | 1.557 | 1.182 | 0.688 | 0.659 | 0.472 | 0.472 | ------ | 1381328 | 20.7 | 30.0 | 20.7 | 30.0 | 0.681 | MT | 102975 | 102975 |
| CD30TE03(U/S) | 12 | 3.191 | 2.423 | 0.688 | 0.877 | 0.472 | 0.472 | 1460918 | ------ | --- | --- | --- | --- | 0.922 | MT | 102975 | ----- |
| CD30TE03(D/S) | 12 | 5.095 | 3.868 | 0.688 | 0.886 | 0.472 | 0.472 | 937337 | ------ | --- | --- | --- | --- | 0.959 | MT | 102975 | ----- |
| CD30TE03(BR.) | 12 | 3.617 | 2.746 | 0.594 | 0.494 | 0.394 | 0.394 | 320639 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP05 US | 64 | 2.486 | 1.887 | 0.688 | 0.652 | 0.472 | 0.472 | ------ | 831553 | 33.1 | 53.0 | 33.1 | 53.0 | 0.687 | GW | 102975 | 102975 |
| CD30SP05 DS | 64 | 2.486 | 1.887 | 0.688 | 0.619 | 0.472 | 0.472 | 682436 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30EL05 | 1 | 4.101 | 3.114 | 0.688 | 0.575 | 0.472 | 0.472 | 288222 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30SP06 | 51 | 2.734 | 2.076 | 0.688 | 0.661 | 0.472 | 0.472 | ------ | 797648 | 53.9 | 33.0 | 53.9 | 33.0 | 0.683 | GW | 160352 | 160352 |
| CD30EL06 | 3 | 4.350 | 3.302 | 0.688 | 0.637 | 0.472 | 0.472 | ------ | 435754 | 85.7 | 82.0 | 85.7 | 82.0 | 0.671 | MT | 160352 | 160352 |
| CD30SP07 | 53 | 3.107 | 2.359 | 0.688 | 0.642 | 0.472 | 0.472 | ------ | 627877 | 61.2 | 27.0 | 61.2 | 27.0 | 0.666 | MT | 160352 | 160352 |
| CD30TE04(U/S) | 14 | 6.835 | 5.189 | 0.688 | 0.499 | 0.472 | 0.472 | 45628 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE04(D/S) | 14 | 4.281 | 3.250 | 0.688 | 0.570 | 0.472 | 0.472 | 262725 | ------ | --- | --- | --- | --- | 0.688 | -- | 0 | ----- |
| CD30TE04(BR.) | 14 | 3.724 | 2.827 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD02(L/E) | 7 | 2.724 | 2.068 | 0.688 | 0.839 | 0.472 | 0.472 | 1550493 | ------ | --- | --- | --- | --- | 0.860 | MT | 160352 | ----- |
| CD30RD02(S/E) | 7 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.527 | PW | 160352 | ----- |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | | | | | | | | | | | |
| CD30SP08 US | 57 | 2.660 | 2.019 | 0.594 | 0.527 | 0.394 | 0.394 | ------ | 578380 | 52.4 | 46.0 | 52.4 | 46.0 | 0.548 | MT | 160352 | 160352 |
| CD30SP08 DS | 57 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL07 | 7 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD30VA02 | 22 | 5.254 | 3.988 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP07 | 58 | 2.341 | 1.777 | 0.594 | 0.529 | 0.394 | 0.394 | 669131 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL08 | 3 | 3.724 | 2.827 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL09 | 3 | 3.724 | 2.827 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP10 | 53 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30EL10 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30SP11 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30FE01 | 6 | 0.051 | 0.039 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30FE01A | 56 | 2.633 | 1.999 | 0.812 | 0.836 | 0.460 | 0.460 | ------ | 1649076 | 70.0 | 28.0 | 70.0 | 28.0 | 0.839 | MT | 230118 | 230118 |
| CD30EL11 | 3 | 3.724 | 2.827 | 0.594 | 0.736 | 0.394 | 0.394 | ------ | 1061541 | 99.0 | 99.0 | 99.0 | 99.0 | 0.740 | GW | 230118 | 230118 |
| CD30SP12 | 53 | 2.660 | 2.019 | 0.594 | 0.550 | 0.394 | 0.394 | ------ | 679545 | 70.7 | 38.0 | 70.7 | 38.0 | 0.553 | MT | 230118 | 230118 |
| CD30EL12 | 4 | 3.937 | 2.989 | 0.594 | 0.594 | 0.394 | 0.394 | ------ | 586738 | 52.5 | 74.0 | 52.5 | 74.0 | 0.650 | GW | 102975 | 102975 |
| CD30SP13 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD04(L/E) | 17 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD30RD05(S/E) | 17 | 2.546 | 1.933 | 0.500 | 0.430 | 0.315 | 0.315 | 520249 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

===>Grouped by Line: 037-16"-C-30, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD30EL13 | 4 | 5.234 | 3.974 | 0.500 | 0.356 | 0.315 | 0.315 | 89662 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| INLET NOZZLE P-1-1A | 30 | 5.658 | 4.296 | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

===>Grouped by Line: 038-20"-C-31, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD31VA01 | 22 | 5.254 | 3.988 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31SP01 | 58 | 2.341 | 1.777 | 0.594 | 0.529 | 0.394 | 0.394 | 669131 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31EL01 | 3 | 3.724 | 2.827 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31EL02 | 3 | 3.724 | 2.827 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31SP02 | 53 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31EL03 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31SP03 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31FE01 | 6 | 0.051 | 0.039 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31FE01A | 56 | 2.633 | 1.999 | 0.812 | 0.761 | 0.460 | 0.460 | ------ | 1320359 | 70.0 | 44.0 | 70.0 | 44.0 | 0.764 | MT | 230118 | 230118 |
| CD31EL04 | 3 | 3.724 | 2.827 | 0.594 | 0.679 | 0.394 | 0.394 | ------ | 884921 | 99.0 | 85.0 | 99.0 | 85.0 | 0.683 | GW | 230118 | 230118 |
| CD31SP04 | 53 | 2.660 | 2.019 | 0.594 | 0.545 | 0.394 | 0.394 | ------ | 657855 | 70.7 | 46.0 | 70.7 | 46.0 | 0.548 | MT | 230118 | 230118 |
| CD31EL05 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31SP05 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD31RD01(L/E) | 17 | 2.660 | 2.019 | 0.594 | 0.626 | 0.394 | 0.394 | ------ | 1007845 | 52.4 | 192.0 | 52.4 | 192.0 | 0.647 | GW | 160352 | 160352 |
| CD31RD01(S/E) | 17 | 2.546 | 1.933 | 0.500 | 0.788 | 0.315 | 0.315 | ------ | 2143244 | 50.2 | 123.0 | 50.2 | 123.0 | 0.808 | GW | 160352 | 160352 |

===>Grouped by Line: 038-16"-C-31, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD31EL06 | 4 | 5.234 | 3.974 | 0.500 | 0.468 | 0.315 | 0.315 | ------ | 336789 | 103.1 | 102.0 | 103.1 | 102.0 | 0.509 | GW | 160352 | 160352 |
| INLET NOZZLE P-1-1B | 30 | 5.658 | 4.296 | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

===>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD30SP05 | 51 | 2.341 | 1.777 | 0.594 | 0.530 | 0.394 | 0.394 | ------ | 673546 | 59.9 | 59.0 | 59.9 | 59.0 | 0.535 | MT | 218618 | 218618 |
| CD32SP04 | 64 | 2.128 | 1.615 | 0.594 | 0.508 | 0.394 | 0.394 | ------ | 618482 | 54.5 | 75.0 | 54.5 | 75.0 | 0.512 | MT | 218618 | 218618 |
| CD32EL02 | 3 | 3.724 | 2.827 | 0.594 | 0.682 | 0.394 | 0.394 | ------ | 892013 | 95.3 | 160.0 | 95.3 | 160.0 | 0.689 | GW | 218618 | 218618 |
| CD32VA01 | 22 | 5.254 | 3.988 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32EL03 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32SP01 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32FE01 | 6 | 0.051 | 0.039 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32FE01A | 56 | 2.633 | 1.999 | 0.812 | 0.739 | 0.460 | 0.460 | ------ | 1223976 | 61.2 | 23.0 | 61.2 | 23.0 | 0.751 | PW | 195618 | 195618 |
| CD32EL04 | 3 | 3.724 | 2.827 | 0.594 | 0.662 | 0.394 | 0.394 | ------ | 830835 | 86.5 | 95.0 | 86.5 | 95.0 | 0.678 | GW | 195618 | 195618 |
| CD32SP02 | 53 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32EL05 | 4 | 3.937 | 2.989 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32SP03 | 54 | 3.405 | 2.585 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32RD01(L/E) | 17 | 2.660 | 2.019 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | --- | --- | --- | --- | 0.594 | -- | 0 | ----- |
| CD32RD01(S/E) | 17 | 2.546 | 1.933 | 0.500 | 0.430 | 0.315 | 0.315 | 520249 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

===>Grouped by Line: 039-16"-C-32, No Sorting.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD32EL06 | 4 | 5.234 | 3.974 | 0.500 | 0.356 | 0.315 | 0.315 | 89662 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |
| INLET NOZZLE P-1-1C | 30 | 5.658 | 4.296 | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | --- | --- | --- | --- | 0.500 | -- | 0 | ----- |

Notes:
[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last inspection (last known meas. wear).
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

Company: Vermont Yankee Nuclear Power Corporation    Report Date: 28-SEP-2006 Time: 08:51:36
Plant: Vermont Yankee    Analysis Date: 28-SEP-2006 Time: 08:47:32
Unit:    CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Predictions Report ***

Run Name: Cond2006 R3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618    Duty Factor (Global): 1.000
NRA Data Option: Ignore NFA    Exclude Measure Wear: No
Line Correction Factor: 0.252

| Component Name | Total Lifetime Wear (mils) Prd.[1] | Total Lifetime Wear (mils) Meas. | In-Service Cmp. Wear (mils) Prd.[1] | In-Service Cmp. Wear (mils) Meas. | In-Service Cmp. Tmeas (in)[3] | Method (2) | Time (hrs)[3] | In-Service Cmp. Thickness (mils)[4] Tp | In-Service Cmp. Thickness (mils)[4] Tm | Incremental Wear (mils)[5] PRWEAR | Time (hrs) Last Inspected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | | | | | |
| CD29SP02 US | 45.4 | 34.0 | 45.4 | 34.0 | 0.580 | MT | 102975 | 548.6 | 580.0 | 48.5 | 102975 |
| CD29EL03 | 52.5 | 125.0 | 52.5 | 125.0 | 0.685 | GW | 102975 | 541.5 | 685.0 | 56.1 | 102975 |
| CD29SP03 US | 45.4 | 36.0 | 45.4 | 36.0 | 0.584 | GW | 102975 | 548.6 | 584.0 | 48.5 | 102975 |
| CD29SP03 US | 45.4 | 59.0 | 45.4 | 59.0 | 0.603 | GW | 102975 | 548.6 | 603.0 | 48.5 | 102975 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | | | | | |
| CD30EL02 | 91.5 | 96.0 | 91.5 | 96.0 | 0.562 | GW | 195618 | 502.5 | 562.0 | 17.1 | 195618 |
| CD30EL03 | 91.5 | 135.0 | 91.5 | 135.0 | 0.536 | GW | 195618 | 502.5 | 536.0 | 17.1 | 195618 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | | | | | |
| CD30SP03DS | 21.9 | 36.0 | 21.9 | 36.0 | 0.652 | MT | 218618 | 666.1 | 652.0 | 1.7 | 218618 |
| CD30TE02(U/S) | 109.5 | 140.0 | 109.5 | 140.0 | 0.902 | MT | 218618 | 578.5 | 902.0 | 8.5 | 218618 |
| CD30TE02(D/S) | 175.4 | 133.0 | 175.4 | 133.0 | 1.037 | GW | 218618 | 512.6 | 1037.0 | 13.7 | 218618 |
| CD30SP04 US | 39.8 | 52.0 | 39.8 | 52.0 | 0.629 | MT | 218618 | 648.2 | 629.0 | 3.1 | 218618 |
| CD30SP04 DS | 20.7 | 30.0 | 20.7 | 30.0 | 0.681 | MT | 102975 | 667.3 | 681.0 | 22.2 | 102975 |
| CD30SP05 US | 33.1 | 53.0 | 33.1 | 53.0 | 0.687 | GW | 102975 | 654.9 | 687.0 | 35.4 | 102975 |
| CD30SP06 | 53.9 | 33.0 | 53.9 | 33.0 | 0.683 | GW | 160352 | 634.1 | 683.0 | 21.6 | 160352 |
| CD30EL06 | 85.7 | 82.0 | 85.7 | 82.0 | 0.671 | MT | 160352 | 602.3 | 671.0 | 34.3 | 160352 |
| CD30SP07 | 61.2 | 27.0 | 61.2 | 27.0 | 0.666 | MT | 160352 | 626.8 | 666.0 | 24.5 | 160352 |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | | | | | |
| CD30SP08 US | 52.4 | 46.0 | 52.4 | 46.0 | 0.548 | MT | 160352 | 541.6 | 548.0 | 21.0 | 160352 |
| CD30FE01A | 70.0 | 28.0 | 70.0 | 28.0 | 0.839 | MT | 230118 | 742.0 | 839.0 | 2.6 | 230118 |
| CD30EL11 | 99.0 | 99.0 | 99.0 | 99.0 | 0.740 | GW | 230118 | 495.0 | 740.0 | 3.7 | 230118 |
| CD30SP12 | 70.7 | 38.0 | 70.7 | 38.0 | 0.553 | MT | 230118 | 523.3 | 553.0 | 2.7 | 230118 |
| CD30EL12 | 52.5 | 74.0 | 52.5 | 74.0 | 0.650 | GW | 102975 | 541.5 | 650.0 | 56.1 | 102975 |
| ===>Grouped by Line: 037-16"-C-30, No Sorting. | | | | | | | | | | | |
| ===>Grouped by Line: 038-20"-C-31, No Sorting. | | | | | | | | | | | |
| CD31FE01A | 70.0 | 44.0 | 70.0 | 44.0 | 0.764 | MT | 230118 | 742.0 | 764.0 | 2.6 | 230118 |
| CD31EL04 | 99.0 | 85.0 | 99.0 | 85.0 | 0.683 | GW | 230118 | 495.0 | 683.0 | 3.7 | 230118 |
| CD31SP04 | 70.7 | 46.0 | 70.7 | 46.0 | 0.548 | MT | 230118 | 523.3 | 548.0 | 2.7 | 230118 |
| CD31EL01(L/E) | 52.4 | 192.0 | 52.4 | 192.0 | 0.647 | GW | 160352 | 541.6 | 647.0 | 21.0 | 160352 |
| CD31RD01(S/E) | 50.2 | 123.0 | 50.2 | 123.0 | 0.808 | GW | 160352 | 449.8 | 808.0 | 20.1 | 160352 |
| ===>Grouped by Line: 038-16"-C-31, No Sorting. | | | | | | | | | | | |
| CD31EL05 | 103.1 | 102.0 | 103.1 | 102.0 | 0.509 | GW | 160352 | 396.9 | 509.0 | 41.3 | 160352 |
| ===>Grouped by Line: 039-20"-C-32, No Sorting. | | | | | | | | | | | |
| CD32SP05 | 59.9 | 59.0 | 59.9 | 59.0 | 0.535 | MT | 218618 | 534.1 | 535.0 | 4.7 | 218618 |
| CD32SP04 | 54.5 | 75.0 | 54.5 | 75.0 | 0.512 | MT | 218618 | 539.5 | 512.0 | 4.3 | 218618 |
| CD32EL02 | 95.3 | 160.0 | 95.3 | 160.0 | 0.689 | GW | 218618 | 498.7 | 689.0 | 7.4 | 218618 |
| CD32FE01A | 61.2 | 23.0 | 61.2 | 23.0 | 0.751 | PW | 195618 | 750.8 | 750.8 | 11.4 | 195618 |
| CD32EL04 | 86.5 | 95.0 | 86.5 | 95.0 | 0.678 | GW | 195618 | 507.5 | 678.0 | 16.2 | 195618 |

===>Grouped by Line: 039-16" C-32, No Sorting.

[1] Predictions are for the time of last inspection (last known meas. wear).
[2] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear.
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US - Tmeas is user specified.
[3] If no Tmeas has been determined from measured data, then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.
[4] These two values are used for thickness plot.
Tp - Predicted thickness at Tmeas.
Tm = Last measured thickness (Tmeas).
[5] PRWEAR = Incremental wear from last Tmeas time to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:51:32
Analysis Date: 28-SEP-2006 Time: 08:47:32
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Combined Rankings for Inspection ***

Run Name: Cond2006 E3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NRA Data Option: Ignore NRA
Line Correction Factor: 0.252

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geometry Code | Average Wear Rate (mils/year) | Component Predicted Time to Tcrit (hrs) Non-Inspected | Component Predicted Time to Tcrit (hrs) Inspected |
|---|---|---|---|---|
| CD30EL0[illegible] | 3 | 4.350 | ------ | 435754 |
| CD31EL06 | 4 | 5.234 | ------ | 336789 |
| CD30FE01 | 6 | 0.051 | 38821984 | ------ |
| CD30RD02(S/E) | 7 | 3.405 | 360571 | ------ |
| CD29VA01 | 22 | 5.254 | 60937 | ------ |
| CD29SP03 DS | 54 | 3.405 | ------ | 544832 |
| CD30TE02(D S) | 14 | 6.853 | ------ | 927559 |
| CD30TE04(U-S) | 14 | 6.835 | 45628 | ------ |
| INLET NOZZLE P-1-1C | 30 | 5.658 | 59068 | ------ |
| INLET NOZZLE P-1-1B | 30 | 5.658 | 59068 | ------ |
| INLET NOZZLE P-1-1A | 30 | 5.658 | 59068 | ------ |
| CD30VA02 | 22 | 5.254 | 60937 | ------ |
| CD30VA01 | 22 | 5.254 | 60937 | ------ |
| CD31VA01 | 22 | 5.254 | 60937 | ------ |
| CD32VA01 | 22 | 5.254 | 60937 | ------ |
| CD32EL06 | 4 | 5.234 | 89662 | ------ |
| CD30EL13 | 4 | 5.234 | 89662 | ------ |
| CD29EL02 | 4 | 3.937 | 240659 | ------ |
| CD30TE04(D/S) | 14 | 4.281 | 262725 | ------ |
| CD30TE03(D-S) | 12 | 5.095 | 937337 | ------ |
| CD32EL05 | 4 | 3.937 | 268836 | ------ |
| OUTLET NOZZLE E-3-1B | 31 | 4.546 | 304197 | ------ |
| CD30EL10 | 4 | 3.937 | 268836 | ------ |
| OUTLET NOZZLE E-3-1A | 31 | 4.546 | 304197 | ------ |
| CD31EL03 | 4 | 3.937 | 268836 | ------ |
| CD32EL03 | 4 | 3.937 | 268836 | ------ |
| CD30EL01 | 4 | 3.937 | 268836 | ------ |
| CD30TE02(U/S) | 14 | 4.281 | ------ | 1134771 |
| CD30EL07 | 2 | 3.937 | 268836 | ------ |
| CD30EL05 | 1 | 4.101 | 288222 | ------ |
| CD29EL01 | 4 | 3.937 | 268836 | ------ |
| CD30EL04 | 2 | 3.937 | 268836 | ------ |
| CD31EL05 | 4 | 3.937 | 268836 | ------ |
| CD30EL09 | 3 | 3.724 | 302385 | ------ |
| CD31EL01 | 3 | 3.724 | 302385 | ------ |
| CD31EL02 | 3 | 3.724 | 302385 | ------ |
| CD30EL08 | 3 | 3.724 | 302385 | ------ |
| CD30TE04(BR.) | 14 | 3.724 | 302385 | ------ |
| CD30EL12 | 4 | 3.937 | ------ | 586738 |
| CD30EL03 | 4 | 3.937 | ------ | 367000 |
| CD30TE03(BR.) | 12 | 3.617 | 320639 | ------ |
| CD29EL03 | 4 | 3.937 | ------ | 689327 |
| CD30EL02 | 4 | 3.937 | ------ | 443209 |
| CD32SP01 | 54 | 3.405 | 360571 | ------ |
| CD30EL11 | 3 | 3.724 | ------ | 1061541 |
| CD31SP03 | 54 | 3.405 | 360571 | ------ |
| CD30SP11 | 54 | 3.405 | 360571 | ------ |
| CD32SP03 | 54 | 3.405 | 360571 | ------ |
| CD31SP05 | 54 | 3.405 | 360571 | ------ |
| CD30SP01 DS | 54 | 3.405 | 360571 | ------ |
| CD32EL04 | 3 | 3.724 | ------ | 830835 |
| CD29SP01 | 54 | 3.405 | 360571 | ------ |
| CD30TE02(BR.) | 14 | 3.724 | 895111 | ------ |
| CD30SP01 US | 54 | 3.405 | 360571 | ------ |
| CD32EL02 | 3 | 3.724 | ------ | 892013 |
| CD29SP02 DS | 54 | 3.405 | 360571 | ------ |
| CD30SP13 | 54 | 3.405 | 360571 | ------ |
| CD31EL04 | 3 | 3.724 | ------ | 884921 |
| CD30RD01(S/E) | 18 | 2.979 | 457547 | ------ |
| CD29SP02 US | 54 | 3.405 | ------ | 466883 |

| | | | | |
|---|---|---|---|---|
| CD29SP03 US | 54 | 3.405 | ------ | 480439 |
| CD32RD01(S-E) | 17 | 2.546 | 520249 | ------ |
| CD30RD03(S-E) | 17 | 2.546 | 520249 | ------ |
| CD30SP01 US | 52 | 2.660 | 550644 | ------ |
| CD31SP02 | 53 | 2.660 | 550644 | ------ |
| CD30SP10 | 53 | 2.660 | 550644 | ------ |
| CD30SP08 DS | 57 | 2.660 | 550644 | ------ |
| CD32SP02 | 53 | 2.660 | 550644 | ------ |
| CD30SP02 DS | 52 | 2.660 | 550644 | ------ |
| CD30RD03(L-E) | 17 | 2.660 | 550644 | ------ |
| CD30TE03(U-S) | 12 | 3.191 | 1460918 | ------ |
| CD32RD01(L-E) | 17 | 2.660 | 550644 | ------ |
| CD30SP07 | 53 | 3.107 | ------ | 627877 |
| CD30SP08 US | 57 | 2.660 | ------ | 578380 |
| CD30SP06 | 51 | 2.734 | ------ | 797648 |
| CD32SP04 | 64 | 2.128 | ------ | 618482 |
| CD30RD02(L/E) | 7 | 2.724 | 1550493 | ------ |
| CD30SP12 | 53 | 2.660 | ------ | 679545 |
| CD31SP04 | 53 | 2.660 | ------ | 657855 |
| CD31SP01 | 58 | 2.341 | 669131 | ------ |
| CD30SP09 | 58 | 2.341 | 669131 | ------ |
| CD30SP05 | 51 | 2.341 | ------ | 673546 |
| CD30SP05 DS | 64 | 2.486 | 682436 | ------ |
| CD31RD01(L/E) | 17 | 2.660 | ------ | 1007845 |
| CD30TE01(U/S) | 15 | 2.335 | 746881 | ------ |
| CD30TE01(D S) | 15 | 2.335 | 746881 | ------ |
| CD30RD01(L/E) | 18 | 2.335 | 746881 | ------ |
| CD32FE01A | 56 | 2.633 | ------ | 1223976 |
| CD30SP05 US | 64 | 2.486 | ------ | 831553 |
| CD31FE01A | 56 | 2.633 | ------ | 1320359 |
| CD30FE01A | 56 | 2.633 | ------ | 1649076 |
| CD31RD01(S-E) | 17 | 2.546 | ------ | 2143244 |
| CD30SP04 US | 64 | 1.557 | ------ | 1137408 |
| CD30SP03 | 65 | 1.557 | 1279453 | ------ |
| CD30SP04 DS | 64 | 1.557 | ------ | 1381328 |
| CD30SP03DS | 9 | 0.856 | ------ | 2396788 |
| CD32FE01 | 6 | 0.051 | 38821984 | ------ |
| CD31FE01 | 6 | 0.051 | 38821984 | ------ |

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:51:28
Analysis Date: 28-SEP-2006 Time: 08:47:32
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Thickness/Service Time Report ***

Run Name: Cond2006 E3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
NRA Data Option: Ignore NRA
Line Correction Factor: 0.252

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Thickness (in) Init. | Prd.[1] | Thoop | Tcrit | Component Predicted[1] Time to Tcrit (hrs) Non-Inspected | Inspected | Component Actual Service Time (hrs) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1A | 0.594 | 0.534 | 0.394 | 0.394 | 304197 | ------ | 115707 |
| CD29EL01 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD29SP01 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD29VA01 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | 241618 |
| CD29EL02 | 0.594 | 0.476 | 0.394 | 0.394 | 240659 | ------ | 241618 |
| CD29SP02 US | 0.594 | 0.531 | 0.394 | 0.394 | ------ | 466883 | 241618 |
| CD29SP02 DS | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD29EL03 | 0.594 | 0.629 | 0.394 | 0.394 | ------ | 689327 | 241618 |
| CD29SP03 US | 0.594 | 0.535 | 0.394 | 0.394 | ------ | 480439 | 241618 |
| CD29SP03 DS | 0.594 | 0.554 | 0.394 | 0.394 | ------ | 544832 | 241618 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1B | 0.594 | 0.534 | 0.394 | 0.394 | 304197 | ------ | 115707 |
| CD30EL01 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD30VA01 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | 241618 |
| CD30EL02 | 0.594 | 0.545 | 0.394 | 0.394 | ------ | 443209 | 241618 |
| CD30EL03 | 0.594 | 0.519 | 0.394 | 0.394 | ------ | 367000 | 241618 |
| CD30SP01 US | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD30SP01 DS | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD30EL04 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD30SP02 US | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD30SP02 DS | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | |
| CD30SP03DS | 0.688 | 0.650 | 0.472 | 0.472 | ------ | 2396788 | 241618 |
| CD30PD01(L/E) | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | 241618 |
| CD30RD01(S/E) | 0.594 | 0.512 | 0.394 | 0.394 | 457547 | ------ | 241618 |
| CD30TE01(U/S) | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | 241618 |
| CD30TE01(D/S) | 0.688 | 0.624 | 0.472 | 0.472 | 746881 | ------ | 241618 |
| CD30SP03 | 0.688 | 0.645 | 0.472 | 0.472 | 1279453 | ------ | 241618 |
| CD30TE02(U/S) | 0.688 | 0.893 | 0.472 | 0.472 | ------ | 1134771 | 241618 |
| CD30TE02(D/S) | 0.688 | 1.023 | 0.472 | 0.472 | ------ | 927559 | 241618 |
| CD30TE02(BR.) | 0.594 | 0.683 | 0.394 | 0.394 | 895111 | ------ | 241618 |
| CD30SP04 US | 0.688 | 0.626 | 0.472 | 0.472 | ------ | 1137408 | 241618 |
| CD30SP04 DS | 0.688 | 0.659 | 0.472 | 0.472 | ------ | 1381328 | 241618 |
| CD30TE03(U/S) | 0.688 | 0.877 | 0.472 | 0.472 | 1460918 | ------ | 241618 |
| CD30TE03(D/S) | 0.688 | 0.886 | 0.472 | 0.472 | 937337 | ------ | 241618 |
| CD30TE03(BR.) | 0.594 | 0.494 | 0.394 | 0.394 | 320639 | ------ | 241618 |
| CD30SP05 US | 0.688 | 0.652 | 0.472 | 0.472 | ------ | 831553 | 241618 |
| CD30SP05 DS | 0.688 | 0.619 | 0.472 | 0.472 | 682436 | ------ | 241618 |
| CD30EL05 | 0.688 | 0.575 | 0.472 | 0.472 | 288222 | ------ | 241618 |
| CD30SP06 | 0.688 | 0.661 | 0.472 | 0.472 | ------ | 797648 | 241618 |
| CD30EL06 | 0.688 | 0.637 | 0.472 | 0.472 | ------ | 435754 | 241618 |
| CD30SP07 | 0.688 | 0.642 | 0.472 | 0.472 | ------ | 627877 | 241618 |
| CD30TE04(U/S) | 0.688 | 0.499 | 0.472 | 0.472 | 45628 | ------ | 241618 |
| CD30TE04(D/S) | 0.688 | 0.570 | 0.472 | 0.472 | 262725 | ------ | 241618 |
| CD30TE04(BR.) | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | 241618 |
| CD30PD02(L/E) | 0.688 | 0.839 | 0.472 | 0.472 | 1550493 | ------ | 241618 |
| CD30RD02(S/E) | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | |
| CD30SP08 US | 0.594 | 0.527 | 0.394 | 0.394 | ------ | 578380 | 241618 |
| CD30SP08 DS | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| [illegible] | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30VA02 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | 241618 |
| CD30SP09 | 0.594 | 0.529 | 0.394 | 0.394 | 669131 | ------ | 241618 |
| CD30EL08 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | 241618 |
| CD30EL09 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | 241618 |
| CD30SP10 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD30EL10 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD30SP11 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD30FE01 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | 241618 |
| CD30FE01A | 0.812 | 0.836 | 0.460 | 0.460 | ------ | 1649076 | 241618 |
| CD30EL11 | 0.594 | 0.736 | 0.394 | 0.394 | ------ | 1061541 | 241618 |
| CD30SP12 | 0.594 | 0.550 | 0.394 | 0.394 | ------ | 679545 | 241618 |
| CD30EL12 | 0.594 | 0.594 | 0.394 | 0.394 | ------ | 586738 | 241618 |
| CD30SP13 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD30RD03(L/E) | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD30RD03(S/E) | 0.500 | 0.430 | 0.315 | 0.315 | 520249 | ------ | 241618 |

===>Grouped by Line: 037-16"-C-30, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30EL13 | 0.500 | 0.356 | 0.315 | 0.315 | 89662 | ------ | 241618 |
| INLET NOZZLE P-1-1A | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | 241618 |

===>Grouped by Line: 038-20"-C-31, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD31VA01 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | 241618 |
| CD31SP01 | 0.594 | 0.529 | 0.394 | 0.394 | 669131 | ------ | 241618 |
| CD31EL01 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | 241618 |
| CD31EL02 | 0.594 | 0.491 | 0.394 | 0.394 | 302385 | ------ | 241618 |
| CD31SP02 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD31EL03 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD31SP03 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD31FE01 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | 241618 |
| CD31FE01A | 0.812 | 0.761 | 0.460 | 0.460 | ------ | 1320359 | 241618 |
| CD31EL04 | 0.594 | 0.679 | 0.394 | 0.394 | ------ | 884921 | 241618 |
| CD31SP04 | 0.594 | 0.545 | 0.394 | 0.394 | ------ | 657855 | 241618 |
| CD31EL05 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD31SP05 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD31RD01(L.E) | 0.594 | 0.626 | 0.394 | 0.394 | ------ | 1007845 | 241618 |
| CD31RD01(S.E) | 0.500 | 0.788 | 0.315 | 0.315 | ------ | 2143244 | 241618 |

===>Grouped by Line: 038-16"-C-31, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD31EL06 | 0.500 | 0.468 | 0.315 | 0.315 | ------ | 336789 | 241618 |
| INLET NOZZLE P-1-1B | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | 241618 |

===>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30SP05 | 0.594 | 0.530 | 0.394 | 0.394 | ------ | 673546 | 241618 |
| CD32SP04 | 0.594 | 0.508 | 0.394 | 0.394 | ------ | 618482 | 241618 |
| CD32EL02 | 0.594 | 0.682 | 0.394 | 0.394 | ------ | 892013 | 241618 |
| CD32VA01 | 0.594 | 0.449 | 0.421 | 0.421 | 60937 | ------ | 241618 |
| CD32EL03 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD32SP01 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD32FE01 | 0.594 | 0.593 | 0.420 | 0.420 | 38821984 | ------ | 241618 |
| CD32FE01A | 0.812 | 0.739 | 0.460 | 0.460 | ------ | 1223976 | 241618 |
| CD32EL04 | 0.594 | 0.662 | 0.394 | 0.394 | ------ | 830835 | 241618 |
| D32SP02 | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD32EL05 | 0.594 | 0.485 | 0.394 | 0.394 | 268836 | ------ | 241618 |
| CD32SP03 | 0.594 | 0.500 | 0.394 | 0.394 | 360571 | ------ | 241618 |
| CD32RD01(L.E) | 0.594 | 0.521 | 0.394 | 0.394 | 550644 | ------ | 241618 |
| CD32RD01(S.E) | 0.500 | 0.430 | 0.315 | 0.315 | 520249 | ------ | 241618 |

===>Grouped by Line: 039-16" C-32, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD32EL05 | 0.500 | 0.356 | 0.315 | 0.315 | 89662 | ------ | 241618 |
| INLET NOZZLE P-1-1C | 0.500 | 0.344 | 0.315 | 0.315 | 59068 | ------ | 241618 |

Note:
[1] Predictions are based on last Tmeas to analysis ending period.

Company: Vermont Yankee Nuclear Power Corporation
Plant: Vermont Yankee
Unit:
DB Name: VY

Report Date: 28-SEP-2006 Time: 08:51:24
Analysis Date: 28-SEP-2006 Time: 08:47:32
CHECWORKS FAC Version 1.0F (Build 52)

*** Wear Rate Analysis: Inspection History Report ***

Run Name: Cond2006 E3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618
WRA Data Option: Ignore NPA
Line Correction Factor: 0.252

Duty Factor (Global): 1.000
Exclude Measure Wear: No

| Component Name | Geom. Code | Material No. | Material Cr. (%) | Material Cu. (%) | Material Mo. (%) | Sigma (psi) | Time (hrs) Last Inspected | Time (hrs) Replaced | Analysis Option | Measured Wear (mils) |
|---|---|---|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | | | | |
| OUTLET NOZZLE E-3-1A | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |
| CD29EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29SP01 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| CD29EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD29SP02 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 34 |
| CD29SP02 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD29EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 125 |
| CD29SP03 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 36 |
| CD29SP03 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 59 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | | | | |
| OUTLET NOZZLE E-3-1B | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| *Replacement #1 | 31 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | 125911 | | --- |
| CD30EL01 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | | --- |
| CD30EL02 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 96 |
| CD30EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | | 135 |
| CD30SP01 US | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP01 DS | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL04 | 2 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP02 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP02 DS | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | | | | |
| CD30SP03DS | 9 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 36 |
| CD30RD01(L.E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD01(S/E) | 18 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE01(U/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE01(D/S) | 15 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP03 | 65 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE02(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 140 |
| CD30TE02(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 133 |
| CD30TE02(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP04 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | | 52 |
| CD30SP04 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 30 |
| CD30TE03(U/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30TE03(D/S) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30TE03(BR.) | 12 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | Excl LCF | --- |
| CD30SP05 US | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | | 53 |
| CD30SP05 DS | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30EL05 | 1 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30SP06 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 33 |
| CD30EL06 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 82 |
| CD30SP07 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 27 |
| CD30TE04(U/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE04(D/S) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30TE04(BR.) | 14 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD02(L/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| CD30RD02(S/E) | 7 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | | --- |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | | | | |
| CD30SP08 US | 52 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | | 45 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD30SP08 DS | 57 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30EL07 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30VA02 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| CD30SP09 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30EL08 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30EL09 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30SP10 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30EL10 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30SP11 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30FE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 14050 | ----- | ----- | --- |
| CD30FE01A | 56 | 2 | 0.00 | 0.00 | 0.00 | 12800 | 230118 | ----- | 28 |
| CD30EL11 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 99 |
| CD30SP12 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 37 |
| CD30EL12 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 102975 | ----- | 74 |
| CD30SP13 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30RD03(L/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD30RD03(S/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 037-16"-C-30, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD30EL13 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET NOZZLE P-1-1A | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 038-20"-C-31, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD31VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| CD31SP01 | 58 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31EL01 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31EL02 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31SP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31SP03 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31FE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 14050 | ----- | ----- | --- |
| CD31FE01A | 56 | 2 | 0.00 | 0.60 | 0.00 | 12800 | 230118 | ----- | 43 |
| CD31EL04 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 85 |
| CD31SP04 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 230118 | ----- | 45 |
| CD31EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31SP05 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD31RD01(L/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | 192 |
| CD31RD01(S/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | 123 |

===>Grouped by Line: 038-16"-C-31, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD31EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 160352 | ----- | 102 |
| INLET NOZZLE P-1-1B | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD30SP05 | 51 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 58 |
| CD32SP04 | 64 | 5 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 74 |
| CD32EL02 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 218618 | ----- | 160 |
| CD32VA01 | 22 | 93 | 0.00 | 0.00 | 0.00 | 14000 | ----- | ----- | --- |
| CD32EL03 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32SP01 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32FE01 | 6 | 61 | 18.00 | 0.00 | 0.00 | 14050 | ----- | ----- | --- |
| CD32FE01A | 56 | 2 | 0.00 | 0.00 | 0.00 | 12800 | 195618 | ----- | 23 |
| CD32EL04 | 3 | 21 | 0.00 | 0.00 | 0.00 | 15000 | 195618 | ----- | 95 |
| CD32SP02 | 53 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32EL05 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32SP03 | 54 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32RD01(L/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| CD32RD01(S/E) | 17 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

===>Grouped by Line: 039-16"-C-32, No Sorting.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CD32EL06 | 4 | 21 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |
| INLET NOZZLE P-1-1C | 30 | 5 | 0.00 | 0.00 | 0.00 | 15000 | ----- | ----- | --- |

Company: Vermont Yankee Nuclear Power Corporation  Report Date: 28-SEP-2006 Time: 08:51:19
Plant: Vermont Yankee  Analysis Date: 28-SEP-2006 Time: 08:47:32
Unit:  CHECWORKS FAC Version 1.0F (Build 52)
DB Name: VY

*** Wear Rate Analysis: Wear Rates/Input Data Report ***

Run Name: Cond2006 E3 to 3 FWP
Ending Period: CYCLE 25
Total Plant Operating Hours: 241618  Duty Factor (Global): 1.000
NRA Data Option: Ignore NRA  Exclude Measure Wear: No
Line Correction Factor: 0.252

| Component Name | Geom. Code | Average Wear Rate (mils/year) | Current Wear Rate (mils/year) | Temp. (F) | Velocity (ft/s) | Steam Quality | Diameter (in) |
|---|---|---|---|---|---|---|---|
| ===>Grouped by Line: 034-20"-C-29, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1A | 31 | 4.546 | 4.039 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29EL01 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP01 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29VA01 | 22 | 5.254 | 3.988 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD29EL02 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP02 US | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP02 DS | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29EL03 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP03 US | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD29SP03 DS | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 035-20"-C-30, No Sorting. | | | | | | | |
| OUTLET NOZZLE E-3-1B | 31 | 4.546 | 4.039 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL01 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30VA01 | 22 | 5.254 | 3.988 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD30EL02 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL03 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP01 US | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP01 DS | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL04 | 2 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP02 US | 52 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP02 DS | 52 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 036-24"-C-30, No Sorting. | | | | | | | |
| CD30SP03DS | 9 | 0.856 | 0.650 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD01(L/E) | 18 | 2.335 | 1.773 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD01(S/E) | 18 | 2.979 | 2.262 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30TE01(U/S) | 15 | 2.335 | 1.773 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE01(D/S) | 15 | 2.335 | 1.773 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30SP03 | 65 | 1.557 | 1.182 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE02(U/S) | 14 | 4.281 | 3.250 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE02(D/S) | 14 | 6.853 | 5.203 | 294.7 | 11.146 | 0.000 | 24.000 |
| CD30TE02(BR.) | 14 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP04 US | 64 | 1.557 | 1.182 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30SP04 DS | 64 | 1.557 | 1.182 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE03(U/S) | 12 | 3.191 | 2.423 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE03(D/S) | 12 | 5.095 | 3.868 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE03(BR.) | 12 | 3.617 | 2.746 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP05 US | 64 | 2.486 | 1.887 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP05 DS | 64 | 2.486 | 1.887 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30EL05 | 1 | 4.101 | 3.114 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP06 | 51 | 2.734 | 2.076 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30EL06 | 3 | 4.350 | 3.302 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30SP07 | 53 | 3.107 | 2.359 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE04(U/S) | 14 | 6.835 | 5.189 | 294.7 | 11.094 | 0.000 | 24.000 |
| CD30TE04(D/S) | 14 | 4.281 | 3.250 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30TE04(BR.) | 14 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD02(L/E) | 7 | 2.724 | 2.068 | 294.7 | 5.547 | 0.000 | 24.000 |
| CD30RD02(S/E) | 7 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| ===>Grouped by Line: 037-20"-C-30, No Sorting. | | | | | | | |
| CD30SP08 US | 57 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP08 DS | 57 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL07 | 2 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30VA02 | 22 | 5.254 | 3.988 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD30SP09 | 58 | 2.341 | 1.777 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL08 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL09 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP10 | 53 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL10 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP11 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30FE01 | 6 | 0.051 | 0.039 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD30FE01A | 56 | 2.633 | 1.999 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD30EL11 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP12 | 53 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30EL12 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30SP13 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD03(L/E) | 17 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD30RD03(S/E) | 17 | 2.546 | 1.933 | 294.7 | 12.619 | 0.000 | 16.000 |

==>Grouped by Line: 037-16"-C-30, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30EL13 | 4 | 5.234 | 3.974 | 294.7 | 12.619 | 0.000 | 16.000 |
| INLET NOZZLE P-1-1A | 30 | 5.658 | 4.296 | 294.7 | 12.619 | 0.000 | 16.000 |

==>Grouped by Line: 038-20"-C-31, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD31VA01 | 22 | 5.254 | 3.988 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD31SP01 | 58 | 2.341 | 1.777 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31EL01 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31EL02 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31SP02 | 53 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31EL03 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31SP03 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31FE01 | 6 | 0.051 | 0.039 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD31FE01A | 56 | 2.633 | 1.999 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD31EL04 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31SP04 | 53 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31EL05 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31SP05 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31RD01(L/E) | 17 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD31RD01(S/E) | 17 | 2.546 | 1.933 | 294.7 | 12.619 | 0.000 | 16.000 |

==>Grouped by Line: 038-16"-C-31, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD31EL06 | 4 | 5.234 | 3.974 | 294.7 | 12.619 | 0.000 | 16.000 |
| INLET NOZZLE P-1-1B | 30 | 5.658 | 4.296 | 294.7 | 12.619 | 0.000 | 16.000 |

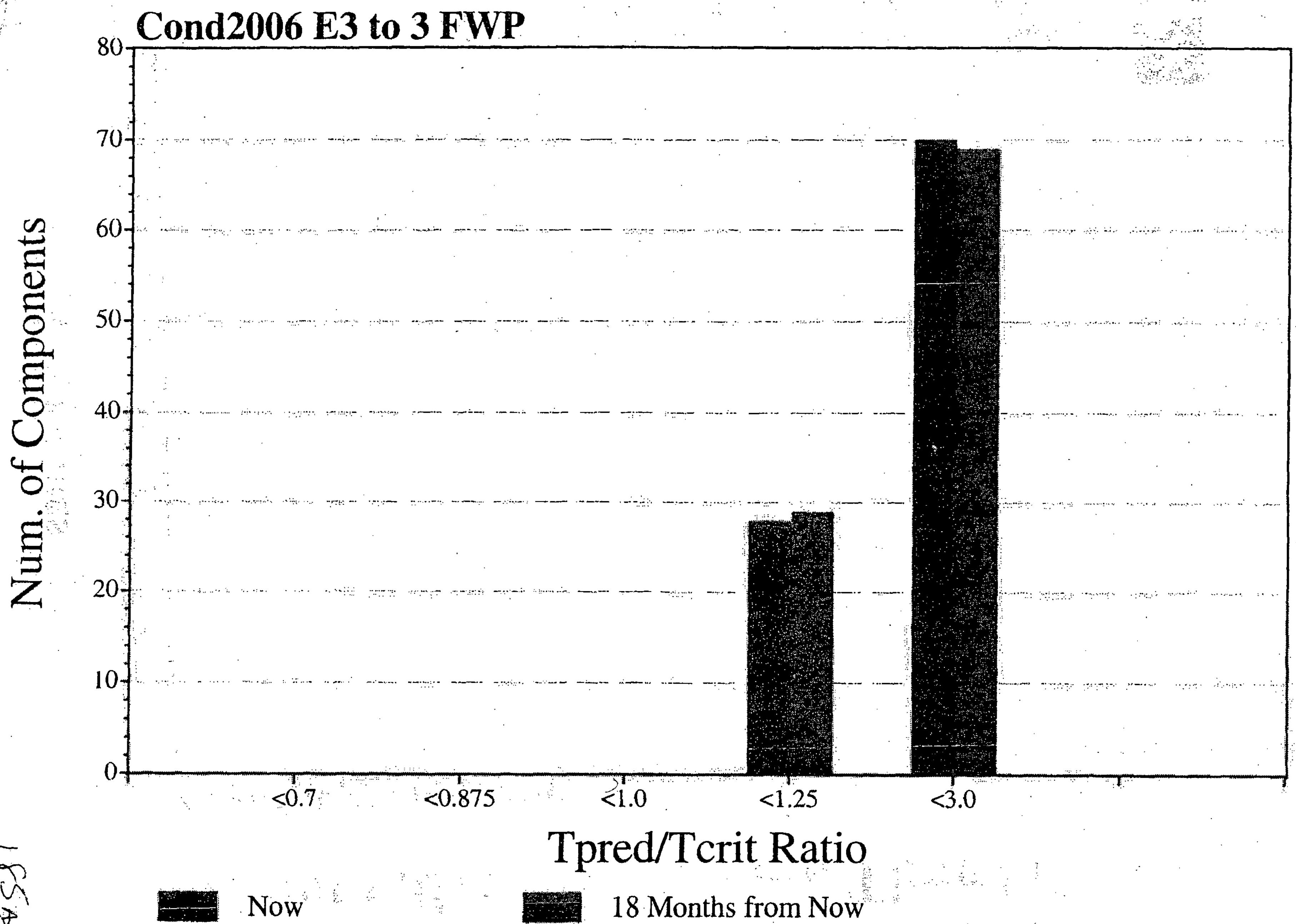
==>Grouped by Line: 039-20"-C-32, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD30SP05 | 51 | 2.341 | 1.777 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP04 | 64 | 2.128 | 1.615 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32EL02 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32VA01 | 22 | 5.254 | 3.988 | 294.7 | 7.865 | 0.000 | 20.000 |
| CD32EL03 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP01 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32FE01 | 6 | 0.051 | 0.039 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD32FE01A | 56 | 2.633 | 1.999 | 294.7 | 33.876 | 0.000 | 20.000 |
| CD32EL04 | 3 | 3.724 | 2.827 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP02 | 53 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32EL05 | 4 | 3.937 | 2.989 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32SP03 | 54 | 3.405 | 2.585 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32RD01(L/E) | 17 | 2.660 | 2.019 | 294.7 | 8.023 | 0.000 | 20.000 |
| CD32RD01(S/E) | 17 | 2.546 | 1.933 | 294.7 | 12.619 | 0.000 | 16.000 |

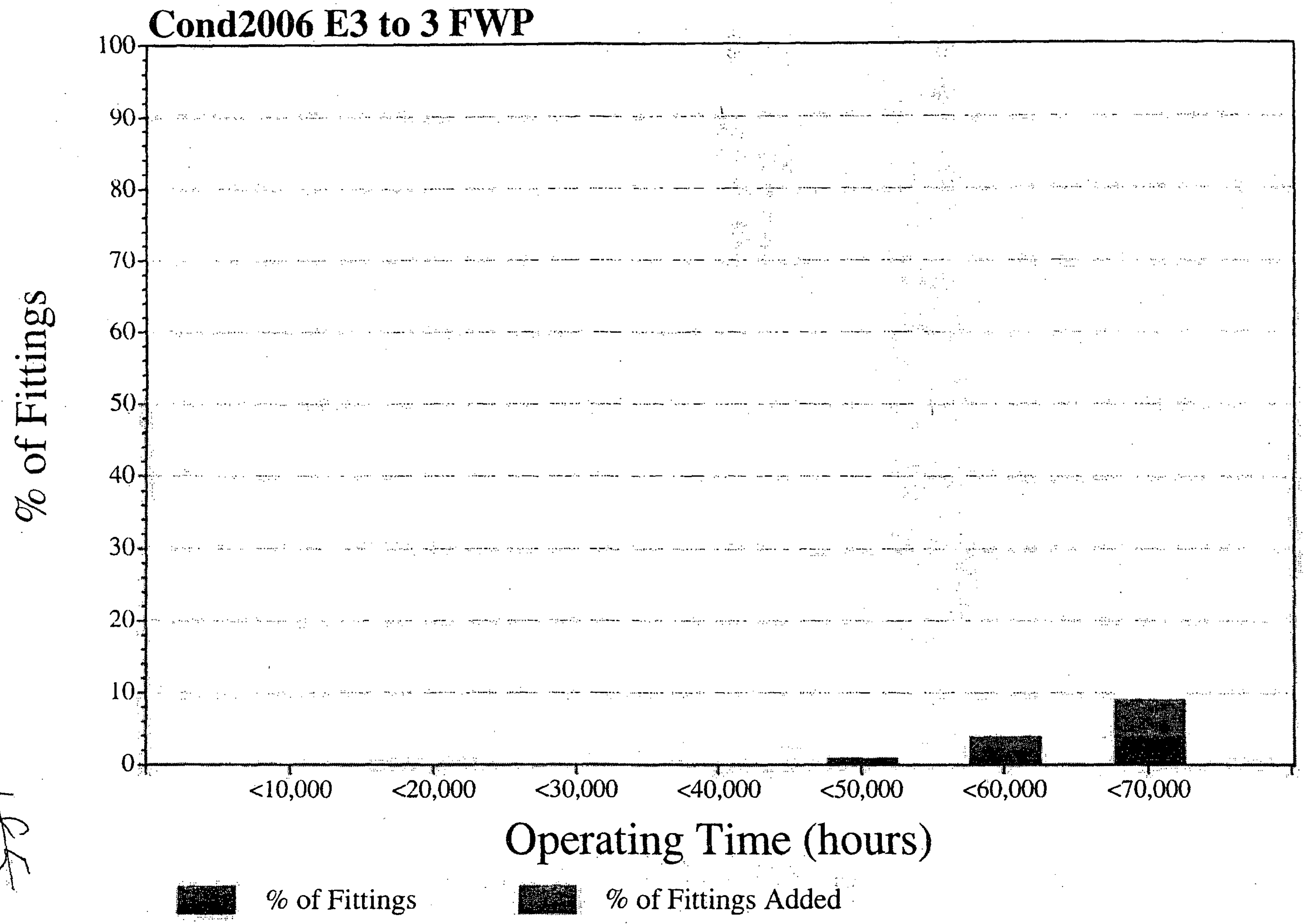
==>Grouped by Line: 039-16"-C 32, No Sorting.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CD32EL06 | 4 | 5.234 | 3.974 | 294.7 | 12.619 | 0.000 | 16.000 |
| INLET NOZZLE P-1-1C | 30 | 5.658 | 4.296 | 294.7 | 12.619 | 0.000 | 16.000 |

# Tpred/Tcrit Ratio Plot



# Cumulative % of Comp. Time to Tcrit



| Entergy | ASSIGNMENTS | CR-VTY-2006-02699 |
|---|---|---|

**Version:** 2

**Significance Code:** C - INVEST & CORRECT

**Classification Code:** C

**Owner Group:** Eng DE Civil Struct Mgmt

**Performed By:** Felumb,Rhonda 09/05/2006 11:55

**Assignment Description:**

CR-VTY-2006-2699
Screening Data
On 09/05/2006 CRG Recommend this CR as a C - INVEST & CORRECT Assigned to Eng DE Civil Struct Mgmt
Comments:
Trending Items
MANAGEMENT OVERSIGHT
RW - 1 (SELF-IDENTIFIED)
Problem Code Work Group
WN Eng. Work practices ESDE Design Engineering/Fluids/Civil/Elec
Additional CA's Required
ACTION CA issued to Eng DE Civil Struct Mgmt With 0 NONE Plant Constraint CA Comments: Evaluate for Adverse Trend and present to CRG.

| Entergy | ADMIN | CR-VTY-2006-02699 |
|---|---|---|

**Initiated Date:** 8/30/2006 14:09 **Owner Group :** Eng DE Civil Struct Mgmt

**Current Contact:** RMF

**Current Significance:** C - INVEST & CORRECT

**Closed by:** Pallang,Alexander P 10/4/2006 5:36

**Summary Description:**

Untimely update to FAC CHECWORKS Models

During FAC Program Health Report presentation to Plant Management it was reported that the program status/color (e.g. white trending to yellow) was due, in part because the CHECWORKS predictive models are not current. This issue was previously identified and was being tracked thru the ER process for completing model updates. Due to more emergent issues supporting EPU/EPU Contentions, LR/LR Contentions, the model updates remain incomplete. This CR is written in order to place a higher level focus within Engineering Management to facilitate completion of this task to update the models.

This is an administrative issue with respect to the FAC Program and has no effect upon plant equipment or operations.

**Remarks Description:**

**Closure Description:**

CR Closure review completed by responsible department

SUBJECT: Extent of Condition Evaluation for CR-VTY-2006-2699 (CA2), Untimely Update to FAC CHECWORKS Models

DISCUSSION: The subject CR was written to document a programmatic issue related to not having all historical inspection data loaded into the existing models. As noted, this issue is related to programmatic aspects of the FAC Program.

In order to evaluate the extent of condition related to this issue, guidance contained in EN-LI-119, Attachment 9.5 was used. Following this guidance, the nonconformance is maintaining the programmatic aspects of the FAC Program. The existence of this similar condition does not extend to any other program under the cognizance of DE C/S as the FAC Program is the only such program that remains in DE C/S. A review of Open Action Items as listed in the 7-12-06 Program Health Report has been performed with the following results:

1) Perform snap shot SA of FAC Program activities. This action is scheduled form completion on 12/10/06.
2) Convert existing FAC component location sketches into controlled drawings. This is a recommended program enhancement. This activity is on-going and is approximately 85% complete with a due date of 9/30/06.
3) Incorporate program reports/documents into RIMS per ENN-DC-126 and EN-DC-147 as applicable. This is an enhancement that will allow easier document recall going forward. This activity is on-going and is approximately 90% complete with a due date of 9/19/06.
4) Add into the Program the new piping 8" CD-46 installed under MM 2003-024. This is due 1/11/07.
5) Add into the Program the new FW Htrs and related components installed under VYDC 2003-002. This is due 3/15/07.
6) Evaluate items identified in the EPU Recommendations and Observations data base and disposition. This is due 11/10/06.

The Fleet FAC Program Procedure, ENN-DC-315 became effective at VY on 3-15-06. Active participation in the FAC peer group has influenced many of these programmatic activities to be pursued. All actions are being tracked in PCRS as LOCAs. The Program is in transition from DE C/S to Engineering Programs consistent with the Fleet model. A new employee has been recently hired into Engineering Programs to assume the role of FAC Coordinator.

The CR listed above recommends increased management attention to support the allocation and dedication of resources that will result in programmatic activities being completed in a timely manner.

Discussions were held with Engineering Programs Supervision to determine if any additional VY Programs are having difficulty maintaining the programmatic/administrative aspects of program requirements. Based on these discussions, there are none.

Based on the review performed above it is concluded that there is no adverse trend related to this issue. The suggested actions contained within the subject CR will resolve the condition.

# Attachment Header

**Document Name:**

untitled

**Document Location**

Resp Description

**Attach Title:**

Extent of Condition

| Entergy | CORRECTIVE ACTION | CR-VTY-2006-02699 |
|---|---|---|

**CA Number:** 2

| | Group | Name |
|---|---|---|
| **Assigned By:** | CRG/CARB/OSRC | |
| **Assigned To:** | Eng DE Civil Struct Mgmt | Goodwin,Scott D |
| **Subassigned To :** | Eng DE Civil Struct Mgmt | |

| | | |
|---|---|---|
| **Originated By:** | Felumb,Rhonda | 9/5/2006 11:58:14 |
| **Performed By:** | Goodwin,Scott D | 9/13/2006 12:46:11 |
| **Subperformed By:** | | |
| **Approved By:** | | |
| **Closed By:** | Pallang,Alexander P | 9/14/2006 07:50:59 |

**Current Due Date:** 09/15/2006 **Initial Due Date:** 09/15/2006

**CA Type:** ACTION

**Plant Constraint:** 0 NONE

**CA Description:**

Evaluate for Adverse Trend and present to CRG.

**Response:**

Extent of condition evaluation performed iaw EN-li-119 Attachment 9.5 guidelines and attached.

**Subresponse :**

**Closure Comments:**

APPROVED BY CRG ON 9/14/06

**Attachments:**

Resp Description

Extent of Condition

| | | | | |
|---|---|---|---|---|
| 7 | Revise report VY-RPT-05-00013 to incorporate changes as a result of ER 05-0591 | JCF | 2/27/07 | Tracked per WT-2006-0000 CA817 |

Entergy



**Title:** Vermont Yankee Flow Accelerated Corrosion (FAC) Inspection Program
Action Plan to Return Program Heath Status to Green

**Manager:** JH Callaghan
**Issue Date:** 10/2/06

| | Action | Owner | Due Date | Status |
|---|---|---|---|---|
| 1 | Perform Snapshot SA of Program | JCF | 12/8/06 | Tracked per LO-VTYLO-2003-00327 CA2 |
| 2 | Update FAC component sketches and convert to plant controlled drawings | JCF | 10/15/06 | Tracked per LO-VTYLO-2003-00327 CA4 |
| 3 | Complete program report per ENN-DC-147 for small bore susceptibility (VY-RPT-05-00013) | JCF | 10/31/06 | Tracked per LO-VTYLO-2003-00327 CA6 |
| 4 | Update program documents as a result of installing Condemineralizer Bypass under MM 2003-024 | JCF | 1/9/2007 | Tracked per LO-VTYLO-2004-00399 CA1 |
| 5 | Update program documents as a result of installing HP FW Htrs and include any related effects from VYDC 2003-0002 | JCF | 3/13/2007 | Tracked per LO-VTYLO-2005-00215 |
| 6 | Revise VY-RPT-05-00012 to incorporate changes as a result of ER 05-0591 | JCF | 2/27/07 | Tracked per WT-2006-0000 CA816 |

| **Closure Justification:** |
| --- |
| |

# CORRECTIVE ACTION PLAN
## Vermont Yankee

Title:

Vermont Yankee Flow Accelerated Corrosion (FAC) Inspection Program
Action Plan to Return Program Heath Status to Green
10/2/06

| | | | |
|---|---|---|---|
| **Corrective Action Plan Lead:** | JC Fitzpatrick | DE C/S | 10/2/06 |
| | Print Name / Signature | Department | Date |
| **Reviewed By:** | SD Goodwin | DE C/S | 10/2/06 |
| | Print Name / Signature | Department | Date |
| **Approved By:** | JH Callaghan | DEM | 10/2/06 |
| | Print Name / Signature | Department | Date |
| **Approved By:** | | | |
| | Print Name / Signature | Department | Date |

**Purpose:**

Address timeliness of completion of programmatic actions associated with the FAC Program. Refer CR-VTY-2006-2699

**Reference(s):**

1. ENN-DC-315, Rev.1, Flow Accelerated Corrosion Program
2. ENN-CS-S-008 Engineering Standard Pipe Wall Thinning Evaluation
3. ENN-EP-S-005, Rev.0, Flow Accelerated Corrosion Component Scanning and Gridding Standard.

**Status:**

See attached

**Action(s):** See attached.

# Attachment Header

**Document Name:**

untitled

**Document Location**

Resp Description

**Attach Title:**

FAC Action Plan

| Entergy | CORRECTIVE ACTION | CR-VTY-2006-02699 |
|---|---|---|

**CA Number:** 1

| | Group | Name |
|---|---|---|
| **Assigned By:** | CRG/CARB/OSRC | |
| **Assigned To:** | Eng DE Civil Struct Mgmt | Goodwin,Scott D |
| **Subassigned To :** | | |

| | | |
|---|---|---|
| **Originated By:** | Felumb,Rhonda | 9/5/2006 11:57:08 |
| **Performed By:** | Goodwin,Scott D | 10/3/2006 13:57:21 |
| **Subperformed By:** | | |
| **Approved By:** | | |
| **Closed By:** | Pallang,Alexander P | 10/4/2006 04:56:25 |

**Current Due Date:** 10/05/2006 **Initial Due Date:** 10/05/2006

**CA Type:** DISP - CA

**Plant Constraint:** 0 NONE

**CA Description:**

C - INVEST & CORRECT (Review CR for full details)
The CRG has initially classified this CR as
Classification Code - "C"
Significance Code - INVEST & CORRECT

Per the CRG, Perform an Investigation of the issues identified in this CR and determine if additional actions are required within 30 days.

All Attachments are to be in PDF format

Ensure all Screening Comments have been addressed in the investigation - (CR assignment tab)
Develop adequate corrective actions and issue CAs. (Due Dates per LI 102 Attachment 9.4)
LT CAs Require Approval from Site VP/ GMPO or Director prior to initiating. Completion of Attachment 9.9 LTCA Classification Form is required.

**Response:**

Problem Statement: Untimely update to FAC CHECWORKS Models

All piping models related to the FAC program have been updated to include all inspections data obtained thru latest set of outage inspections. The results of the updated model execution has not identified any instances where recommended inspections have not been performed.

In addition, as suggested in the the Initiation Tab of the CR, DE C/S has reviewed all outstanding programmatic actions that are identified in the latest program health report and entered these items into a formal action plan to be used going forward to more closely monitor programmatic acivities. A copy of the action plan is attached.

There are no further actions required to be taken as a result of this event. This CR has been reviewed in accordance with the requirements of LI-102 and can be closed.

**Subresponse :**

**Closure Comments:**

**Attachments:**

Resp Description
FAC Action Plan

**Version:** 1

**Significance Code:** C - INVEST & CORRECT

**Classification Code:** C

**Owner Group:** Eng DE Civil Struct Mgmt

**Performed By:** Goodwin,Scott D 08/30/2006 14:54

**Assignment Description:**

Pre-Screening - Assignment Response:

RW(4)
WN
DE Eng
Keywords: MANAGEMENT OVERSIGHT

**Engineering Report No.** VY-RPT-05-00012 **Rev.** 0
**Page** 1 **of** 42

Entergy

ENTERGY NUCLEAR NORTHEAST

Engineering Report Cover Sheet

**Engineering Report Title:**

**VERMONT YANKEE PIPING FLOW ACCELERATED CORROSION INSPECTION PROGRAM - FAC SUSCEPTIBILITY REVIEW**

**Engineering Report Type:**

New ☒ Revision ☐ Cancelled ☐ Superseded ☐

**Applicable Site(s)**

IP1 ☐ IP2 ☐ IP3 ☐ JAF ☐ PNPS ☐ VY ☒

**Quality-Related:** ☒ Yes ☐ No

**Prepared by:** James C. Fitzpatrick [signature] Date: 10/5/05
Responsible Engineer (Print Name/Sign)

****Reviewed by:** Thomas M. O'Connor [signature] Date: 10/7/05
**Reviewer (Print Name/Sign)

***Reviewed by:** N/A Date: N/A
Authorized Nuclear In-service Inspector (ANII)

**Approved by:** Scott D. Goodwin [signature] Date: 10.25.05
Supervisor (Print Name/Sign)

Multiple Site Review (**10**)

| Site | Design Verifier/Reviewer (Print Name/Sign) | Supervisor (Print Name/Sign) | Date |
|---|---|---|---|
| | N/A | N/A | N/A |
| | | | |
| | | | |
| | | | |

* For ASME Section XI Code Program plans per ENN-DC-120, if required.

** This Report does not interpret design, nor are the results used for design input to a design change. Therefore Design Verification per ENN-DC-134 is not required. Only a technical review is performed.

## RECORD OF REVISIONS

**Engineering Report No: VY-RPT-05-00012, "Vermont Yankee Piping Flow Accelerated Corrosion Inspection Program – FAC Susceptibility Review"**

| Revision No. | Description of Change | Reason For Change |
|---|---|---|
| 0 | Original Report: Converts previous Vermont Yankee Susceptibility Evaluation into ENN-DC-147 format and includes piping and system changes made since May 15, 2000. This revision incorporates operation under Nobel Metal Hydrogen Water Chemistry (NMHWC) and the increased flows from 120% Extended Power Uprate (EPU). | LO-VTYLO-2003-00327-CA6, LO-VTYLO-2004-00399-CA1, LO-VTYLO-2005-00030-CA11, LO-VTYLO-2005-00215-CA1 |
| | | |
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## REVISION SUMMARY

Revision 0:

Information in this report was originally contained in a Vermont Yankee FAC Inspection Program document entitled "FAC Susceptible Piping Identification" Revision 0, dated May 15, 2000. This report formalizes the previous VY document per the requirements of ENN-DC-147. Also piping system operational, configuration, and material changes made at Vermont Yankee since May 15, 2000 are incorporated. These include operation under Nobel Metals Hydrogen Water Chemistry, piping changes to various feedwater heater replacements, and piping replacements due to previous through wall leaks. This revision considers the effects of the increased flow rates and revised Heat Balance Diagrams resulting from a proposed 120% Extended Power Uprate (EPU).

# TABLE OF CONTENTS

## 1.0 INTRODUCTION

An evaluation was performed to ensure all plant piping lines which are susceptible to damage from Flow Accelerated Corrosion (FAC) are included in the scope of the Vermont Yankee Piping FAC Inspection Program.

The evaluation documented herein identifies the plant systems and piping lines considered, the assumptions applied, sources of data, and drawing references. The evaluation considers both the current Vermont Yankee design and operating conditions and the effects of a proposed 120% Extended Power Uprate. The criteria used to screen the piping for susceptibility to FAC was developed by EPRI in [Ref. 4].

VY will adopt the Entergy Northeast Standard FAC Program Procedure, ENN-DC-315, "Flow Accelerated Corrosion Program" [Ref. 5]. The existing VY Program Procedure, No. PP 7028 [Ref. 3] will be superseded. Information in this report was originally contained in a Vermont Yankee FAC Inspection Program document entitled "FAC Susceptible Piping Identification" Revision 0, dated May 15, 2000. This report formalizes the previous VY document per the requirements of procedure ENN-DC-147.

Piping system operational, configuration, and material changes made at Vermont Yankee since May 15, 2000 are incorporated. These are listed in section 4.0. This revision considers the effects of the increased flow rates and revised Heat Balance Diagrams resulting from a proposed 120% Extended Power Uprate (EPU).

## 2.0 PURPOSE

The purpose of this document is to provide a single, comprehensive, source to identify all piping systems or portions of systems, which could be susceptible to damage caused by flow accelerated corrosion (FAC). This document will be periodically reviewed and revised as required to reflect changes in plant operation and configuration [Ref. 5, Section 5.14].

## 3.0 SCOPE OF REVIEW

To insure that all susceptible piping is included in the scope of the Piping FAC Inspection Program, all plant piping systems shown on plant flow diagrams and equipment drawings will be screened using the criteria listed in Section 5.0. Piping provided with vendor supplied equipment, which is generally not shown on plant flow diagrams (i.e., turbine Gland Seal Supply lines) is also included.

All feedwater heater shells at Vermont Yankee have now been replaced with FAC resistant materials [Ref. 24]. No shell wall thickness inspections are anticipated to be required for the remaining term of the plant operating license. FAC susceptible equipment other than feedwater heater shells may also be identified during this review although inspection of equipment is currently outside the scope of the Piping FAC Inspection Program.

The plant flow diagrams and drawings reviewed are listed in Table 1.

# 4.0 INPUT DATA

## 4.1 Piping Design Data

The piping systems at VY are shown on the drawings (Flow Diagrams for Mechanical Systems) listed in Table 1. Each flow diagram contains a "Piping Line List" which contains for each line: the line number, line size, piping schedule, material, the design temperature and pressure, and a reference to the original Ebasco Piping Specification, [Ref. 6]. There is no separate controlled line list at Vermont Yankee. The flow diagrams are the controlled design information.

Piping and fitting materials installed by Ebasco, the original plant Architect /Engineer are identified by piping class (i.e. CS-1 or LAS-2), as shown on the Flow Diagrams. These designations refer to sections in the Ebasco Piping Specification [Ref. 6] which give detailed material requirements for the respective piping class. Equipment manufacturer data is used if available.

## 4.2 Operating Conditions

Operating temperatures and pressures for process steam piping are shown on the plant Heat Balance diagrams. Prior to RFO 24 (Spring 2004), normal operating conditions at current licensed thermal power (CLTP) are taken from Drawing No. 5920-11399, Sh.2 of 19, Rev.1, reference 7. The HP turbine rotor was replaced and the steam path was modified during RFO 24. The revised Heat Balance Diagram for CLTP is drawing No. 5920-13297 Sht.6, reference19. The Heat Balance Diagram for the 120% Extended Power Uprate (EPU) including the HP Turbine replacement is shown on drawing No. 5920-13297 Sht. 4, [Ref. 20].

An additional Heat Balance for both CLTP and 122% EPU using the PEPSE code for evaluation of balance of plant equipment (BOP) was developed by Stone & Webster, reference 18. These Heat Balance Diagrams contain more detailed modeling for some BOP piping.

VY has continuously operated under Nobel Metals Hydrogen Water Chemistry since November 2003. Current plant power level is 100% CLTP. Accession testing to 120% CLTP (EPU) operation is expected to start in 2006.

Reference 20 (120% EPU) conditions will be used for the FAC susceptibility screening. If actual operating temperatures are not available, the conservative end of the design range with respect to FAC is used.

## 4.3 Piping and Equipment Design Changes

Plant design changes that affect FAC Susceptible systems installed at VY since May 15, 2000 as documented in the plant Flow Diagrams listed in Table 1.

- VYDC-2003-002 - HP Feedwater Heater Replacements
- VYDC 2003-006 - High Pressure Turbine Replacement
- VYDC 2003-016 - Alternate Souse Term (AST)
- MM 2000-25 - Hydrogen Water Chemistry Outage Modifications
- MM 2000-51 Main Steam Drain Modifications for Small HELB
- MM 2003-24 - Condensate Demineralizer Filtered Bypass
- MM 2003-26 Alternate Source Term (AST) Component Modifications
- MM 2003-43 Min Turbine Cross-around Pipe Relief Valves Discharge Piping Mods
- MM 2003-26 Alternate Source Term (AST) Level Control Valve Replacements

# 5.0 EVALUATION CRITERIA

There are thousands of piping components (pipe and fittings) in service at VY, most of which do not operate under conditions where FAC is a concern. FAC occurs in piping with single-phase water and two-phase water/steam flow regimes under certain thermodynamic and chemistry conditions. In order to focus attention and resources effectively, those components where FAC is not a concern shall be eliminated from the scope of the FAC inspection program. To accomplish this, the exclusion criteria developed by EPRI contained in Section 4.2.2 of NSAC 202L-R2, [Ref.4], will be used.

Portions of piping systems which meet certain exclusion criteria, may or may not be excluded from the program scope. Examples include piping with no flow connecting directly to the condenser which has experienced leak-by from normally closed valves. The piping excluded by the criteria below could be susceptible to damage from other corrosion or degradation mechanisms. These include; cavitation, erosion, liquid impingement erosion, inter-granular stress corrosion cracking (IGSCC), microbiologically-influenced corrosion (MIC), and solid particle erosion.

All plant systems are considered within the scope of the VY Piping FAC Inspection Program unless excluded (screened out) by one of the following criteria [Ref. 4 Section 4.2.2]:

## 5.1 Exclusion Criteria

### 5.1.1 Stainless Steel or Low Alloy Steel Piping

Systems of stainless steel piping or low alloy steel piping with nominal chromium content equal to or greater than 1-1/4%. This exclusion pertains only to complete piping systems constructed of FAC resistant alloys. If some components in a high alloy line are carbon steel (valves) then the line shall not be excluded. In lines with specific components or sections of piping replaced with FAC resistant materials, the entire line should be identified as susceptible. Note that high chromium materials do not necessarily protect against other damage mechanisms, especially cavitation and liquid impingement erosion. If the specific damage mechanism which prompted previous material replacement has not been identified, then the system should not automatically be excluded from the program scope.

Piping locations with upstream FAC resistant material replacements will be noted for future inspection due to the "Leading Edge Effect" at the chrome material - carbon steel material boundary.

### 5.1.2 Superheated Steam Systems

Superheated steam systems with no moisture content regardless of temperature or pressure levels. However drains, traps, and other potentially high-moisture content lines from super-heated steam systems should not be excluded automatically.

### 5.1.3 High Dissolved Oxygen or Raw Water Systems

Systems with high levels of dissolved oxygen (oxygen > 1000. ppb), such as Service Water, Circulating Water, and Fire Protection.

### 5.1.4 Single Phase Systems With Temperature Below 175F.

EPRI recommends exclusion of single phase systems with temperature below 200F (low temperature). However, if measurable wear is found in nearby piping operating slightly above 200F, EPRI recommends that the systems exclusion be reconsidered. A temperature of 175F will be used for conservatism.

### 5.1.5 Systems With No Flow, or Which is in Use Less Than 2% of Pant Operating Time

Systems with no flow, or those that operate less than 2% of plant operating time or single phase systems that operate with temperature > 200F less than 2% of plant operating time. However, if the actual operating conditions of the system can not be confirmed (potentially leaking valves, etc.) or if the service is severe (fluid flashing), the system should not be excluded based on operation time alone.

This includes normally closed small bore equipment vents, drains, and level control instrument lines which are not connected to the condenser. These lines will not be accounted for in Table 2.

### 5.1.6 Piping Which Carries Fluids Other Than water or Wet Steam

The VY Piping FAC Inspection Program applies only to piping carrying water or wet steam. Therefore non-water systems such as Instrument Air or Turbine Lube Oil Systems are excluded.

## 6.0 ASSUMPTIONS

6.1 EPRI report NSAC-202I-R2, [Ref.4] describes systems susceptible to FAC as those made of carbon or low alloy steel which contain flowing water or wet steam. Process instrumentation and sampling lines at Vermont Yankee are typically constructed of stainless steel tubing, fittings, and valves. Instrumentation lines are typically considered as negligible flow and therefore not susceptible to FAC. These lines are not shown in Table 2.

6.2 All small bore equipment and piping low point drain and vent lines with normally closed manual valves are considered as non-susceptible to FAC based on the usage criteria unless otherwise noted.

6.3 Emergency bypass lines to the condenser will be included on a case by case basis. Thermal Performance Monitoring instruments on lines connecting to the main condenser are used to identify possible leakage by normally closed valves.

6.4 If the actual operating time of a system cannot be confirmed, or if the system operates under severe conditions relative to FAC, then that system should not be excluded from FAC inspection program based on time alone.

6.5 Large bore piping will be considered as 3 inch nominal diameter and larger. Small bore piping will be considered as 2-1/2 inch nominal diameter and smaller. Some small bore lines may include short segments of 3 inch pipe. These short segments of 3 inch pipe will be considered as small bore for classification of the line.

6.6 For the purpose of determining system susceptibility, system operating temperatures are assumed to be less than or equal to design temperatures and system operating pressures are assumed to be less than or equal to design pressures at all times. Design values are used if the operating values from the Heat Balance Diagram (reference 20) are not available.

## 7.0 SUSCEPTIBILITY REVIEW METHODOLOGY

For each System or Line contained on the drawings listed in Table 1 document the piping size and material, design temperature and process fluid.

Determine line operating conditions at full power EPU (120% CLTP) from available documentation. See Heat Balance Diagrams, references 18 & 20). Valve lineups are taken from System Operating Procedures, references 10 to 13, and 21.

Review all plant piping shown on the drawings listed in Table 1 against the exclusion criteria listed in Section 5 above. Document in Table 2 whether it is susceptible to FAC or not, and how it is addressed if it is susceptible.

All piping determined to be susceptible to FAC is considered within the scope of the program. Piping determined to be resistant to FAC, or the fluid environment is not conducive to FAC, is considered outside the scope of the program.

Each System or and/or Line in each system is assigned to one of the following categories:

**Non-Susceptible (NS):**

These systems/lines are not susceptible to FAC per the exclusion criteria contained in Section 5.0.

**Susceptible–Modeled in CHECWORKS (SMC):**

These large bore systems/lines are susceptible to FAC and the fluid flow regime is appropriate for modeling using CHECWORKS.

**Susceptible– Not Modeled (SNM):**

These large bore systems/lines are susceptible to FAC and are not appropriate for modeling using CHECWORKS due to pipe size, or uncertain thermodynamic conditions.

**Susceptible Small Bore (SSB):**

These small bore lines are generally not modeled using CHECWORKS. The entire line is considered susceptible. However, only specific locations on these lines are inspected. The locations inspected are included in a separate small bore piping database [Ref.14]. Long term trending and inspection of small bore piping is generally not performed at VY. If small bore piping and components show significant wear the entire line is generally replaced with FAC resistant materials.

## 8.0 RESULTS/CONCLUSIONS

All piping line shown on the plant P&IDs listed in Table 1, have been reviewed using the methodology from Section 7.0 and the exclusion criteria from Section 5.0. The results of the susceptibility screening are shown in Table 2. Each line, or group of lines, has been classified into one of four categories:

- NS: Non-Susceptible to FAC
- SMC: Susceptible–Modeled in CHECWORKS
- SNM: Susceptible– Not Modeled
- SSB: Susceptible Small Bore

Table 2 is essentially an inventory of every line shown on the plant P&IDs, excluding normally closed small bore vents, drains, instrument taps, and test connections.

Non Susceptible piping is considered outside the scope of the FAC inspection program.

Large bore piping, both SMC and SNM, is currently monitored for FAC damage under PP 7028. VY will adopt the Entergy Northeast Standard FAC Program Procedure, ENN-DC-315, "Flow Accelerated Corrosion Program" [Ref. 5]. PP 7028 [Ref. 3] will be superseded.

Inspections of susceptible small bore piping, SSB, are prioritized and documented using a separate Small Bore Data base documented in ENVY Engineering Report No. VY-RPT-05-00013 Rev.0, "Vermont Yankee Piping Flow Accelerated Corrosion Inspection Program – Small Bore Piping Component Inspection Database". [Ref.14].

## 9.0 REFERENCES


1. V.Y. Piping Flow Accelerated Corrosion (FAC) Inspection Program Manual, Revision 2a, November 2,1999. [Note Historical Reference Superseded by PP 7028, Reference 3]

2. V.Y. Procedure, "Piping Flow Accelerated Corrosion Inspection", DP 4023, Rev. 2, March 20, 1998. [Note Historical Reference Superseded by PP 7028, Reference 3]

3. V.Y. Program Procedure, "Piping Flow Accelerated Corrosion Inspection Program", PP7028, Original, Issued LPC 1, 12/06/01.

4. EPRI Report "Recommendations for an Effective Flow Accelerated Corrosion Program", NSAC-202L-R2, Final Report, April 1999, Electric Power Research Institute.

5. Entergy Northeast Standard FAC Program Procedure, ENN-DC-315, "Flow Accelerated Corrosion Program" Revision 0.

6. Ebasco Specification for Piping, Piping Components, Hangers and Supports for Station Piping Systems BWR QC-10, Revised 2/1/70.

7. VY Plant Heat Balance Diagram for 100% rated Power Drawing No. 5920-11399, Sh.2 of 19, Rev.1, "Vermont Yankee Thermal Kit: Turbine S/N 170X383. [Note: Historical Reference, Superseded by Reference 19]

8. Steam Tables - Properties of Saturated and Superheated Steam, ABB Combustion Engineering (reprint of 1967 ASME Steam Tables).

9. Vermont Yankee Piping FAC Inspection Program, Small Bore Piping Component Selection Review, Revision 1 December 6,1999. (Includes Small Bore Data Base). [Note: Historical Reference, Superseded by Reference 14]

10. VY Procedure RP 2170, Condensate System, Revision 24, LPC 1, (Appendices A & B – Valve Lineup).

11. VY Procedure OP 2113, Main & Auxiliary Steam, Revision 20, (Appendix A – Valve Lineup).

12. VY Procedure RP 2171, Condensate Demineralizer System, Revision 30.

13. VY Procedure OP 2172, Feedwater System, Revision 23, LPC No.3

14. ENVY Engineering Report No. VY-RPT-05-00013 Rev.0, "Vermont Yankee Piping Flow Accelerated Corrosion Inspection Program – Small Bore Piping Component Inspection Database"

15. Engineering Request ER 04-1409 ,"Extended Power Uprate Master Design Change"

16. GE Project Task Report for ENVY Extended Power Uprate Task T0100: Reactor Heat Balance, GE-NE-0000-0010-0197-01 Revision 0 December 2002.

17. GE Project Task Report for ENVY Extended Power Uprate Task T0700: Turbine-Generator Performance Evaluation, GE-NE-0000-0007-5277-01 Revision 0 June 2003.

18. Entergy / Vermont Yankee Nuclear Power Station PEPSE Heat Balances for Extended Power Uprate, Rev.0 dated March 26, 2003, by Stone & Webster

19. Entergy – Vermont Yankee #1 Turbine 170x383 Heat Balance Diagram for HP ADSP at 100% Current Licensed Thermal Power Conditions (1593 MWt), VY Drawing No. 5920-13297, Sh.6, Rev.0, "Thermal Kit for HP Steam Path Replacement".

20. Entergy – Vermont Yankee #1 Turbine 170x383 Heat Balance Diagram for HP ADSP / 120% CTP Uprate Rated Power Conditions (1912 MWt), VY Drawing No. 5920-13297, Sh.4, Rev.0, "Thermal Kit for HP Steam Path Replacement".

21. VY Procedure OP 0105 Reactor Operations, Revision 11, LPC 5

22. GEK 17999A, Turbine Bypass Valves and System Description GE Power Systems, March1991.

23. VY-RPT-05-00008, Revision 0, ALT Drain Paths and Seismic Isolation Boundaries for AST

24. VYDC-2003-002 - HP Feedwater Heater Replacements

25. VY Drawings VYI-FDW-Part 22A, VYI-FDW-Part 22B, 5920-10841. Feedwater flush lines partial Replacement drawings for PAR 87-12.

26. INPO Operating Experience OE 16287," Reactor Feed Pump Turbine Sealing Steam Small-Bore Piping not Included in the Flow Accelerated Corrosion Program"

## TABLE 1: Plant Flow Diagrams & Equipment Drawings Reviewed

| Drawing No. | Revision (Note 1) | Title |
|---|---|---|
| G191156 | 36 | Flow Diagram – Main , Extraction, & Auxiliary Steam Systems |
| G191157 Sht.1 | 59 | Flow Diagram – Condensate, Feedwater, and Air Evacuation Systems |
| G191157 Sht.2 | 05 | Flow Diagram – Condensate, Feedwater, and Air Evacuation Systems |
| G191157 Sht.3 | 03 | Flow Diagram – Condensate, Feedwater, and Air Evacuation Systems |
| G191158 | 27 | Flow Diagram – Heater Drain & Vent Systems |
| G191159 Sht.1 | 72 | Flow Diagram Service Water System |
| G191159 Sht.2 | 84 | Flow Diagram Service Water System |
| G191159 Sht.3 | 37 | Flow Diagram RCW Cooling Water System |
| G191159 Sht.4 | 35 | Flow Diagram TCW Cooling Water System |
| G191159 Sht.5 | 16 | Flow Diagram Recirc. Pump Cooling Water |
| G191159 Sht.6 | 09 | Flow Diagram AOG Closed Cooling Water |
| G191160 Sht.1 | 30 | Flow Diagram Instrument Air System |
| G191160 Sht.2 | 17 | Flow Diagram Instrument Air System |
| G191160 Sht.3 | 28 | Flow Diagram Instrument Air System |
| G191160 Sht.4 | 19 | Flow Diagram Instrument Air System |
| G191160 Sht.5 | 20 | Flow Diagram Service Air System |
| G191160 Sht.6 | 10 | Flow Diagram Service Air System |
| G191160 Sht.7 | 22 | Flow Diagram Diesel Starting Air System |
| G191160 Sht.8 | 03 | Flow Diagram Service Air System |
| G191161 | 22 | Flow Diagram Makeup Water Treatment System |
| G191162 Sht.1 | 19 | Flow Diagram Misc. Systems Turbine & Recirculation Lube Oil |
| G191162 Sht.2 | 25 | Flow Diagram Misc. Systems Fuel Oil |
| G191162 Sht.3 | 22 | Flow Diagram Misc. Systems Exhaust Stack & Off Gas System |
| G191162 Sht.4 | 10 | Gas Control Piping Diagram |
| G191162 Sht.5 | 02 | Arrangement of Shaft Sealing System |
| G191162 Sht.6 | 01 | P& ID H2 System |
| G191162 Sht 7 | 05 | Stator Winding Cooling Water System |
| G191163 Sht.1 | 39 | Flow Diagram Fire Protection System - Inner Loop |
| G191163 Sht.2 | 13 | Flow Diagram Fire Protection System – Outer Loop |
| G191163 Sht.3 | 06 | Flow Diagram Fire Protection System – Low Pressure CO2 |
| G191163 Sht.4 | 00 | Flow Diagram Fire Protection System – Control Room Bldg. Cable Vault, East & West Switchgear Rooms |
| G191164 | 23 | Flow Diagram Sampling System Sheet 1 |
| G191165 | 44 | Flow Diagram Sampling System Sheet 2 |
| G191166 | 44 | Flow Diagram Circulating Water & Associated Systems |
| G191167 | 74 | Flow Diagram – Nuclear Boiler |
| G191168 | 43 | Flow Diagram – Core Spray |
| G191169 Sht.1 | 47 | Flow Diagram – High Pressure Coolant Injection System |
| G191169 Sht.2 | 43 | Flow Diagram – High Pressure Coolant Injection System |
| G191170 | 48 | Flow Diagram – Control Rod Drive Hydraulic System |
| G191171 | 25 | Flow Diagram – Standby Liquid Control System |
| G191172 | 64 | Flow Diagram – Residual Heat Removal System |
| G191173 Sht.1 | 36 | Flow Diagram – Fuel Pool Cooling & Cleanup System |
| G191173 Sht.2 | 08 | Flow Diagram – Fuel Pool Cooling & Cleanup System |
| G191174 Sht.1 | 42 | Flow Diagram – Reactor Core Isolation Cooling System |
| G191174 Sht.2 | 23 | Flow Diagram – Reactor Core Isolation Cooling System |
| G191175 Sht.1 | 69 | Flow Diagram Primary Containment & Atmospheric Control System |
| G191175 Sht.2 | 19 | Nitrogen Supply System - Flow Diagram |
| G191176 Sht.1 | 41 | Flow Diagram – Condensate and Demin. Water Transfer System |

## TABLE 1: Plant Flow Diagrams & Equipment Drawings Reviewed - continued

| Drawing No. | Revision (Note 1) | Title |
|---|---|---|
| G191176 Sht.2 | 42 | Flow Diagram – Condensate and Demin. Water Transfer System |
| G191177 Sht.1 | 39 | Flow Diagram – Radwaste Systems |
| G191177 Sht.2 | 22 | Flow Diagram – Radwaste Systems |
| G191177 Sht.3 | 21 | Flow Diagram – Radwaste Systems |
| G191177 Sht.4 | 16 | Flow Diagram – Radwaste Systems |
| G191178 Sht.1 | 49 | Flow Diagram – Reactor Water Clean-Up System |
| G191178 Sht.2 | 21 | Flow Diagram – Reactor Water Clean-Up System |
| G191236 | 09 | HVAC-Flow Diagram Radwaste Building |
| G191237 Sht.1 | 46 | HVAC-Flow Diagram Turbine, Service, and Control Room Bldgs. |
| G191237 Sht.2 | 10 | HVAC-Flow Diagram Turbine, Service, and Control Room Bldgs. |
| G191238 | 33 | HVAC-Flow Diagram Reactor Building |
| G191254 | 35 | HVAC-Heating Flow Diagram & Boiler Room Layout. |
| G191267 Sht.1 | 30 | Flow Diagram – Nuclear Boiler Vessel Instrumentation |
| G191267 Sht.2 | 05 | Flow Diagram – Nuclear Boiler Vessel Instrumentation |
| G191274 | 36 | Flow Diagram – Condensate Demineralizer System |
| G191280 | 11 | Potable Water - Flow Diagram |
| VY-E-75-001 | 11 | Flow Diagram A. O. G. |
| VY-E-75-002 | 19 | Engineering Flow Diagram Containment Atmosphere Dilution System (CAD) |
| 33600-A-00202 | 04 | Process Flow Diagram Off Gas System |
| 33600-A-00207 | 22 | Engineering Flow Diagram Train A Recombiner Area |
| 33600-A-00208 | 20 | Engineering Flow Diagram Train B Recombiner Area |
| 33600-A-00209 | 17 | Engineering Flow Diagram Train A Off Gas Drying |
| 33600-A-00210 | 16 | Engineering Flow Diagram Train B Off Gas Drying |
| 33600-A-00211 | 21 | Engineering Flow Diagram Charcoal Off Gas System |
| 33600-A-00213 | 13 | Engineering Flow Diagram H20 Chiller System (GCH-100-1A &1B) |
| 33600-A-00216 | 11 | Utility Flow Diagram Steam ReHeat Coils |
| 33600-A-00217 | 21 | Engineering Flow Diagram Turbine Bldg. Area Off Gas Modification |
| 5920-00568 | 04 | Moisture Removal Provisions & Extraction Diagram |
| 5920-00870 | 11 | HPCI Turbine Oil Piping Diagram |
| 5920-01068 | 03 | Flow Diagram Instrument Air Dryer ORIAD Model 4127 |
| 5920-11015 | 00 | Flow Diagram (Atlas-Copco Station Air Compressors) |
| 5920-12598 | 02 | Diagram of Steam Seal Piping (GE No.735E758) |
| 5920-12857 Sh.1 | 00 | Flow Diagram Hydrogen & Process Air Injection Module |
| 5920-12857 Sh.2 | 00 | Flow Diagram Hydrogen & Process Air Injection Module |
| 5920-12858 | 00 | Flow Diagram Off Gas Monitor Panel |
| | | |

Notes:

1. Revision as of 6/16/05 including pending drawing changes documented on VY Drawing Pending Change List dated 6/16/05 located on \Vyshared1\public\Controlled Doc.

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191156 | Main Steam | 18-MS-1A to -1D | MS from V2-86A-D to Turbine Stop & Control valves. | Sat Steam | 540. | CS-5 | Continuous | | SMC | Note 8 |
| G191156 | Main Steam | 20-MS by GE | MS leads from S.&C. valves to H.P Turbine. | Sat Steam | 540 | CS | Continuous | | SMC | |
| G191156 | Main Steam | 16-MS-2A to –2D | MS from 18-MS to Turbine Bypass Valve Chests Z-1-1A & Z-1-1B | Sat Steam | <540 | CS-5 | Static- N.C. Valves. | U | NS | Flow during startup & transients. Note 8 |
| G191156 | Main Steam to SSR | 3", 3-1/2" , 5"-MS (GE-SSRM) | MS from MS-1A to V60-6 & SSR (SSR Supply) | Sat Steam | <540 | CS-5 | Static- N.C. Valve. | U | NS | V60-6 N.C. @ >70% power (Ref. 21), Note 8 |
| G191156 | Main Steam to SSR | 5-MS (GE-SSRM) US/DS of V60-10 | Steam Seal Regulator Bypass | Sat Steam | <540 | CS-5 | Normally Closed | U | NS | Ref. 11 & 21 |
| G191156 | Main Steam to SSR | 8,12-MS (GE-SSRM) US/DS of V60-9 | Steam Seal Regulator Unload | Sat Steam | <540 | CS-5 | Normally Closed | U | NS | Ref. 11 |
| G191156 | Main Steam Bypass | 10-MS-3A to –3J | Bypass lines from Z1-1A & Z1-1B to condenser | Sat Steam | <540 | CS-5 | Warming Steam | | SNM | Note 7 |
| G191156 | Turbine Cross Around | 36" CAR A to D | CAR from H.P. turbine to M.S. | Sat Steam | <435 | CS* | Continuous | | SNM | *GE copper bearing alloy |
| G191156 | Turbine Cross Around | 30" CAR A, C, & D | CAR from M.S. to L.P.turbine. | Sat Steam | <435 | LAS | Continuous | | NS | A691-P22 |
| G191156 | Turbine Cross Around | 30" CAR B | CAR from M.S. to L.P.turbine. | Sat Steam | <435 | CS | Continuous | | SNM | B line is carbon steel |
| G191156 | Extraction Steam | 12-ES-1A & -1B | ES from H.P.Turb to No.1 FDW Htrs. | Steam | <440 | LAS-2 | Continuous | M | NS | Note 3 |
| G191156 | Extraction Steam | 10-ES-2A & -2B | ES from LP 7th stg to No. 2 FDW Htrs. | Steam | <400 | LAS-1 | Continuous | M | NS | Note 3 |
| G191156 | Extraction Steam | 20-ES-3A & -3B | ES from LP 8th stg to No. 3 FDW Htrs. | Steam | <370 | LAS-1 | Continuous | M | NS | Note 3 |
| G191156 | Extraction Steam | 20,30-ES-4A & -4B | ES from LP 10th stg to No. 4 FDW Htrs. | Steam | <300 | LAS-1 | Continuous | M | NS | Note 3 |
| G191156 | Extraction Steam | 26/20-ES-5A to 5H | ES from LP 12th stg to No. 5 FDW Htrs. | Steam | <300 | LAS-1 | Continuous | M | NS | Note 3 |
| G191156 | Extraction Steam | 12-ES-6 | SSR CV-1-1A to E-5-1A | Steam | <300. | CS | Intermittent | | SNM | 1992 Inspections |
| G191156 | Extraction Steam | 3-ES-7A & -7B | Bypass to conden. from 30-ES-4A/B to valve LCV-4A/B | Steam | <300 | LAS-1 | Static - N.C. Valve | M | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191156 | Extraction Steam | 3-ES-8A & -8B | Bypass to conden. Downstream valve LCV-4A/B | Steam | <300 | LAS-1 | Static - N.C. Valve | M | NS | SB Loc. 120 & 121. Note 3. |
| G191156 | Extraction Steam | 2-ES-9A & -9B 2-ES-10A & -10B | Bypass to conden. From 20-ES-3A/B US & DS of valve LCV-3A/B | Steam | <370 | LAS-1 | Static - N.C. Valve | M | NS | SB Loc. 63 & 65. Note 3. |
| G191156 | Extraction Steam | 2-ES-11A & -11B 2-ES-12A & -12B | Bypass to conden. From 10-ES-2A/B US & DS of valve LCV-2A/B | Steam | <400 | LAS-1 | Static - N.C. Valve | M | NS | SB Loc. 62 & 64. Note 3. |
| G191156, 5920-0568 | Extraction Steam | 8" 13th stage ES into condenser | 13th stage ES line USof RO 61-13 A to H in condenser | Steam | <300 | LAS | Continuous | M | NS | Note 12. |
| G191156 | Turbine Steam Relief Valves | 18", 20" -SRV-1 to SRV-4 | From CIV to Main Condenser Nozzle 48 | Steam | <435 | CS-2 | Static - N.C. Valve | U | NS | |
| G191156 | SSR Relief Valves | 10-SRV-5A& 5B 10-SRV-6A& 6B | SSR RV to Main Condenser Nozzles 36 & 37 | Steam | <540 | CS-1 | Static - N.C. Valve | U | NS | |
| G191156 | Aux. Steam | 2 SS-1 | Piping at FE-9 | Steam | 540 | 316-SS | Continuous | M | NS | Note 8 |
| G191156 | Aux. Steam | 3,2-1/2,2-AS 1 | Steam Supply from MS-1A to SJAE | Steam | 540 | CS-5 | Continuous | | SSB | Note 8 |
| G191156 | Aux. Steam | 2-1/2-AS-2A & -2B | FCV-1A/1B to 1st Stg. Inter-condenser | Steam | 540 | CS-5 | Continuous | | SSB | Note 8 |
| G191156 | Aux. Steam | 3-AS-3 | PCV-1 to 2nd Stg. Aftercondenser | Steam | 540 | CS-5 | Continuous | | SSB | Note 8 |
| G191156 | Aux. Steam | 3-AS-4 | Piping at FCV-36A & FCV-35 | Steam | 540 | CS-5 | Continuous | | SSB | Note 8 |
| G191156 | Aux. Steam | 2" & 2-1/2" AS | Piping US/DS of FCV-2A & -2B to after condenser | Steam | 540 | CS-5 | Continuous | | SSB | |
| G191156 | Aux. Steam | 1" & 2"-AS | US & DS of LCV-101-39 & ST-62-1 | Steam | <540 | CS-5 | Intermittent | | SSB | SB Location Nos. 66 & 67, Note 8 |
| G191156 | Aux. Steam | 2" –MSD-465 | Drain from FVC-34 to condenser at Conn. 68 | Steam | <540 | CS-5 | Intermittent | | SSB | SB Location Nos. 68,69 |
| G191156 | Aux. Steam | 1" & 1-1/2"-AS | US & DS of LCV-101-40 & ST-62-2 to main condenser Conn.69 | Steam | <540 | CS-5 | Intermittent | | SSB | SB Location Nos. 70,71,72 |
| G191156 | Off Gas | 2 & 2-1/2-HS-190 | Steam Supply MS-7B to A.O.G | Steam | 540 | CS | Continuous | | SSB | Note 8 |
| G191156 | Main Steam Drains | 3-MSD-4 | MS drain DS of ST60-3& LCV-143 in RX Bldg. At condenser Nozzle 47 | Water/ Steam | <540 | CS-5 | Intermittent | | SSB | SB Location No. 5, Note 8 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191156 | Main Steam Drains | 1,2-1/2 US/DS of V60-2A thru -2D | Turbine Stop Valve Inlet drains | Water/ Steam | 540 | CS-5 | Start- up / Normally Closed | | SSB | SB Location Nos. 14,15, 16,17, Note 8 |
| G191156 | Main Steam Drains | 2-1/2-MSD-6 | Combined TSV inlet drains from V60-4 to condenser Nozzle 33. | Water/ Steam | <540 | CS-5 | Start- up / Normally Closed | | SSB | SB Location Nos. 18,19,20 |
| G191156 | Main Steam Drains | 6-MSD-7A to 7D | MS Drip Leg off MS-7A to MS-7D | Water / steam | 540 | CS-5 | Intermittent (drip leg) | | SNM | Note 8 |
| G191156 | Main Steam Drains | 1,& 2-1/2 MSD-7A to 7D D.S. of ST-60-2A to -2D | MS Line Drip Leg Steam Traps | Water / steam | 540 | CS-5 | Intermittent | | SSB | SB Location Nos. 6,8,10,12, Note 8 |
| G191156 | Main Steam Drains | 1,2, & 2-1/2 MSD-8A-D at LCVs–38A-D, MS-956-A | MS Line Drip Leg Level control valves | Water / steam | 540 | CS-5 | Intermittent | | SSB | SB Location Nos. 7,9,11,13, Note 8 |
| G191156 | Main Steam Drains | 8-MSD-9 | MS Line Drip Leg collector to condenser | Water / steam | <540 | CS-5 | Intermittent | | SNM | SB Location Nos. 7,9,11,13, Note 8 |
| G191156 | Main Steam Drains | 1-MSD U.S./D.S. of Valves MS-5A to MS-5D | Turbine Control Valve Inlet Drain | Water / steam | 540 | CS-5 | Start- up / Normally Closed | | SSB | SB Location Nos. 21,22,23,24 |
| G191156 | Main Steam Drains | 2" D.S. V60-5A- -5D to condenser | TCV inlet drains from V60-5A-D to condenser Nozzle 34 | Water / steam | <540 | CS-5 | Start- up / Normally Closed | | SSB | SB Location Nos. 25,26,27 |
| G191156 | Main Steam Drains | 1" & 2" MSD, U.S. V60-12 / R.O.60-1 | HP Leads drains to V60-12 and R.O.60-1 | Water / steam | 540 | CS-5 | Continuous | | SSB | |
| G191156 | Main Steam Drains | 1" & 2" MSD, D.S. V60-12/R.O.60-1 to stub at Cond. A | HP Leads drain from V60-12 and R.O.60-1 to stub at condenser nozzle 35 | Water / Steam | <540 | SS & A335-P11 | Continuous | M | NS | SB Location Nos. 28,29,30 Note 4. |
| G191156 | Main Steam Drains | 2" MSD, D.S. V60-12 / R.O.60-1 | Stub at condenser Nozzle 35 D.S. of V60-12 and R.O.60-1 | Water / Steam | <540 | CS | Continuous | | SSB | Note 10 |
| G191156 | SSH | 1" LPDR | SSH Front End Low Point drain to condenser nozzle 61 | Water / Steam | <540 | CS | Continuous | | SSB | |
| G191156 | SSH | ½" & 1-1/2" drains | ½" & 1-1/2" drains SR60-1A, 1B, 2A, 2B to condenser Nozzle 62 | Water / Steam | <540 | CS | Static - N.C. Valve | U | NS | |
| G191157 Sht.1 | Condensate | 20-C-1,20-C-2 24,30,36-C3 24-C-4, 24-C-5 | Condensate Pump suction from Hotwell | Water | 105 | CS-1 | Continuous | T | NS | Note 3, Ref 20 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191157 Sht.1 | Condensate | 18-C-6, 18-C-7 18,24-C-8 | Condensate Pump discharge to SJAE inter-condensers | Water | 105 | CS-2 | Continuous | T | NS | Note 3, Ref 20 |
| G191157 Sht.1 | Condensate | 12-C-10, 12-C-11 12-C-13, 12-C-14 | SJAE inter- condenser inlet & outlet. | Water | 106 | CS-2 | Continuous | T | NS | Note 3, Ref 20 |
| G191157 Sht.1 | Condensate | 12-C-9, 12-C-12 | SJAE after- condenser inlet & outlet. | Water | 105 | CS-2 | Static – N.C. Valves | T,U | NS | Note 3, OG558/OG560 closed |
| G191157 Shts.1& 2 | Condensate | 24-C-15,24-C-16 | From SJAE to SPE to Con. Demin. | Water | 106 | CS-2 | Continuous | T | NS | Note 3, Ref.20 |
| G191157 Shts.1& 2 | Condensate | 20,24-C-18, 20-C-19 | Con Demin to E-5s | Water | 107 | CS-2 | Continuous | T | NS | Note 3, Ref.20 |
| G191157 Sht.2 | Condensate | 4-C-20, 4-C-48 | To LCV-1A-2 ( to CRD pumps) | Water | 107 | CS-2 | Continuous | T | NS | Ref.20 |
| G191157 Sht.1 | Condensate | 10,14-C-21, 10-C-22 | Min flow line thru FCV-4 to main condenser Nzl.44 | Water | 107 | CS-2 | Start-up | T,U | NS | Ref.20 |
| G191157 Sht.1 | Condensate | 12-C-23 | LP Htr bypass line | Water | 107 | CS | Normally Closed | T,U | NS | V64-19 closed |
| G191157 Sht.1 | Condensate | 20-C-25, 20-C-26 | E-5s to E-4s | Water | 172 | CS-2 | Continuous | T | NS | Note 3, Ref.20 |
| G191157 Sht.1 | Condensate | 20-C-27, 20-C-28 | E-4s to E-3s | Water | 249 | CS-2 | Continuous | | SMC | Ref.20 |
| G191157 Shts.1&2 | Condensate | 20-C-29, 16,20,24 -C-30 16,20-C-31 & -32 | E-3s to Feedwater Pumps | Water | 309 | CS-2 | Continuous | | SMC | Ref.20 |
| G191157 Shts.1& 2 | Condensate | 6,8,12-C-33, 6-C-34 | Hotwell Emergency Makeup CST to condenser Nzl.45 Thru N.C. V64-31 | Water | 90 | CS-1 | Normally Closed | T,U | NS | |
| G191157 Sht.1 | Condensate | 4,6,C-33, | US/DS of LCV-1A-1 (Condenser Makeup LCV) bypasses N.C. V64-31 | Water | 90 | CS-1 | Normally Closed | T,U | NS | |
| G191157 Sht.1 | Condensate | 4,6-C-35 | Condenser hood spray Bypass (FVC-36) at Nzl.60 | Water | 107 | CS-2 | Start-up / Intermittent | T,U | NS | Ref.20 |
| G191157 Sht.1 | Condensate | 3,6-C-37, 3-C-38, 3-C-39 | Condensate Pump Casing Vent to Hotwell Nozzle 46 | Water | 105 | CS-1 | Open / Static | T | NS | Ref.20 |
| G191157 Shts.1& 2 | Condensate | 4-C-40 | SPE Loop Seal drain to Atm. Drain Tank | Water | <175 | CS-1 | Drain | T | NS | |
| G191157 Sht.1 | Condensate | 4-C-41, 2-1/2-C-41A &41B | SJAE loop seal drain to Cond Nzl.49 | Water | <175 | CS-1 | Drain | T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191157 Shts.1& 2 | Condensate | 8-C-42 | DS of valve V62-18 N.C. | Water | 107 | CS-1 | Static / N.C. | T,U | NS | |
| G191157 Shts.1& 2 | Condensate | 2-1/2-C-43 | US/DS of LCV-1A-3 (Condenser Reject LCV) | Water | 107 | CS-2 | Continuous | T | NS | SB Location No. 116 |
| G191157 Shts.1& 2 | Condensate | 3,4-C-44, 3-C-44A | Atmos. Drain Tank drain to Condenser Nozzle 63 | Water | 105 | CS-1 | Drain | T | NS | |
| G191157 Shts.1& 2 | Condensate | 2-1/2-C-45, 2-1/2-C-41B | SJAE afterconden. Loop seal drain line to Atm. Drn. Tk. | Water | 105 | CS-1 | Static / N.C. valve | T | NS | V64-46 is N.C. |
| G191157 Shts.1& 2 | Condensate | 2" C & 6"-C-46 | Atmos. Drain Tank overflow / drain to sump. | Water / Air | 105 | CS-1 | Drain | T | NS | Vented to Atmosphere |
| G191157 Sht.2 | Condensate | 3-C-47 | Atmos. Drn Tk vent to suction of Ventilation Exhaust Sys. | Air/Gas | 105 | CS-1 | Vent | T,NW | NS | |
| G191157 Shts.1 & 2 | Condensate | ¾" & 1"-C | Press. Line for RHR,CS, HPCI,RCIC in Rx. Bldg. thru PCV-32, & RO-64-2 to condenser nozzle 64 | Water | 107 | CS-1 | Continuous | T* | SSB* | SB Location No. 119 *Note 9 |
| G191157 Sht.1 | Condensate | ¾" & 1" | Condensate Pump Gland seal lines (R.O. 64-1A & 1B) | Water | 105 | CS-1 | Continuous | T* | SSB* | *Note 9 |
| G191157 Sht.1 | Condensate | ¾" & 1" lines at V64-26A,B,C | (SRV's SR-643A,B,C) & bypass lines | Water | 310 | CS-1 | Static - N.C Valve | U | NS | V64-27A,B,C N.C., Ref. 10 |
| G191157 Sht.1 | Condensate | 2"-C | Condenser Exhaust Hood Spray lines (FCV-5) | Water | 105 | CS-2 | Start-Up / Low Power | U,T | NS | |
| G191157 Sht.1 | Condensate | ¾" | ¾" SJAE bypass line with iun-identified FE OG-559 is N.C. | Water | 105 | CS | Static –N.C. Valve | U | NS | |
| G191157 Sht.1 | Condensate | 2"-C | 2" bypass around valves V64-25A & V64-25B | Water | 310 | CS-2 | Static –N.C. Valve | U | NS | V64-145A & B N.C., Ref. 10 |
| G191157 Sht.2 | Condemin | 8" CD-46 | Condemin Bypass Strainer Return to Condensate | Water | 107 | CS-2 | Intermittent | U,T | NS | |
| G191157 Sht.3 | Feedwater | 12,16,24-FDW-1 12,16-FDW-2, -3 18-FDW-7, -8 | Feedwater Pumps to E-2s) | Water | 312 | CS-5 | Continuous | | SMC | Ref.20 |
| G191157 Sht.3 | Feedwater | 18-FDW-12, -13 | E-2s to E-1s | Water | 344 | CS-5 | Continuous | | SMC | Ref 20 |
| G191157 Sht.3 | Feedwater | 16,18-FDW-14, -15 | E-1s to Rx | Water | 392 | CS-5 | Continuous | | SMC | Ref.20 |
| G191157 Sht.3 | Feedwater | 6-FDW-9 | 10% flow Feed Reg Valve. | Water | 312 | CS-5 | Start-up | U | NS | Ref.20 |
| G191157 Sht.3 | Feedwater | 18-FDW-10 | Equalizing line | Water | 312 | CS-5 | Continuous (Static) | | SMC | Flow at startup; Ref 20 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191157 Sht.3 | Feedwater | 10-FDW-11 | HP Heater Bypass line | Water | 312 | CS-5 | Normally Closed | U | NS | V63-5 N.C. |
| G191157 Sht.3 | Feedwater | 4-FDW-4, -5, -6 | Feed Pump Recirc: from 16" FDW to FCV 2A,B,C | Water | 312 | CS-5 | Normally Closed | U | SMC* | *Notes 3,5 |
| G191157 Sht.3 | Feedwater | 4-FDW-24, -25, -26 | Feed Pump Recirc: FCV 2A,B,C to 4x6 expander | Water | 312 | A335-P11 | Normally Closed | U,M | SMC* | *Notes 3,5 |
| G191157 Sht.3 | Feedwater | 6-FDW-4, -5, -6 | Feed Pump Recirc: 4x6 expander to Cond. Nzl. 32 | Water | 312 | CS-5 | Normally Closed | U | SMC* | *Notes 3,5,10 |
| G191157 Sht.3 | Feedwater | 8-FDW-22A & 22B | Feedwater HP Htr. flush from 18" FDW to V63-22A,B. | Water | 312 | CS-5 | Normally Closed | U | SMC* | *Notes 3,5, Ref.25 |
| G191157 Sht.3 | Feedwater | 8-FDW-22A & 22B | Feedwater HP Htr. flush from V63-22A,B. to V63-23A,B | Water | 312 | A335-P11 | Normally Closed | U,M | SMC* | *Notes 3,5, Ref.25 |
| G191157 Sht.3 | Feedwater | 8-FDW-22A & 22B | Feedwater HP Htr. flush from V63-23A,B to 5-FDW-22A,B. | Water | 312 | CS-5 | Normally Closed | U | SMC* | Notes 3,5, 10 Ref.25 |
| G191157 Sht.3 | Feedwater | 5-FDW-22A & 22B | FDW Htr. Flush U.S. of R.O. 2A-C & RO3A-C . | Water | 312 | A335-P11 | Normally Closed | U,M | SMC* | Notes 3,5, Ref.25 |
| G191157 Sht.3 | Feedwater | 10-FDW-23A &23B | R.O. 2A-C & R.O. 3A-C to Condenser Nzl. 70 | Water | 312 | A335-P11 | Normally Closed | U,M | SMC* | Notes 3,5, Ref.25 |
| G191157 Sht.3 | Feedwater | 1/2" & ¾" | Feed pump Warm-up lines (R.O.4) | Water | 312 | CS-1 | Continuous | | SSB | Ref.13 |
| G191157 Sht.3 | Feedwater | 2" | 2" bypass around valves V63-7A & V63-7B | Water | 392 | CS-5 | Static N. C. Valve | U | NS | Ref.13 |
| G191157 Sht. 3 | Air Evacuation | 10,16,-AE-1, 10-AE-2 8,10-AE-3 10,14-AE-4 2" & Smaller | Air Evacuation System from condenser to SJAE and P-53-1A | Air, Gases | <175 | CS-1 | Continuous | NW | NS | |
| G191157 Sht. 3 | Off Gas | 10-OG-1 10,16-OG-2 10-OG-3,3-OG-11 | Off Gas Piping from SPE | Air, Gases | <175 | CS-1 | Continuous | NW | NS | |
| G191157 Shts. 2&3 | Off Gas | 1/1/2" -OG-5 | Drain from Shutdown Iodine Filter to Atmos. Drain Tank | Water | <175 | CS-1 | Static No Flow to SIF | T | NS | |
| G191157 Sht.1 | Off Gas | 10, 12-OG-100 | Off Gas Piping from SJAE to AOG ( thru Valve OG-557) | Air, Gases | <175 | CS-1 | Continuous | NW | NS | |
| G191157 Sht.2 | Off Gas | SIF-1, SIF-2, SIF-3, SIF-4 | 16" inlet & outlet piping at Shutdown Iodine Filter | Air, Gases | <175 | CS-1 | Static N.C. Valves | NW | NS | |
| G191157 Sht.1 | Oxygen Injection | All | Condensate Oxygen Injection From Manifolds to 24"-C-6 | $O_2$ | Ambi-ent | SS Tubing | Continuous | M,NW | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191157 Sht.2 | SPE Drip Leg Loop Seal | 1-1/2" vent | SPE Header Drip Leg Loop Seal vents to line 3"C-47 | Gases | <195 | CS | Continuous | NW | NS | |
| G191157 Sht.2 | SPE Drip Leg Loop Seal | 1" ,1-1/2" drain | SPE Header Drip Leg Loop Seal drain to TK-3-1A. | Water | <195 | CS | Continuous | | SSB | |
| G191158 | Heater Drains | 6-HD-1A, & -1B (3" @ LCV) | E-1-1A to LCV-103-1A-1 E-1-1B to LCV-103-1B-1 | Water | 354 | CS-2 | Continuous | | SMC | Refs.20,24 |
| G191158 | Heater Drains | 3-HD-1A, & -1B | LCV-103-1A-1/1B-1 to E-2-1A/B | Water | 354 | A335-P11 | Continuous | M | NS | Refs. .20,24 |
| G191158 | Heater Drains | 6-HD-2A/ -2B 3,10-HD-18A /18B | E-1-1A/B to E-2-1A/B Condenser Bypass Lines | Water | 354 | CS-2 | Normally Closed | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 8,10-HD-3A, & -HD-3B | E-2-1A/B to LCV-103-2A/B-1 | Water | 322 | CS | Continuous | | SMC | Ref.20 |
| G191158 | Heater Drains | 3,10-HD-23A & -HD-23B | LCV-103-2A/B-1 to E-3-1A/B | Water | 322 | SS | Continuous | M | NS | SA240-304L Ref.20 |
| G191158 | Heater Drains | 6-HD-4A, & -4B 6-HD-19A & -19B | E-2-1A/B to E-3-1A/B Condenser Bypass Lines | Water | 322 | CS | Normally Closed | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 10,14-HD-5A, HD-5B | E-3-1A/B to LCV-103-3A/B-1 | Water | 250 | CS | Continuous | | SMC | Ref.20 |
| G191158 | Heater Drains | 6,20-HD-24A & HD-24B | LCV-103-3A/B-1 to E-4-1A/B | Water | 250 | SS | Continuous | M | NS | A430, TP-308L, Ref.20 |
| G191158 | Heater Drains | 6-HD-6A, & -6B 6,18-HD-20A/20B | E-3-1A/B to E-4-1A/B Condenser Bypass Lines | Water | 250 | CS | Normally Closed | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 16-HD-7A, -7B 14-HD-25A -25B | E-4-1A/B to E-5-1A/B | Water | 182 | CS | Continuous | | SMC | Ref.20 |
| G191158 | Heater Drains | 16-HD-8A, -8B 10,18-HD-21A/B | E-4-1A/B to E-5-1A/B Condenser Bypass Lines | Water | 182 | CS | Normally Closed | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 8,12-HD-9A, -9B | P-3-1A/B suction and discharge | Water | <182 | CS | N.C. used @ <70% Power | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 4-HD-10A, -10B | P-3-1A/B min flow lines | Water | <182 | CS | N.C. used @ <70% Power | U | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 16,20-HD-14A/B, 16,24-HD-17A-D | E-5-1A/B to E-6-1A/B (condenser) | Water | 117 | CS | Continuous | T | NS | Note 3, Ref.20 |
| G191158 | Heater Drains | 3-HD-26A /B | E-5-1A/B external reference leg for level controls | Water | 117 | CS-1 | Static | T,U | NS | |
| G191158 | Moisture Separator Drains | 6,24-HD-11A-11D 6-HD-12A –12D | MS-1-1A-D to LCV-24A-D | Water | <440 | CS-2 | Continuous | | SMC | |

# TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191158 | Moisture Separator Drains | 6,14-HD-15A & 15B | LCV-24A-D to E-2-1A & 1B | Water | <440 | A335-P22 | Continuous | M | SMC* | Notes 3,5 |
| G191158 | Moisture Separator Drains | 4,6-HD-13A-13D | MS-1-1A-D to LCV-23A-D (Bypass to Condenser) | Water | <440 | CS-2 | No flow, Normally Closed | U | NS | Note 5 |
| G191158 | Moisture Separator Drains | 4,6-HD-16A-16D | LCV-23A-D to Condenser | Water | <440 | A335-P22 | No flow, Normally Closed | U,M | NS | Note 5 |
| G191158 | Heater Vents | 1-HV-1A/1B | E-1-1A/B Shell Start-up Vent US/DS of V67-1A/1B to Condenser B - Nozzle 25 | Gases / Vapor | <440 | A335-P11 | Start up | U, M | NS | Ref.24 |
| G191158 | Heater Vents | 2-HV-12A/12B | E-1-1A/B Shell Continuous Vent US/DS of R.O. 1A/1B to common 2 inch line to Cond. B Nozzle 25A | Gases / Vapor | <440 | A335-P11 | Continuous | M | NS | Ref.24 |
| G191158 | Heater Vents | 1-HV-14A/14B | 1 inch Bypass around R.O. 1A & 1B | Gases / Vapor | <440 | A335-P11 | Static N.C. Valve | U,M | NS | Ref. 10, 24 |
| G191158 | Heater Vents | 1-HV-2A/2B | E-2-1A/B Shell Start-up Vent US /DS of V67-4A/4B to condenser A –Nozzle 24 | Gases / Vapor | <400 | A335-P11 | Start Up | U,M | NS | Ref.24 |
| G191158 | Heater Vents | 1-HV-13A/13B | E-2-1A/B Shell Continuous Vent to Cond. B (Nzl. 24) US & DS of R.O. 2A &2B | Gases / Vapor | <400 | A335-P11 | Continuous | M | NS | Ref.24 |
| G191158 | Heater Vents | 1-HV-15A/15B | 1 inch Bypass around R.O. 2A & 2B | Gases / Vapor | <400 | A335-P11 | Static N.C. Valve | U,M M | NS | Ref.10, 24 |
| G191158 | Heater Vents | 1, 1-1/2-HV-3A/3B | E-3-1A/B Drain Cooler Startup Vent US/DS of V67-7A &7B to Cond. A (Nzl. 23) | Gases / Vapor | <300 | CS-1 | Start Up | U | NS | Note 3, SB Location Nos. 46,47,51,52 |
| G191158 | Heater Vents | 3/4-HV-8A/8B | E-3-1A/B to V67-15A/B, Shell Start-up Vent | Gases / Vapor | <300 | SS | Start Up | U,M | NS | |
| G191158 | Heater Vents | 2-HV-9A/9B | E-3-1A/B Shell Continuous Vent US/DS of R.O. 3A/3B to Cond. A Nzl. 23B. | Gases / Vapor | <300 | CS | Continuous | | SSB | SB Location Nos. 48,49,50, 53,54,55 |
| G191158 | Heater Vents | 2-1/2-HV-4A/4B | E-4-1A/B Shell Start-up Vent US/DS V67-9A/9B to Condenser B (Nzl. 22) | Gases / Vapor | <370 | CS-2 | Start Up | U | NS | SB Location Nos. 56,58,59,61 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191158 | Heater Vents | 2-1/2,4-HV-8A | E-4-1A/B Shell Continuous US/DS of R.O. 4A/4B to common 4 inch line to Cond. A Nozzle 22B | Gases / Vapor | <370 | CS-2 | Continuous | | SSB | SB Location Nos. 57,60,118 |
| G191158 | Heater Vents | 3,4-HV-11A/11B | E-5-1A/B Vent to Condenser A/B (Nzl. 21A/21B) | Gases / Vapor | <168 | CS-1 | Continuous | T | NS | |
| G191158 | Heater Vents | 1-HV-5A/5B | E-5-1A/B Start-up Vent to Condenser A/B (Nzl. 21A/B) (V67-11A &11B ) | Gases / Vapor | <168 | CS-1 | Start Up | U,T | NS | |
| G191158 | Heater Vents | 3/4-HV | HD Pump P-3-1A/B Vent to E-4-1A/B | Gases / Vapor | <163 | CS-1 | Start Up | U,T | NS | |
| G191158 | Heater Vents | 2-HV | HD Pump P-3-1A/B Vent to Condenser B (Nzl 50) | Gases / Vapor | <163 | CS-1 | Start Up | U,T | NS | |
| G191158 | Moisture Separator Vents | 3-HV-6A to 6D | MS-1-1A to D, shell to drain tank TK-1-1A vent | Gases / Vapor | <380 | CS-2 | Static / Equalizing Line | U | NS | |
| G191158 | Moisture Separator Vents | 6-HV-7A to 7D | MS-1-1A to D, drain line to tank TK-1-1A equalizing line. | Gases / Vapor | <380 | CS-2 | Static / Equalizing Line | U | NS | |
| G191158 | Safety Relief | 6-SRV-7A/B | Heater Shell Safety Relief E-1-1A/B to Conden B (Nzl. 29) | Steam | <380 | CS-2 | No Flow (Relief line) | U | NS | |
| G191158 | Safety Relief | 6-SRV-8A/B | Heater Shell Safety Relief E-1-2A/B to Conden A (Nzl. 28) | Steam | <333 | CS-2 | No Flow (Relief line) | U | NS | |
| G191158 | Safety Relief | 1-SRV | Heater Tube Side Safety Relief E-1-2A/B to Conden A (Nzl. 30) | Steam | <327 | CS-2 | No Flow (Relief line) | U | NS | |
| G191158 | Safety Relief | 6-SRV-9A/B | Heater Shell Safety Relief E-1-3A/B to Conden A (Nzl. 27) | Steam | <300 | CS-1 | No Flow (Relief line) | U | NS | |
| G191158 | Safety Relief | 6-SRV-10A/B | Heater Shell Safety Relief E-1-4A/B to Conden B (Nzl. 26) | Steam | <234 | CS-1 | No Flow (Relief line) | U | NS | |
| G191158 | Safety Relief | 1-SRV | Heater Tube Side Safety Relief E-1-5A/B to 10-AE-4 | Steam | <168 | CS-2 | No Flow (Relief line) | U | NS | |
| G191159 Sht.1 & 2 Sht.6 | Service Water & AOGCCW | All | All | Raw Water | 32 to 150 | CS/SS, Copper | Continuous | O2,T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191159 Sht.3 & 5 | RBCCW | All | All | Treated Water | 32 to 150 | CS-1, | Continuous | T | NS | |
| G191159 Sht.4 | TBCCW | All | All | Treated Water | 32 to 150 | CS-1, Copper | Continuous | T | NS | |
| G191160 Shts . 1 to 4 & Sht.8 | Instrument Air | All | All | Air | 150 | CS-1 | Continuous | NW | NS | |
| G191160 Sht. 5 & 6 | Service Air | All | All | Air | 150 | CS-1 | Continuous | NW | NS | |
| G191160 Sht. 7 | Diesel Generator Starting Air | All | Diesel Generator Starting Air & Air Inlets and Exhausts | Air | 150 | CS-1 | Continuous | NW | NS | |
| G191161 | Makeup Water Treatment | All | Raw Water & Demineralized Water | Raw Water | <175 | CS-1 | Continuous | O2,T | NS | |
| G191162 Sht. 1 | Lube Oil | All | Turbine & Recirc Pump MG Set Lube Oil | Lube Oil | 100 & 250 | CS-1 | Continuous | NW | NS | |
| G191162 Sht.2 | Fuel Oil | All | Diesel Generator, House Heating , & Diesel Fire Pump Fuel Oil | Fuel Oil | 100 | CS-1 | Continuous | NW | NS | |
| G191162 Sht.3 | Exhaust Stack & Off Gas | All | Exhaust Stack & Off Gas | Gas | 175 | CS-1 | Continuous | NW | NS | |
| G191162 Sh.4 | Gas Control Piping | All | Generator CO2 & H2 Piping | Gas | | | Continuous | NW | NS | |
| G191162 Sh.5 | Generator Shaft Seal | All | Generator H2 & Seal Oil Piping | Gas/Oil | | | Continuous | NW | NS | |
| G191162 Sh.6 | Hydrogen Piping | ALL | H2 Piping from Trailer to Turbine Building | H2 | <150 | S.S | Continuous | NW | NS | |
| G191162 Sh.7 | Stator Winding Cooling | All | Skid and piping to stator. Closed loop cooling system | De-ionized H2O | <212 | CS/CU | Continuous | O2 | NS | |
| G191163 Shts 1 & 2 | Fire Protection | All | Fire Protection Piping : Inner & Outer Loops | Raw Water | 100 | A53 & A-120 | No Flow | O2 | NS | |
| G191163 Sht. 3 | Fire Protection | All | Low Pressure CO2 | $CO_2$ | | CS | No Flow | NW | NS | |
| G191163 Sht. 4 | Fire Protection | All | CO2 piping and bottle racks for Cable Vault / SWGR Rms | $CO_2$ | | CS | No Flow | NW | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191164 | Sampling System Sh.1 | All | Process Sampling Line | Water | | SS | | M | NS | |
| G191165 | Sampling System Sh.2 | All | Process Sampling Line | Water | | SS | | M | NS | |
| G191166 | Circ. Water | All | Circulating Water System & Associated Piping | Raw Water | <150 | CS | Continuous | O2 | NS | |
| G191167 | Main Steam | 18-MS-7A to -7D | MS from Rx to V2-86A -86D | Sat Steam | 540 | CS-5 | Continuous | | SMC | Ref. 20 |
| G191167 | Main Steam | 10-MS-4A | MS 18-MS-7D to HPCI Turb. | Sat Steam | 540 | CS-5 | Static | U | NS | Ref. 20 |
| G191167 | Main Steam | 3-MS-5A | MS 18-MS-7C to RCIC Turb. | Sat Steam | 540 | CS-5 | Static | U | NS | Ref. 20 |
| G191167 | Main Steam Drains | 3-MSD-2 | MSD Drain Header in Drywell thru Pen. X-8 (US of V2-77) | Steam/ Condensate | 540 | CS-5 | Start-Up | U | NS | Ref. 20 |
| G191167 | Main Steam Drains | 1-1/2,2-1/2 & 3-MSD-3 | MSD Header in Stm Tunnel to 3-MS-3 in Torus Area between MS-77, -79, & -78 | Steam/ Condensate | 540 | CS-5 | Start-Up | U | NS | Ref. 20, Note 8 |
| G191167 | Main Steam Drains | 3-MSD-4 | MSD drain header D.S. of V2-79 Torus Area & Htr. Bay to condenser nozzle 45. | Steam/ Condensate | 540 | CS-5 | Intermittent | | SNM/SSB | SB Locations No. 4 & No. 5 Note 8. |
| G191167 | Main Steam Drains | 3-MSD-5 | MSD drain header to CRW (N.C. line ) | Steam/ Condensate | 540 | CS-5 | Normally Closed | U | NS | Note 8 |
| G191167 | Main Steam Drains | 6-MSD-10 | MSD drip leg MS-1-1A | Steam/ Condensate | 540 | CS-5 | Intermittent | | SNM | Note 8 |
| G191167 | Main Steam Drains | 1,2,2-1/2-MSD-11 | From 3" MSD-4 thru ST-60-3 to tee with line 2-1/2-MSD-12 | Steam/ Condensate | 540 | CS-5 | Intermittent | | SSB | SB Location No. 2, Note 8 |
| G191167 | Main Steam Drains | 1,2-1/2-MSD-12 | MSD around ST-60-3 thru LCV-143 to line 3-MSD-4 | Steam/ Condensate | 540 | CS-5 | Intermittent | | SSB | SB Location No. 3, Note 8 |
| G191167 | Main Steam Drains | 2-MSD-1 | MSD from 6"MSD-10 drip leg to 2-1/2"MSD-3 | Steam/ Condensate | 540 | CS-5 | Intermittent | | SSB | Note 8 |
| G191167 | Main Steam Drains | 2", 1" -MSD | MSD piping immediately downstream of V60-24 | Steam/ Condensate | 540 | A335-P11 | Intermittent | | NS | Note 8 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191167 | Main Steam Drains | 1-MSD | MSD from HPCI & RCIC Stm Supply in Drywell to 3-MSD-2 (US of V23-15 & V23-15) | Steam/ Condensate | 540 | CS-5 | Start-Up | U | NS | Note 8 |
| G191167 | Main Steam Drains | 2-MSD | MSD from 18-MS-7A to D in Drywell to 3-MSD-2 | Steam/ Condensate | 540 | CS-5 | Start-Up | U | NS | Note 8 |
| G191167 | Main Steam Drains | 1- MSD | MSD MS-79 bypass (open thru orificed valve MS-33) . | Steam/ Condensate | 540 | CS-5 | Continuous | | SSB | SB Location No.1, Note 8 |
| G191167 | Main Steam Drains | 1-MSD | MSD from HPCI/ RCIC Stm. Supply outside Drywell to 2"MSD-1 (US of V23-16 & V23-16) | Steam/ Condensate | 540 | CS-5 | Static - N.C. Valve | U | NS | Note 8 |
| G191167 | Rx Recirc. | 12,22,28-PLR. | Rx Recirculation Piping in Drywell. | Water | 540 | SA316L | Continuous | M | NS | |
| G191167 | Feedwater | 16-FDW-14/15 | FDW in Turb. Bldg. & Stm. Tunnel up to V2-96B & -27B Turb. | Water | 392 | CS-5 | Continuous | | SMC | Ref.20 |
| G191167 | Feedwater | 16-FDW-16/17 | FDW in Stm. Tunnel & Drywell up to V2-29A/B. | Water | 392 | CS-5 | Continuous | | SMC | Ref.20 |
| G191167 | Feedwater | 16,10-FDW-18 to –FDW-21 | FDW in Drywell from V2-29A/B to Reactor. | Water | 392 | CS-5 | Continuous | | SMC | Ref.20 |
| G191167 | Rx Safety Relief | 10-SRV –15A to -15D | SRV in Drywell & Torus | Steam | <540 | CS-2 | No Flow (Relief line) | U | NS | |
| G191167 | Rx. Water Clean Up | 2-CUW | Rx Btm. Head Drain (N-15) to SS weld at bottom of CRDs | Water | <540 | CS | Continuous | | SSB | |
| G191167 | Rx. Water Clean Up | 2-CUW | Rx Btm. Head Drain SS weld at bottom of CRDs to V2-99 | Water | <540 | SS | Continuous | M | NS | |
| G191167 | Rx. Water Clean Up | 2-CUW-19 | Rx Btm. Head Drain V2-99 to 4" CUW-18 | Water | <540 | SS | Continuous | M | NS | |
| G191167 | Rx. Water Clean Up | 4-CUW-18 | CUW from RHR to V12-16 | Water | <540 | SS | Static N.C. Valve | M | NS | |
| G191167 | Rx. Water Clean Up | 2-CUW | Rx Btm. Head Drain DS of Valve V2-46 to floor drain | Water | <540 | CS | Static N.C. Valve | U | NS | |
| G191167 | RV Top Head Vent | 1", 2 " | Vent Line N-7 to FCV-2-17, and Rx Vessel Instrument. | Steam | 540 | SS | Static | M | NS | |
| G191167 | RV Top Head Vent | 2 " | Vent Line N-7 to 18"MS-7C | Steam | 540 | SS | Continuous | M | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191167 | RV Top Head Vent | 1",2 " | Drain Line from FCV-2-18 and FCV-2-21 to Drywell Equipment Sump | Water/ Steam | <540 | CS | Intermittent | | SSB | |
| G191167 | RV Flange Leakoff | ½", 1" | RV Flange High Pressure leakoff N-13 to LCV-2-21 | Steam/ Condensate | <540 | SS | Intermittent | M | NS | |
| G191167 | RV Flange Leakoff | ½", 1" | RV Flange Low Pressure leakoff N-14 (capped line) | Steam/ Condensate | <540 | CS | Static | U | NS | |
| G191168 | Core Spray | 12-CS-1A/B<br>10-CS-2A/B<br>8-CS-3A/B<br>8-CS-4A/B(partial) | Core Spray from Torus to 6 inches beyond valves CS 12A/B | Water | <175<br><175<br><575<br><575 | CS-1<br>CS-2<br>CS-5<br>CS-5 | ECCS | U,T | NS | |
| G191168 | Core Spray | 8-CS-4A/B(partial) | Core Spray from beyond valves CS 12A/B to Rx. | Water | <575 | S.S. | ECCS | U,M,T | NS | |
| G191168 | Core Spray | 1-1/2-CS-8A/8B<br>3-CS-5A/5B | SRV-20A/B suction & disch. to Rx. Bldg. floor sumps. | Water | <175 | CS-2<br>CS-1 | ECCS | U,T | NS | |
| G191168 | Core Spray | 8-CS-6A/6B | Core Spray full flow test line to 12-RHR-17/18 &Torus | Water | <175 | CS-2 | ECCS | U,T | NS | |
| G191168 | Core Spray | 8-CS-6A/6B | Core Spray full flow test line DS of RO 42A and 42B | Water | <175 | CS-2 | ECCS | U,T* | SNM* | Note 9 |
| G191168 | Core Spray | 3-CS-7A to 7D | Core Spray connect. to RHR Normally Closed Valves CS-16A/B | Water | <175 | CS-2 | Static | U,T | NS | |
| G191168 | Core Spray | 3-CS-11A/11B | CS Pump Min Flow Lines to 12-RHR-17/18 & Torus | Water | <175 | CS-2 | ECCS | U,T | NS | |
| G191168 | Core Spray | 3-CS-11A/11B | CS Pump Min Flow Lines DS of R,O, 37A and 37B | Water | <175 | CS-2 | ECCS | U,T * | SMN * | Note 9 |
| G191168 | Core Spray | 2-CS-9A/9B | Core Spray Pump Min Flow Line RO bypass N.C. valve CS-27A /27B. | Water | <175 | CS-2 | ECCS | U | NS | |
| G191168 | Core Spray | 2-CS-10A/10B | Core Spray flushing line from CST . N.C. valve CS-21A /2B. | Water | <175 | CS-2 | ECCS | U | NS | |
| G191168 | Core Spray | 1-CS-12A/12B | 1 inch line to core dp above core plate instruments. | Water | <575 | SS-6 | ECCS | U,M | NS | |
| G191168 | Core Spray | 1-CS-13A/13B | 1 inch line pressurizing line from Condensate. | Water | <175 | CS-2 | ECCS | U | NS | |
| G191168 | Condensate Storage | 12-CST4<br>12-CST-27 | 12 inch line from CST. N.C. valves CS-8A & CS-8B. | Water | <175 | CS-2 | ECCS | U | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191169 Sht.1 & 2 | HPCI | 14,16-HPCI-1 | HPCI Pump suction from CST | Water | <175 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 14-CST-1 | HPCI Pump suction from CST | Water | <175 | SS-1 | ECCS | U,M | NS | |
| G191169 Sht.1 & 2 | HPCI | 10-HPCI-18<br>14-HPCI-2,<br>14-HPCI-15B/15A | HPCI Pump discharge to RX | Water | <175<br><140<br><400 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 18,20,24-HPCI-3 | HPCI Turbine Exhaust to Torus | Steam | <350 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 16-HPCI-14A / 14B | HPCI Turbine Exhaust to Torus Rupture Disc. | Steam | <350 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 16-HPCI-4 | HPCI Pump suction from Torus | Water | <175 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 10-HPCI-5 | HPCI Test line to CST from 14-HPCI-15B to V-23-24 | Water | <140 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | CST | 10-CST-2 | HPCI Test line to CST (from V23-24 to CST) | Water | <140 | SS-1 | ECCS | U,M | NS | |
| G191169 Sht.1 & 2 | HPCI | 4-HPCI-6<br>4-HPCI-7 | HPCI Pump Min. Flow line | Water | <175 | CS-5<br>CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2-HPCI-8<br>2-HPCI-9 & -12 | Coolant for HPCI Gland Seal Condenser (suction & disch.) | Water | <140<br><175 | CS-2<br>CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2-HPCI-10<br>2-HPCI-11 | Coolant for HPCI Lube Oil Cooler (suction & discharge) | Water | <140<br><175 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2,4-HPCI-12 | Gland Seal Condenser Coolant discharge back to HPCI pump suction | Water | <175 | CS | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 3-HPCI-13 | Gland Seal Exhauster Discharge to SBGT | Gas / Water Vapor | <175 | CS | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2-HPCI-16 | HPCI Turbine Exhaust Drain line to Torus | Stm./ Water | <375 | CS | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2-HPCI-17 | HPCI Turbine Hotwell to HPCI Pump suction. | Water | <200 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 2,3-HPCI-19 | HPCI Turbine Exhaust to Torus Air Space Vacuum Breaker. | Air/N2/ Steam | <350 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 1-HPCI | HPCI Turbine discharge drain to gland seal condenser. | Water | <175 | CS-1 | ECCS | U | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191169 Sht.1 & 2 | HPCI | 1-HPCI | From HPCI gland seal condenser to hotwell. | Water | <175 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 1-HPCI | 1 inch line pressurizing line from Condensate. | Water | <175 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 1-HPCI | 1" vent line between rupture discs on 14-HPCI-14B. | Air | <175 | CS-1 | No Flow | U | NS | |
| G191169 Sht.1 & 2 | HPCI | 1-HPCI | To floor drain through LCV-39 & LCV-40 | Water | <200 | CS-1 | No Flow | U | NS | |
| G191169 Sht.1 & 2 | Main Steam | 10-MS 4A/4B | MS Supply from Rx to V-23-14 | Steam | 540 | CS-5 | Static/ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD | HPCI Turb. Casing Drain to Exhaust Steam Drain Pot. | Steam | 540 | CS-1 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1, 3/4-MSD (HPCI Skid) | HPCI Turb. Ring Drain to Exhaust Steam Drain Pot. | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 3/4-MSD(HPCI Skid) | HPCI Turb. Chest Drain to Exhaust Steam Drain Pot. | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | ¾ -MSD (HPCI Skid) | HPCI Turb. Seat Drain to Exhaust Steam Drain Pot. | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD (HPCI Skid) | HPCI Turb. Shaft Seal L.P.Leakoff to Gland Seal Condenser . | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD Two Lines (HPCI Skid) | HPCI Turb. Control Valve Stem Leakoff to Gland Seal Condenser . | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD HPCI Skid | HPCI Turb. Stop Valve Stem Leakoff to Gland Seal Condenser . | Steam | 540 | CS-5 | ECCS | U | NS | |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD | HPCI MS Drain Pot to HPCI LCV-53 to intersection of line D.S. of ST-3. | Condensate | 540 | CS-5 | Continuous | | SSB | SB Location No. 122, Note 8 |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD | HPCI MS Drain Pot to ST-3 to intersection of line D.S. of HPCI LCV-53 | Condensate | 540 | CS-5 | Continuous | | SSB | SB Location No. 123, Note 8 |
| G191169 Sht.1 & 2 | Main Steam Drains | 1-MSD | HPCI MS Drain piping US & DS of HPCI FCV-42 | Condensate | 540 | CS-5 | Continuous | | SSB | SB Location No. 124, Note 8 |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191169 Sht.1 & 2 | Main Steam Drains | 1', 2"-MSD | HPCI MS Drain piping & fittings D.S. of HPCI FCV-43 to Condenser @ Conn. 56 | Condensate | 540 | A335-P11 | Continuous | M | NS | SB Locations No. 31 & 33 ( Note 4), Note 8 |
| G191170 | Control Rod Drive | 4" & 3" CRD-1A/1B | CRD Pumps P-38-1A/B Suction - | Water | <150 | CS-1 | Continuous | T | NS | |
| G191170 | Control Rod Drive | 2-1/2-CRD-2 | CRD return to RWCU Return | Water | <150 | CS-5 | Continuous | T | NS | |
| G191170 | Control Rod Drive | 2-1/2 & 3-CRD-3 | Old return line to Rx through Pen X-36. Cut & capped. | Water | <150 | SS-5 | No Flow | M/U | NS | |
| G191170 | Control Rod Drive | 10-CRD-4 & 4A 6-CRD-5 & 5A 6-CRD-6 & 6A 6-CRD-7 & 8 | Scram Discharge Volume & Headers | Water | <280 | CS-4 | Post Scram | U | NS | |
| G191170 | Control Rod Drive | 2-1/2-CRD-9 | CRD Return to RWCU Return DS of check valve CUW-181 | Water | <575 | CS-5 | Continuous | | SMC | |
| G191170 | Control Rod Drive | 2-CRD | CRD Pump Discharge to Filters F-16-1A/1B | Water | <150 | CS-5 | Continuous | T | NS | |
| G191170 | Control Rod Drive | 2-CRD | Filters F-16-1A/1B to FCV-19A/B | Water | <150 | SS-5 | Continuous | M,T | NS | |
| G191170 | Control Rod Drive | 1 & 1-1/2CRD | FCV-19A/B to PCV-20 & PCV-22 to 2-1/2 CRD-2 | Water | <280 | SS-5 | Continuous | M | NS | |
| G191170 | Control Rod Drive | 1 CRD | Drive Water & Cooling Water to HCUs | Water | <280 | SS-5 | Continuous | M | NS | |
| G191170 | Control Rod Drive | 2-CRD | Charging Water to HCUs | Water | <280 | SS-5 | Continuous | M | NS | |
| G191170 | Control Rod Drive | 1-CRD | Exhaust Water from HCUs to 2-1/2-CRD-2 | Water | <280 | CS | During Rod Movement | U | NS | |
| G191170 | Control Rod Drive | 1 & 3/4-CRD | Insert & Withdraw lines (89 Total) | Water | <280 | SS | Continuous | M | NS | |
| G191170 | Control Rod Drive | 1 & 1-1/2-CRD | CRD Pump Min Flow to 10-CST-2 | Water | <150 | CS | Continuous | T, U | NS | |
| G191170 | Control Rod Drive | 1-CRD | CRD Pump Min Flow DS of R.O.s 24A/B & 25A/B | Water | <150 | CS | Continuous | T,U* | SSB* | Note 9 |
| G191171 | Standby Liquid Control | All | SLC Piping | Borated Water | | SS | Static | M,U | NS | |
| G191172 | RHR | 20-RHR-1A to 1D | RHR Pump Suction from Recirc. | Water | <300 | CS-1 | Shutdown Cooling | U | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191172 | RHR | 20,24,26-RHR-2A to 2D | RHR Pump Suction from Torus | Water | <300 | CS-1 | ECCS & Torus Cooling | U | NS | |
| G191172 | RHR | 20,24,26-RHR-2A to 2D | RHR Pump Discharge to RHR Hx. | Water | <300 | CS-2 | ECCS & Torus Cooling | U | NS | |
| G191172 | RHR | 4-RHR-4,4A,4B | RHR to Rad Waste | Water | <300 | CS-1/2 | Normally Closed | U | NS | |
| G191172 | RHR | 16-RHR-5A/5B<br>20,24-RHR-6 & 7 | RHR Hx. Discharge & Bypass | Water | <300 | CS-2 | Shutdown & Torus Cooling | U | NS | |
| G191172 | RHR | 20-RHR-8 | Train A to B cross connection Normally Closed. | Water | <262 | CS-2 | No Flow | U | NS | |
| G191172 | RHR | 12,14,16-RHR-9 | Containment Spray Lower Header | Water | <262 | CS-2 | LOCA | U | NS | |
| G191172 | RHR | 12,14-RHR-14 | Containment Spray Upper Header | Water | <300 | CS-2 | LOCA | U | NS | |
| G191172 | RHR | 4-RHR-11 & 16<br>4-RHR-21 & 22 | RHR Hx. to Torus (Torus Spray) | Water | <300 | CS-1 | LOCA | U | NS | |
| G191172 | RHR | 12-RHR-10 & 15<br>12-RHR-12 & 17<br>12-RHR-20 & 23 | RHR Hx. to Torus (Torus Cooling) | Water | <300 | CS-2 | Shutdown & Torus Cooling | U | NS | |
| G191172 | RHR | 3,4-RHR-13A to D<br>4-RHR-24A & 24B | RHR Pump Min-flow lines | Water | <300 | CS-2 | Shutdown & Torus Cooling | U | NS | |
| G191172 | RHR | 24-RHR-6 & 28,<br>24-RHR-7 & 29 | LPCI & Shut Down Cooling to RX | Water | <300<br><575 | CS-2 | ECCS, Shut Down Cooling | U | NS | |
| G191172 | RHR | 24-RHR-30, & -31 | LPCI & Shut Down Cooling to RX | Water | <575 | SS-6 | ECCS, Shut Down Cooling | M | NS | |
| G191172 | RHR | 4-RHR-26A - 26D<br>4-RHR-27A - 27D<br>4-RHR-44A - 44D<br>4-RHR-45A - 45D<br>4-RHR-42A - 42D<br>4-RHR-43A - 43B | Drain Lines to Rx floor drain Sump or to Rad Waste | Water | <300 | CS-1 | N.C. Drain | U | NS | |
| G191172 | RHR | 20-RHR-32 | RHR suction from Recirc. Loop in Drywell | Water | <575 | SS-6 | Shut Down Cooling | M | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191172 | RHR | 20-RHR-33 | RHR suction from Recirc. In Drywell at V-18 to V-17 | Water | <575 | CS-5 | Shut Down Cooling | U | NS | |
| G191172 | RHR | 4-RHR-35A & 35B<br>4-RHR-36A & 36B<br>4-RHR-37A & 37B<br>4-RHR-38A - 38C | Filling & Flushing Lines from CST | Water | <300 | CS-2<br>CS-1 | Normally Closed | U | NS | |
| G191172 | RHR | 8-RHR-39 | From Fuel Pool Cooling System to RHR pump suction | Water | <150 | CS-1 | Normally Closed | U,T | NS | |
| G191172 | RHR | 8-RHR-40 | To Fuel Pool from RHR Hx. A | Water | <262 | CS-2 | Normally Closed | U | NS | |
| G191172 | RHR | 10-RHR-41A/B | Tie in from Service Water | Water | <262 | CS-2 | Normally Closed | U | NS | |
| G191173 Shts. 1 & 2 | FPC | All | FPC & Enhanced FPC | Water | <175 | CS & SS | | T | NS | |
| G191174 Sht.1 & 2 | RCIC | 4-RCIC-1<br>4-RCIC-8B/8A | RCIC Pump to 16-FDW-15 | Water | <175<br><450 | CS-5 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 4-RCIC-2 | RCIC Flow Test Line to 10-HPCI-5 & CST | Water | <140 | CS-5 | ECCS | U,T | NS | |
| G191174 Sht.1 & 2 | RCIC | 6-RCIC-3 | RCIC Pump Suction from Torus | Water | <175 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 6-RCIC-7 | RCIC Pump Suction from CST | Water | <175 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | CST | 6-CST-3 | RCIC Pump Suction from CST | Water | <325 | SS-1 | ECCS | M | NS | |
| G191174 Sht.1 & 2 | RCIC | 8-RCIC-4 | RCIC Turbine Exhaust to Torus | Steam | <325 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 8-RCIC-5A/5B | RCIC Turbine Exhaust to Torus Rupture Disk | Steam | <325 | CS-1 | ECCS / Static | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 3-RCIC-6 | RCIC Turbine Exhaust Drip Leg | Steam | <325 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 2-RCIC-9<br>2-RCIC-10 | RCIC Pump Min Flow Line to 12-RHR-17 | Water | <175 | CS-5<br>CS-1 | ECCS | U,T | NS | |
| G191174 Sht.1 & 2 | RCIC | 2-RCIC-11<br>2-RCIC-12 | RCIC Pump Disch. to L.O. Cooler & Barometric Condenser | Water | <175 | CS-5<br>CS-1 | ECCS | U,T | NS | |
| G191174 Sht.1 & 2 | RCIC | 2-RCIC-13 | RCIC Vacuum Pump Disch. to Torus. | Gas/ C'ndens | <175 | CS-1 | ECCS | U,T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191174 Sht.1 & 2 | RCIC | 1-1/4-RCIC-13 | RCIC Vacuum Pump Disch. To Barometric condenser (through valve PCV-36). | Gas/ C'ndens | <175 | CS-1 | ECCS | U,T | NS | |
| G191174 Sht.1 & 2 | RCIC | 2-RCIC-14 | RCIC Cond. Pump Disch. to RCIC Pump Suction. | Water | <175 | CS-1 | ECCS | U,T | NS | |
| G191174 Sht.1 & 2 | RCIC | 1,2-RCIC-16 | RCIC Turbine Exhaust to Torus Air Space Vacuum Breaker. | Steam/ Vapor | <325 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | RCIC | 1-RCIC | 1 inch vent line between rupture discs on 8-RCIC-5B. | Air | <325 | CS-1 | No Flow | NW | NS | |
| G191174 Sht.1 & 2 | RCIC | 1-RCIC | To floor drain through LCV-12 & LCV-13 | Water | <325 | CS-1 | No Flow | U | NS | |
| G191174 Sht.1 & 2 | Main Steam | 3-MS-5A 2,3-MS-5B | MS Supply from Rx to V-131& V-1 | Steam | 540 | CS-5 | Static | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD (Skid Piping) | RCIC Turbine Seal Drains to Barometric Condenser | C'ndens | 540 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD (Skid Piping) | RCIC Turbine Casing Drain to Turb. Exhaust Drip Leg | C'ndens | <325 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD -2 lines (Skid Piping) | RCIC Turbine Trip/Throttle & Governing valves Seal leakoff lines to barometric condenser | C'ndens | <540 | CS-5 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 3/4-MSD (Skid Piping) | RCIC Turbine drain from Trip/Throttle to turbine | C'ndens | <540 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 1/2-MSD -2 lines (Skid Piping) | RCIC Turbine Trip/Throttle & Governing valves seat drains to Turb. Exhaust Drip Leg | C'ndens | <540 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD | Drain from Turbine Exhaust dripleg US & DS of ST13-7 to barometric condenser | C'ndens | <325 | CS-1 | ECCS | U | NS | |
| G191174 Sht.1 & 2 | Main Steam Drains | ¾, 1-MSD | RCIC MS Drain Pot to RCIC LCV-32 to intersection of line D.S. of ST-6. | C'ndens | <540 | CS-5 | Continuous | | SSB | SB Location No.125. Note.8 |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD | RCIC MS Drain Pot to ST-6 to intersection of line D.S. of HPCI LCV-32 | C'ndens | <540 | CS-5 | Continuous | | SSB | SB Location No.126, Note 8 |
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD | RCIC MS Drain piping US & DS of RCIC FCV-34 | C'ndens | <540 | CS-5 | Continuous | | SSB | SB Location No.127, Note 8 |

# TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191174 Sht.1 & 2 | Main Steam Drains | 1-MSD | HPCI MS Drain piping & fittings D.S. of RCIC FCV-35 | C'ndens | <540 | A335 P-11 | Continuous | M | NS | SB Location No.32 (Notes 4 & 8 ) |
| G191176 Sht.1 | Condensate Transfer | 14-CST-1<br>10-CST-2<br>6-CST 3 | CST Supply to HPCI & RCIC pumps and combined test line return | Water | <175 | SS-1 | ECCS | M,U | NS | |
| G191176 Sht.1 | Condensate Transfer | 12-CST-4 | CST Supply to CS through N..C. Valves V14-8A & 8B | Water | <175 | SS-1/ | No Flow | M,U,T | NS | |
| G191176 Sht.1 | Condensate Transfer | 4-CST-5 | Supply to CST from Rad Waste | Water | <175 | SS-1 | Intermittent | M,T | NS | |
| G191176 Sht.1 | Condensate Transfer | 6-CST-6 | From Fuel Pool (6-FPC-21) Normally Closed. | Water | <175 | SS-1 | Intermittent | M,T | NS | |
| G191176 Sht.1 | Condensate Transfer | 6-CST-6 | From Fuel Pool (6-FPC-21) Normally Closed. | Water | <175 | SS-1 | Intermittent | M,T | NS | |
| G191176 Sht.1 | Condensate Transfer | CST-7 through CST-34 | Misc. transfer lines | Water | <175 | CS-1 | Intermittent | O2, T | NS | |
| G191176 Sht.1 | House Heat-ing Steam | 4-HS-1 | HHS to CST and DWST Steam Heating Coils | Steam | <365 | CS-1 | Winter | | SNM | |
| G191176 Sht.1 | House Heat-ing Steam | 2, 2-1/2" HS-1, | HHS to CST Steam Heating Coil | Steam | <365 | CS-1 | Winter | | SSB | |
| G191176 Sht.1 | House Heat-ing Steam | | CST Steam Heating Coil | Steam | <365 | Alum. 6061 | Winter | M | NS | VY Dwg. No. 5920-3912 |
| G191176 Sht.1 | House Heat-ing Steam | 1-1/2,2-HSCR | HHS Condensate return from CST Steam Heating Coil | Conden sate | <365 | CS-1 | Winter | | SSB | |
| G191176 Sht. 2 | Demin. Water | DW-1 to DW-3,<br>DW-5 to DW-9,<br>DW-10 to DW-11 | Various Demineralized Water Transfer Lines | Water | <175 | SS-1 | Intermittent | T | NS | |
| G191176 Sht. 2 | Demin. Water | DW-10 | Demin. Water Storage Tank (DWST) Overflow | Water | <175 | SS-1 | No Flow | O2, T | NS | |
| G191176 Sht. 2 | House Heat-ing Steam | 2" & SM -HS | HHS to DWST Steam Heating Coil | Steam | <365 | CS-1 | Winter | | SSB | |
| G191176 Sht.1 | House Heat-ing Steam | | DWST Steam Heating Coil | Steam | <365 | Alum. 6061 | Winter | M | NS | VY Dwg. No. 5920-3913 |
| G191176 Sht. 2 | House Heat-ing Steam | 1-1/2,2-HSCR | HHS Condensate return from CST Steam Heating Coil | Conden sate | <365 | CS-1 | Winter | | SSB | |
| G191177 Shts. 1 - 4 | Rad Waste Systems | All | Radwaste System Piping | Water/ Air | <175 | CS-1 | Intermittent | T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191178 Sht.1 | Rx. Water Clean Up | 4-CUW-18<br>4-CUW-1,1A,1B<br>3,4-CUW-2A,2B,3 | Letdown from Rx to RWCU pumps to Regen Hx. to Non-Regen. Hx. | Water | 575 | SS-6 | Continuous | M | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 3,4-CUW-4A &4B | Letdown Non - Regen Hx. to Cleanup Filter Demin. | Water | 150 | SS-5 | Continuous | M | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 3,4-CUW-5A & 5B | Return from Cleanup Filter Demin to Regen. Hx. | Water | 150 | SS-5 | Continuous | M | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 4-CUW-6<br>4-CUW-54 | Return from Regen. Hx. to line 4-CUW-55 | Water | <575 | SS-6 | Continuous | M | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 4-CUW-55 | Return from line 4-CUW-54 to FDW System | Water | 450/ 575 | CS-5 | Continuous | O2 | NS | Note 3 |
| G191178 Sht.1 | Rx. Water Clean Up | 4-CUW-7<br>4-CUW-8 | Return from Clean-up Demin. To main condenser (Conn. 66) | Water | 150 | CS-5<br>CS-1 | Continuous | T | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 4-CUW-9<br>4-CUW-10 | Clean-up Demin drain to Rad Waste. | Water | 150 | CS-5<br>CS-1 | Normally Closed | U | NS | |
| G191178 Sht.1 | Rx. Water Clean Up | 2-CUW-19 | Rx Btm. Head Drain V2-99 to 4" CUW-18 | Water | <540 | SS | Continuous | M | NS | See list for G191167 |
| G191178 Sht.2 | Rx Water Clean Up – Demineralizer | 2,3-CUW-11<br>2-CUW-12A - 12B<br>2-CUW-13A - 13B<br>3-1/2-CUW-14<br>2,3-CUW-14 -15<br>2,3-CUW-16 -17 | Clean-up Filter Demin. Pre-coat pump associated piping. | Water | 150 | CS-5<br>CS-1 | Continuous | T | NS | |
| G191178 Sht.2 | Rx Water Clean Up - Demineralizer | 1 to 4 inch piping Line Nos. 20 to 53 and from 56 to 62 | Remaining lines on the Clean-up Filter Demin / Phase separator associated piping. | Water | 150 | CS / SS | Continuous | T | NS | |
| G191237 Sht. 2 | Chilled Water | 3-CHS & 3-CHR | SAC-1 & SAC –2 Chilled Water Supply & Return Lines | Water | <175 | CS | Continuous | T | NS | |
| G191237 Sht. 2 | SCH-1 | 7/8 & 1-3/8 CU | Chiller SCH-1 Condenser Piping to SACC-1A/1B | Refriger ant | <175 | CU | Continuous | NW | NS | |
| G191238 | SW & RBCCW | 1,2-1/2,& 6 SW & RCW | RRU Supply & Return Piping | Water | <175 | CS/CU | Continuous | O2, T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| G191254 | House Heating Stm | All HHS | HHS Supply Piping to SUH & Bldg. Heaters | Steam | <365 | CS | Winter | | SNM/SSB | |
| G191254 | House Heating Stm | HSCR piping US & DS of Steam Traps | HHS Condensate Return Lines from SUH & Bldg. Heaters | Steam, Conden sate | <365 | CS | Winter | | SSB | Possible Steam Trap Blow-by |
| G191254 | House Heating Stm | HSCR piping DS/ remote from Steam Traps | HHS Condensate Return Lines from SUH & Bldg. Heaters | Conden sate | <175 | CS | Winter | T | NS | |
| G191267 Shts.1 & 2 | Nuclear Boiler Vessel Instrument. | All | Reactor Instrument Tubing and Piping | Water | 540 | SS | Continuous | M | NS | |
| G191274 | Condensate Demineralizer | CD-1A through CD-42E | Condensate Demineralizer & Backwash Piping | Water | 107.1 | CS | Continuous | T | NS | |
| G191280 | Potable Water | All | Plant Potable Water piping | Water | <100 | B88/ PVC | Continuous | T | NS | |
| VY-E-75-002 | Containment Atmosphere Dilution | All | Containment Atmosphere Dilution Piping | Air/ N2 | <200 | CS | Continuous | NW | NS | |
| VY-E-75-001 33600-A-202 33600-A-207 | Advanced Off Gas (AOG) | 12-OGE-100-G1 12-OGE-101A-G1 12-OGE-102A-G1 12-OGE-103A-J1 | Off Gas Process Line from OG-557to Steam Mixing Tee ED-100-1A to HE-101-1A | Gas/ Steam | 273 to 655 | CS | Continuous | | SNM | |
| | | Remaining AOG Process Lines except steam supply | Remaining AOG Process Lines | Gas | <175 | CS | Continuous | T | NS | |
| | Steam Supply | 4-MS-191A-D3 | Steam to MS-100-1A | Steam | 365 | CS | Continuous | | SNM | |
| | | 1-1/2-MS-136A-D3 | Steam to HE-100-1A | Steam | 365 | CS | Continuous | | SSB | |
| | | 2-MS-138A-G1 | Steam to ED-100-1A Mixing Tee | Steam | 365 | CS | Continuous | | SSB | |
| | Steam / Condensate Return Lines | ½", 1",2" CNP | Condensate Return Lines to TK-104-1A | Conden sate | <365 | CS | Continuous | | SSB | |
| | | 2" CNP-164-D3, 2" CNP-184-D3 | Condensate Return TK-104-1A/P-151-1A/B to Cond. B | Conden sate | <365 | CS | Continuous | | SSB | |
| | Cooling from Condensate System | 8"WCS , 8"WCR | HE-101-1A Condenser Cooling Supply and Return | Water | <175 | CS | Continuous | T | NS | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| VY-E-75-001<br>33600-A-202<br>33600-A-208 | Advanced Off Gas (AOG) | 12-OGE-100-G1<br>12-OGE-101A-G1<br>12-OGE-102A-G1<br>12-OGE-103A-J1 | Off Gas Process Line from OG-557 to Steam Mixing Tee ED-100-1B to HE-101-1B | Gas/ Steam | 273 to 655 | CS | Continuous | | SNM | |
| VY-E-75-001<br>33600-A-202<br>33600-A-208 | Advanced Off Gas (AOG) | Remaining AOG Process Lines except steam supply | Remaining AOG Process Lines | Gas | <175 | CS | Continuous | T | NS | |
| | Steam Supply | 4-MS-191B-D3 | Steam to MS-100-1B | Steam | 365 | CS | Continuous | | SNM | |
| | | 1½" -MS-136B-D3 | Steam to HE-100-1B | Steam | 365 | CS | Continuous | | SSB | |
| | | 2-MS-138B-G1 | Steam to ED-100-1B Mixing Tee | Steam | 365 | CS | Continuous | | SSB | |
| | Cooling from Condensate System | 8"WCS | Condenser Cooling Supply to HE-101-1B and HE -101-1A | Water | <175 | CS | Continuous | T | NS | |
| | Steam / Condensate Return Lines | ½", 1",2" CNP | Condensate Return Lines to TK-104-1A | Condensate | <365 | CS | Continuous | | SSB | |
| VY-E-75-001<br>33600-A-202<br>33600-A-209<br>33600-A-210 | AOG Off Gas Drying A & B | All | Off Gas Drying Trains A & B | Gas | | CS | Continuous | NW | NS | |
| | Steam / Condensate Return Lines | 1" CNP & smaller | Condensate Return Lines to TK-104-1A | Condensate | <365 | CS | Continuous | | SSB | |
| VY-E-75-001<br>33600-A-202<br>33600-A-211 | AOG Charcoal Off Gas System | All | Charcoal Beds | Gas | | CS | Continuous | NW | NS | |
| | Condensate Return Lines | ½", 1",2" CNP | Closed Loop Condensate Return Lines | Water | <175 | CS | Continuous | T | NS | |
| | Adsorber Bed Drains | 1½" VRE-171-G1 | Drain to Sample Collection Tank and to Cond, B | Water | <175 | CS | Continuous | T | NS | |
| VY-E-75-001<br>33600-A-202<br>33600-A-213 | AOG Chiller System | All | Water Chiller System Skid Piping. | Water/ Refrig. | <175 | CS | Continuous | T,NW | NS | |
| 33600-A-216 | AOG Steam Reheat | 3"-SH & Smaller | Supply Piping for 30Lb. Steam to Steam Reheat Coils | Steam | 365 | CS | Continuous | | SSB | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 33600-A-216 | AOG Steam Reheat | 2"-CNH & Smaller, 2" HSCR & Smaller | Condensate Return Piping from Steam Traps and Steam Reheat Coils . | Conden sate | <365 | CS | Continuous | | SSB | |
| 33600-A-217 | AOG Steam Turbine Bldg. | 4"-MS-137-D3 | Supply Piping for 30Lb. Steam to Steam Reheat Coils | Steam | 365 | CS | Continuous | | SSB | SB Location Nos. 73,74,75 |
| 33600-A-217 | AOG Steam Turbine Bldg. | 6"-SRV-7B | Relief Valve Disch to line 6"-SRV-7B | Steam | 365 | CS | No Flow | U | NS | |
| 33600-A-217 | AOG Steam Turbine Bldg. | ¾-HCN188-H1<br>¾-MS-189-D3<br>MS-113A-1A<br>MS-115A-1A | Drains to 3"-MSD-4 from steam traps at pressure reducing station. | Conden sate | <540 | A335-P11 | Continuous | M | NS | SB Locations 74,75,76,77 Replaced in 1998 (Note 4) |
| 5920-1068 | Instrument Air Dryer | All | Internal piping to Instrument Air Dryer | Air, Water Vapor | | | Continuous | NW | NS | |
| 5920-0870 | HPCI Turbine Oil Piping | All | HPCI Turbine Skid Oil Piping | Oil | | CS | Intermittent (with turbine operation) | NW | NS | |
| 5920-11015 | Station Air Compressors | All | Internal piping for Station Air Compressors | Air , Water Vapor | | | Continuous | NW | NS | |
| 5920-12598 | Turbine Steam Seal | (GE) 10", 12" SSH | Turbine Steam Seal Supply Header (SSH) | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 8" 1SSH1 | HP Turbine N1 Packing to SSH | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 6" 2SSH2 | HP Turbine N2 Packing to SSH | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 5" 1SSH3 | SSH supply to LP Turbine N3 Packing | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 8" SSH | Common SSH supply to LP Turbine N4 & N5 Packings | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 5"1SSH4 | SSH supply to LP Turbine N4 Packing | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 5" 1SSH5 | SSH supply to LP Turbine N5 Packing | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 5" 1SSH6 | SSH supply to LP Turbine N6 Packing | Steam | 225 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 2,3-1/2 2SPE1 | From N1 Packing to SPE Header | Steam/ Water | 195 | CS | Continuous | | SNM | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 5920-12598 | Turbine Steam Seal | (GE) 4 3SPE2 | From N2 Packing to SPE Header | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 6 2SPE3 | From N3 Packing to SPE Header | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 6 2SPE4 | From N4 Packing to 10" SPE common riser | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 6 2SPE5 | From N5 Packing to 10" SPE common riser | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 10, SPE 6 | Common riser from N4 & N5 Packings to SPE Header | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 6 2SPE6 | From N6 Packing to SPE Header | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | (GE) 8,10,16 SPE | Steam Packing Exhauster | Steam/ Water | 195 | CS | Continuous | | SNM | |
| 5920-12598 | Turbine Steam Seal | 1-1/2" & 3" 1SLMSV | Stop Valve first seal leakoff lines to SSL | Steam | <540 | CS | Continuous | | SSB | SB Locations Nos. 78 to 82 |
| 5920-12598 | Turbine Steam Seal | 1" & 3" 2SLMSV | Stop Valve second seal leakoff lines to SPE | Steam | <540 | CS | Continuous | | SSB | SB Locations Nos. 88 to 90 |
| 5920-12598 | Turbine Steam Seal | 1-1/2" 1SCVL | Control Valve first seal leakoff to 36" Cross around | Steam | 390 | CS | Continuous | | SSB | SB Locations Nos. 83 to 87 |
| 5920-12598 | Turbine Steam Seal | 2-1/2" 2SCVL | Control Valve second seal leakoff to SSH | Steam | 320 | CS | Continuous | | SSB | SB Locations Nos. 91 to 95 |
| 5920-12598 | Turbine Steam Seal | 2" 3SCVL | Control Valve third seal leakoff to SPE | Steam | <320 | CS | Continuous | | SSB | |
| 5920-12598 | Turbine Steam Seal | 1/2",2" 1SLBPV | Bypass Valve first seal leakoff to 36" Cross Around | Steam | 390 | CS | Continuous | | SSB | SB Locations Nos. 96 to 106. See Note 11 |
| 5920-12598 | Turbine Steam Seal | 1",2-1/2" 2SLBPV | Bypass Valve second seal leakoff to SSH | Steam | 320 | CS | Continuous | | SSB | SB Locations Nos. 107 – 109 |
| 5920-12598 | Turbine Steam Seal | 1",2-1/2" 3SLBPV | Bypass Valve third seal leakoff to SPE | Steam | <320 | CS | Continuous | | SSB | |
| 5920-12598 | Turbine Steam Seal | 2-1/2" 1SPL2 | HP Turbine pocket drain to 36" Cross Around | Steam | 540 | CS | Continuous | | SSB | SB Locations Nos. 110 –115 |
| 5920-12598 | Turbine Steam Seal | 1" 1SLCIV (4 lines total) | CIV Intercept Valve first seal leakoff to SSH | Steam | <382 | CS | Continuous | | SSB | |
| 5920-12598 | Turbine Steam Seal | 1" 2SLCIV (4 lines total) | CIV Intercept Valve second seal leakoff to SSH | Steam | <382 | CS | Continuous | | SSB | |
| 5920-12598 | Turbine Steam Seal | 1" (4 lines total) | CIV Intermediate Stop Valve seal leakoff to SPE | Steam | <382 | CS | Continuous | | SSB | |

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

| Drawing No. | System | Line No(s). | Description | Fluid | Oper. Temp (F) | Material | Flow at Full Power Operation | Exclusion (Note 1) | Susceptibility Classification (Note 2) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 5920-12598 | Turbine Steam Seal | 1" (4 lines total) | CIV Intermediate Stop Valve seal leakoff to SPE | Steam | <382 | CS | Continuous | | SSB | |
| 5920-12598 | Turbine Steam Seal | 1" SLSSR | Steam Seal Regulator to SPE | Steam | <540 | CS | Continuous | | SSB | |
| 5920-12857 SH.1 | H2 & Air Injection | All | H2 System Injection Process Module | H2, Air | <150 | SS | Continuous | | NS | |
| 5920-12857 SH.2 | H2 & Air Injection | All | H2 System Injection Process Module | H2, Air | <150 | SS | Continuous | | NS | |
| 5920-12858 | Off Gas Monitor | All | Off-gas Monitoring Panel | Offgass, H2, O2, N2 | <150 | SS | Continuous | | NS | |
| | | | | | | | | | | |

## TABLE 2.0 NOTES:

1. Key to Exemption Reasons:
   - **M** = Stainless or low alloy FAC resistant material (Section 5.1.1)
   - **Q** = Superheated steam (5.1.2)
   - **O2** = High dissolved oxygen or Raw Water (5.1.3)
   - **T** = Single phase system operation below 175F (5.1.4)
   - **U** = No flow, or operating less than 2% or total time (5.1.5)
   - **NW** = Fluid other than water or wet steam (5.1.6)

2. Key to be Susceptibility Classification
   - **NS** = Non Susceptible.
   - **SMC** = Susceptible Large Bore – Modeled using CHECWORKS.
   - **SNM** = Susceptible Large Bore – Not Modeled.
   - **SSB** = Susceptible Small Bore

3. Non Susceptible using NSAC 202L–R2 Exclusion Criteria. However Large bore line has been modeled using CHECWORKS. Specific locations on the small bore lines have been included in the Small Bore Location data base.

4. Original piping was carbon steel. Replaced with FAC resistant material.

5. Piping screens out based on no flow (normally closed valves). Line is included in Program Scope based on past leakage through the valves.

6. Normally closed small bore equipment vents, drains, and level control instrument lines along with sampling lines are automatically excluded due to No Flow condition.

## TABLE 2: Summary of Line by Line FAC Susceptibility Screening

### TABLE 2.0 NOTES: - continued

7. Lines 10" MS-3A to 10"MS-3J, Turbine Bypass Valve Discharge lines to the main condensers: Flow from MS lines only during startup, testing, or transients and would screen out as NS based on Usage < 2% of time. However, warming steam continuously flows from line 36 "CAR C via the BPV 1st seal leakoff line 1SLBPV per GEK 17999A, Reference 22.

8. Line is included in AST post DBA Alternate Leakage Treatment Boundary, reference VYDC-2003-016. These lines along with the condenser have been seismically evaluated and are required to remain intact during and after a SSE. See Reference 23.

9. Min Flow line screens as Non-Susceptible based on Usage and/or Temperature. However, there has been industry experience (IE) with wall loss downstream of restriction orifices on Min Flow lines. Include piping downstream of restriction orifices as Susceptible to FAC.

10. Upstream components have been replaced with FAC resistant materials. Noted here for potential of increased wear rates due to "Leading Edge Effect".

11. Turbine Bypass valve Chest 1st Seal Leakoff piping line 1SLBPV is currently scheduled for replacement with FAC resistant material during RFO 25. Refer to Engineering Request No. 04-0964. This line will be considered as susceptible to FAC until replacement is complete.

12. Upstream piping was supplied with LAS replacement casings and is considered as part of the LP turbine. Piping downstream of each the Restriction Orifices was removed. See drawing 5920-568 (Pending Change for VYDC 2003-006, J.O. 2003-038).

# Recommendations for an Effective Flow-Accelerated Corrosion Program

**NSAC-202L-R2**

Final Report, April 1999

NEC-4

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## REPORT SUMMARY

Since the mid-1980s, nuclear power plants have experienced leaks and ruptures caused by flow-accelerated corrosion (FAC). The nuclear power industry has mounted a broad-based effort to reduce the amount of FAC that occurs and to uncover incidents of excessive FAC before failures are likely to occur. This report describes the elements of an effective FAC prevention program, identifying procedures and tasks, necessary documentation, and a strategy for developing and implementing a long-term program. This revision incorporates lessons learned concerning FAC and new prevention technology since November 1996.

### Background
FAC—sometimes referred to as flow-assisted corrosion or erosion-corrosion—leads to wall thinning (metal loss) of steel piping exposed to flowing water or wet steam. The rate of metal loss depends on a complex interplay of many parameters such as water chemistry, material composition, and hydrodynamics. Carbon steel piping components that carry wet steam are especially susceptible to FAC and represent an industrywide problem. Experience has shown that FAC damage to piping at fossil and nuclear plants can lead to costly outages and repairs and can affect plant reliability and safety. EPRI and the industry as a whole have worked steadily since 1986 to develop or refine monitoring programs in order to prevent FAC-induced pipe failures.

### Objectives
To present a set of recommendations for an effective FAC prevention program.

### Approach
EPRI—with the support of the CHECKWORKS™ Users Group (CHUG)—conducted a series of plant visits designed to review the scope and effectiveness of utility FAC programs. (CHUG is an industry-sponsored group formed to deal with FAC-induced wall thinning.) The visits revealed the need for a set of programmatic recommendations. EPRI developed a set of recommendations to help utility personnel design and implement a comprehensive FAC prevention program.

### Results
The Institute of Nuclear Power Operations (INPO), Nuclear Management and Resources Council (NUMARC, now the Nuclear Energy Institute), U.S. Nuclear Regulatory Commission (USNRC), and American Society of Mechanical Engineers (ASME) have all issued guidance related to prevention of FAC. This report describes the organization and activities necessary to implement a successful FAC program. It

identifies typical elements of an effective FAC program and describes the steps utilities should take to minimize the chances of experiencing a FAC-induced consequential leak or rupture. The guidance is directed primarily at FAC-induced wall thinning in large-bore piping, although small-bore piping is also addressed. Key elements of the guidelines include

- Discussion of an effective FAC program design, with emphasis on corporate commitment, industry FAC experience, inspections, engineering judgment, and long-term strategies
- Description of implementation procedures and documentation, including use of a governing document
- Identification of recommended FAC tasks, with key steps of identifying susceptible systems, performing FAC analysis, selecting and scheduling components for inspection, performing inspections, evaluating inspection data, assessing worn components, and repairing and replacing components
- Explanation of how to develop a long-term strategy, with discussions of FAC-resistant materials, water chemistry, and system design changes

**EPRI Perspective**

The recommendations in this document will help utilities implement an effective monitoring program at their plants and establish a uniform industry approach toward mitigating FAC damage. It is believed that implementation of the recommendations will prove a cost-effective method for increasing personnel safety, plant safety, and plant availability. The recommendations also have the potential to reduce forced outages and thus increase the capacity factor while decreasing the cost of plant operations and maintenance. Though implementation of these recommendations should greatly reduce the probability of a consequential leak or a rupture, the industry recognizes it will never be possible to prevent all FAC-related leaks and ruptures. The continuing occurrence of FAC failures is evidence that efforts to eliminate such incidents should be maintained at plants with good experience and intensified at plants that have marginal FAC prevention programs or poor experience.

**NSAC-202L-R2**

**Interest Categories**

Piping, reactor vessel and internals
Non-destructive examination
Corrosion control
Plant support engineering

**Keywords**

Flow-accelerated corrosion
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# ABSTRACT

This document presents a set of recommendations for an effective flow-accelerated corrosion program. These recommendations are the product of a series of plant visits conducted by EPRI. The visits were designed to review the scope and effectiveness of utility flow-accelerated corrosion (FAC) programs. The essential ingredients for an effective FAC program are presented in this document. The steps that utilities should take to minimize the chances of experiencing a FAC-induced consequential leak or rupture are also presented.

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# NSAC PERSPECTIVE

Since the mid eighties, nuclear power plants have experienced leaks and ruptures caused by flow-accelerated corrosion (FAC), also known as flow-assisted corrosion or erosion-corrosion. The nuclear power industry has mounted a broad-based effort to reduce the amount of FAC that occurs and to uncover incidents of excessive FAC before failures are likely to occur. EPRI, the Nuclear Energy Institute (NEI - formerly the Nuclear Management and Resources Council-NUMARC), and the Institute of Nuclear Power Operations (INPO) have all contributed to this effort. Nevertheless, problems caused by FAC have continued to occur.

Several major ruptures in the early nineties showed the importance of having an effective FAC program. In response, EPRI,—with the support of the CHECWORKS™ Users Group (CHUG)—sponsored a series of plant visits to learn about the implementation of utility FAC programs. These visits showed that there were large differences among utility programs. After these visits, EPRI and CHUG decided that a set of programmatic recommendations prepared by EPRI would be desirable. This document is a result of that decision.

This document describes the necessary elements of an effective FAC program. The desirable procedures and necessary documentation are described, as well as a detailed description of the necessary tasks. A strategy for developing a long-term program is also presented. The application of these recommendations should reduce the probability of experiencing FAC-induced leaks and ruptures.

This revision incorporates lessons learned and new technology that has become available since the last revision of this document in November 1996.

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# 1

# INTRODUCTION

In December 1986, an elbow in the condensate system ruptured at the Surry Power Station. The failure caused four fatalities and tens of millions of dollars in repair costs and lost revenue. Flow-accelerated corrosion (FAC)[1] was found to be the cause of the failure.[2] Following this failure, EPRI developed the CHEC® family of computer codes to assist utilities in planning inspections and evaluating the inspection data to prevent piping failures caused by FAC. More recently, EPRI developed the CHECWORKS™ code to replace the original CHEC® family of codes (CHEC®, CHECMATE®, CHEC-NDE™, and CHEC-T™).[3] EPRI has also conducted many technology transfer workshops to promote the exchange of information among utility personnel and to help utilities address this issue. This technology and information have greatly reduced the threat of FAC failures. Nevertheless, instances of severe thinning, leaks, and ruptures still occur. The most significant examples of recent failures occurred at Millstone Unit 3 in December 1990, at Millstone Unit 2 in November 1991, at Sequoyah Unit 2 in March 1993, at the Pleasant Prairie fossil plant in February 1995, at the Green Bay fossil plant in April 1996, and at Fort Calhoun in April 1997

The continuing occurrence of FAC failures is evidence that plant programs to control FAC should be maintained and improved as necessary as industry knowledge evolves and more industry and plant data becomes available. The CHECWORKS™ Users Group (CHUG), an industry sponsored group formed to deal with FAC induced wall thinning, authorized and provided major funding for EPRI to conduct a series of plant visits to understand how the technology, plant experience, and engineering know-how are being used. One result of these visits was that a need was identified for a set of recommendations to help utility personnel develop and effectively implement a comprehensive FAC program.

This document describes the organization and activities necessary to implement a successful FAC program. Typical elements of an effective FAC program are identified,

---

[1] Flow-accelerated corrosion is sometimes, but incorrectly, called erosion-corrosion. Erosion, it should be noted, is not part of the degradation mechanism.

[2] This was not the first instance that a rupture was caused by FAC, but it did bring the issue to prominence.

[3] The CHECWORKS™ code and this document supersede the previous EPRI position on FAC found in EPRI Report NP-3944 (Reference 1).

and recommendations for implementation are made. This document is written to be of use to all utilities, irrespective of the predictive analytical methodology being used.

This document is directed at wall thinning caused by FAC. It is primarily directed at wall thinning in large-bore piping, although small-bore piping is also addressed. It does not cover other thinning mechanisms, such as cavitation, microbiologically-influenced corrosion (MIC), and erosive wear. It is planned that this document will be periodically updated to reflect the advances made in FAC control.

## 1.1 Background

Flow-accelerated corrosion (FAC) is sometimes referred to as flow-assisted corrosion or erosion-corrosion. FAC leads to wall thinning (metal loss) of steel piping exposed to flowing water or wet steam. The rate of metal loss depends on a complex interplay of many parameters including water chemistry, material composition, and hydrodynamics. FAC damage to plant piping can lead to costly outages and repairs and can affect plant reliability and safety. Pipe wall thinning rates as high as 0.120 inch/year have occurred. Pipe ruptures and leaks caused by FAC have occurred at both fossil and nuclear plants. Carbon-steel piping components that carry wet steam are especially susceptible to FAC and represent an industry-wide problem.

Although there were limited FAC programs in place before the Surry pipe rupture, it was not until after this accident that utilities expanded their inspection programs to reduce the risk of pipe ruptures caused by FAC in susceptible single-phase systems. Since the Surry incident in December 1986, the industry has worked steadily to develop or refine their monitoring programs to prevent the failure of piping due to FAC. In March 1987, INPO issued a Significant Operating Experience Report (SOER 87-3, reference 2), which recommended that a continuing program be established at all U.S. nuclear power plants. The program should include analyses for predicting wear rates and selecting intervals for regular inspections. In July 1987, the United States Nuclear Regulatory Commission (USNRC) issued bulletin 87-01 asking licensees to monitor the pipe wall thickness in high-energy piping systems and to report any areas where wall thinning had been identified.

The Nuclear Management and Resources Council[4] (NUMARC) and EPRI developed a resolution approach for FAC in single-phase piping systems and provided the utilities with recommendations for a program (reference 3). This document was issued in June 1987 and recommended that utilities do the following:

---

[4] In 1993 NUMARC and several other industry organizations were combined to form the Nuclear Energy Institute - NEI.

1. Conduct appropriate analysis and a limited but thorough initial inspection of susceptible single-phase piping.
2. Determine the extent of thinning, and repair or replace worn piping components as necessary.
3. Perform follow-up inspections to confirm or quantify rates of thinning.
4. Take long term corrective action.

Based on the NUMARC/EPRI document, the U.S. industry conducted the initial inspections of nuclear plant piping systems during 1987 and 1988. The United States Nuclear Regulatory Commission (USNRC) monitored the results of these inspections and in May 1989 issued Generic Letter 89-08 (reference 4). This, in essence, required that operators of nuclear power plants perform the following:

1. Implement a long term FAC monitoring program.
2. Include all susceptible high-energy carbon-steel piping systems.
3. Include both single- and two-phase systems.
4. Utilize the NUMARC/EPRI or other equally effective analysis method.

To support the industry effort, EPRI began developing the CHEC® (reference 5) and CHECMATE® (reference 6) computer codes for predicting FAC wear rates in piping containing single- and two-phase flow. These codes were developed specifically to assist the utility industry in planning and implementing inspection programs to prevent FAC failures. The codes could also be used to evaluate the effect of changes in piping design or operating conditions on FAC wear rates.

In response to utility requests for assistance in managing and evaluating the NDE data acquired during inspections, the CHEC-NDE™ (reference 7) computer code was developed and released in April 1991. To assist utilities in performing stress analysis of worn fittings, EPRI developed the CHEC-T™ computer code (reference 8). In July 1989, EPRI formed the CHEC®/CHECMATE® Users Group, since renamed the CHECWORKS™ Users Group, CHUG. The key purpose of this group is to provide a forum for the exchange of information pertaining to FAC issues and to provide user support and maintenance for the EPRI codes.

EPRI has continued to develop technology to help utilities control FAC, and in December 1993 released the CHECWORKS™ code (reference 9). In summary, CHECWORKS™ integrated and updated the capability of the previous four codes, and was written to take full advantage of the recent advances in computer technology.

Additionally, capability was added to help utilities manage related plant data and to automate many of the analysis and reporting tasks conducted during an inspection outage.

In response to utility requests , the American Society of Mechanical Engineers (ASME) has published Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning" which provides rules for evaluating piping for FAC. These rules (reference 15) provide structural acceptance criteria for Class 1, 2, and 3 piping components that have experienced wall thinning[5].

## 1.2 Industry Status

Since the Millstone 3 failure in December 1990, EPRI has conducted a series of visits to nuclear power plants to ascertain how well FAC programs had been implemented. The goal was to review the scope, implementation, current status, and effectiveness of individual FAC programs. It was found that, although the utilities had a common goal of preventing leaks and ruptures, their approaches toward and rates of success in attaining this goal varied.

The recommendations in this document are provided to aid utilities in implementing an effective monitoring program at their plants and to establish a uniform industry approach toward mitigating FAC damage. It is believed that the implementation of these recommendations will prove to be a cost-effective method of increasing personnel safety, plant safety, and plant availability. These recommendations also have the potential to reduce forced outages and thus increase the capacity factor, while reducing the cost of plant operations and maintenance. The implementation of recommendations found in this document should greatly reduce the probability of a consequential leak or a rupture occurring. However, it is recognized that it will never be possible to prevent all FAC related leaks and ruptures from occurring.

[5] Some organizations are also using Code Case N-597 to evaluate ANSI B31.1 piping for FAC related wall thinning.

# 2

# ELEMENTS OF AN EFFECTIVE FAC PROGRAM

Six key and interrelated elements are necessary for a plant FAC program to be fully effective. These elements are illustrated in Figure 2-1 and are described in more detail below.

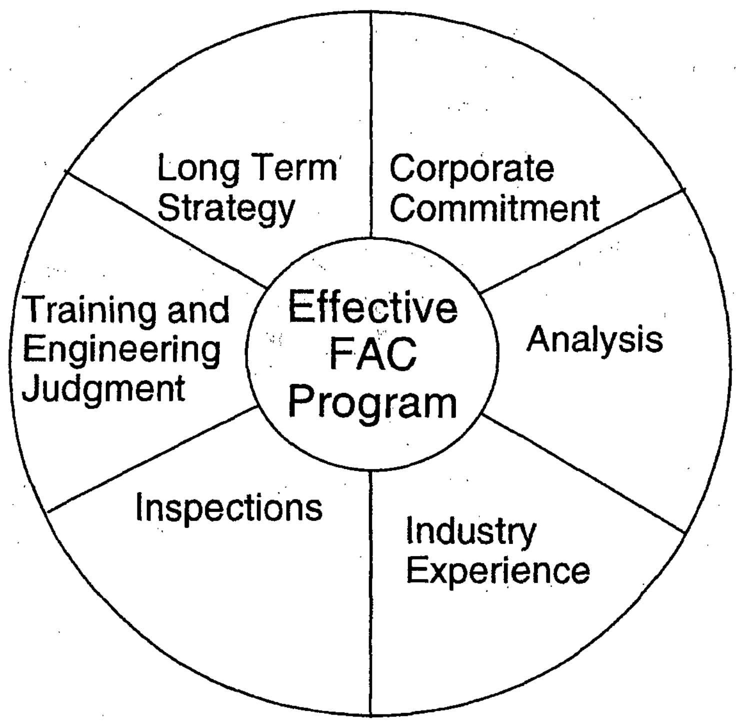


**Figure 2-1**
**An Effective FAC Program is Founded on Interrelated Elements**

## 2.1 Corporate Commitment

Corporate Commitment is essential to an effective FAC program. It is recommended that this commitment include the following:

- Providing adequate financial resources to ensure that all tasks are properly completed.
- Ensuring that overall authority and task responsibilities are clearly defined, and that the assigned personnel have adequate time to complete the work.
- Ensuring that assigned personnel are properly qualified and trained for their area of technical responsibility. Ensuring that adequately trained, backup personnel are available.
- Ensuring that adequate and formal communications exist between various departments. Formalized sharing of data and information is essential.
- Ensuring that FAC experiences at other plants are continuously monitored and evaluated.
- Minimizing personnel turnover on the program, and providing sufficient transition when turnover does occur to ensure that plant and industry experience is not lost.
- Developing and implementing a long-term plan to reduce high FAC wear rates.
- Ensuring that appropriate quality assurance is applied. This should include preparing and documenting procedures for tasks to be performed, properly documenting work, and providing for periodic independent reviews of all phases of the FAC program.

## 2.2 Analysis

There are several thousand piping components in a typical nuclear power plant that are potentially susceptible to FAC damage. Without an accurate FAC analysis of the plant, inspection drawings, and a piping database that includes inspection and replacement histories, the only way to prevent leaks and ruptures is to inspect each susceptible component during each outage. This would be a very costly inspection program.

A primary objective of FAC analysis is to identify the most susceptible components, thereby reducing the number of inspections (the size of this sample being a strong function of both the plant susceptibility and the accuracy of the plant model and analysis method used). This limited sample should be chosen to select the components with the greatest susceptibility to FAC. Some plants have used a simplified approach, often involving rating factors for this susceptibility analysis. However, due to the necessary conservatisms involved, simplified analysis still results in a large number of inspections.

Plants that have used simplified FAC analyses can inspect as many as 300 to 500 inspection locations[6] during each fuel cycle for large-bore piping alone. Experience has shown that until a comprehensive analysis of all susceptible systems has been completed, plant personnel cannot be confident that all highly susceptible components have been identified and are being monitored to prevent leakage or rupture.

Analytical methods should utilize the results of plant specific inspection data to develop plant specific correction factors. This correction accounts for uncertainties in plant data, and for systematic discrepancies caused by plant operation. Utilities that have a comprehensive analytical model of their plants which incorporates inspection data to refine the wear rate predictions and have reduced susceptibility are averaging approximately 50 to 100 large-bore and an additional 10 to 35 small bore inspection locations per fuel cycle. Although the number of inspection locations examined per fuel cycle is extremely plant-specific, depending on the plant age, wall thickness margins, materials, and susceptibility, the above figures reflect a sample of industry experience as of the end of 1998.

For each piping component, an analytical method should be used to predict the FAC wear rate, and the estimated time until it must be reinspected, repaired, or replaced. The analytical model can also be utilized for design studies. These studies are valuable for cost benefit evaluations such as water chemistry changes, materials changes, and design changes, considering various plant constraints for existing and new designs. The rankings of components can be used as relative rankings to assist in planning and carrying out the initial inspection program of a plant or system.

## 2.3 Industry FAC Experience

Review and incorporation of industry experience provides a valuable supplement to plant analysis and associated inspections. To assist utilities in assembling the relevant past data, EPRI has issued a CHUG-supported Plant Experiences Database (PEDB) which summarizes much of the relatively recent US plant FAC experience (reference 11). Utilities have found the following benefits from sharing plant experiences:

- Identifying generic plant problem areas where additional inspections may be warranted.
- Understanding differences in similar types of components (*e.g.*, FAC wear rates of downstream piping is more severe when control valves made by certain manufacturers are used).

[6] In this document, an inspection location consists of measurements on the component and the attached pieces of straight piping.

- Understanding the FAC consequences of using systems off-design (*e.g.*, running bypass lines full time).
- Sharing information on costs, materials, qualified suppliers, repair or replacement techniques, inspection techniques, new equipment, etc.

Membership in the CHECWORKS™ Users Group (CHUG) is recommended as an excellent way for utilities to share industry experience.

## 2.4 Inspections

Good inspections are the foundation of an effective FAC program. Wall thickness measurements will establish the extent of wear in a given component, provide data to help evaluate FAC trends, and provide data to refine the predictive model. Thorough inspections are the key to fulfilling these needs. Thorough inspection of a few components is much more beneficial to a FAC program than a cursory inspection of a large number of components. One practice particularly not recommended is recording only the minimum thicknesses ascertained by UT scanning of large-bore components. Rather, a systematic method of collecting data is recommended. This will help to increase repeatability and allow for the trending of results. Complete inspections may require material sampling.

## 2.5 Training and Engineering Judgment

Training of key personnel is essential to the success of a FAC program. It is recommended that:

- The FAC coordinator of each plant receive both Introductory and Advanced EPRI/CHUG training,
- Each plant FAC coordinator have a trained backup, who has received at least the Introductory EPRI/CHUG training, and
- Other plant personnel that are relied on to successfully implement a comprehensive FAC program also receive training. These personnel may include plant operators, systems engineers, maintenance engineers, inspection personnel, and design engineers. The training should include an overview of FAC and how FAC affects their responsibilities. It can be given by a knowledgeable person such as the plant FAC coordinator.

Application of good engineering judgment is an important ingredient in each step of a FAC program. Judgment should be applied to all steps, from modeling decisions to evaluating inspection data. Accordingly, it is important that personnel involved in the program be aware of industry experience, be formally trained in an appropriate engineering discipline (such as mechanical engineering or engineering mechanics), be trained in FAC, and receive input from the systems engineers, plant operations, maintenance, and water chemistry departments.

Although an important ingredient in a successful FAC program, training and engineering judgment cannot substitute for other factors, such as analysis or inspection. As described above, all of the six key elements are interrelated, and must be used together, not as substitutes for one another.

## 2.6 Long-Term Strategy

The establishment and implementation of a long-term strategy is essential to the success of a plant FAC program. This strategy should focus on reducing FAC wear rates and focusing inspections on the most susceptible locations. Monitoring of components is crucial to preventing failures. However, without a concerted effort to reduce FAC wear rates, the number of inspections necessary will increase as the operating hours increase, due to increased wear. In addition, even with selective repair and replacement, the probability of experiencing a consequential leak or rupture may increase as operating hours increase.

# 3

# PROCEDURES AND DOCUMENTATION

It is recommended that a comprehensive set of procedures (or instructions) be developed to define the FAC program, identify responsibilities, and control how various tasks are performed. For utilities with multiple plants, it is recommended that the procedures (or instructions) be as common to all plants as is practical. These procedures (or instructions) should be controlled documents.

## 3.1 Governing Document

It is recommended that a governing, corporate level document be developed to define the overall program and responsibilities. It is recommended that this document include the following elements:

- A corporate commitment to monitor and control FAC.
- Identification of the tasks to be performed (including implementing procedures) and associated responsibilities.
- Identification of the position that has overall responsibility for the FAC program at each plant.
- Communication requirements between the lead position and other departments that have responsibility for performing support tasks.
- Quality assurance requirements.
- Identification of long-term goals and strategies for reducing high FAC wear rates.
- A method for evaluating plant performance against long-term goals.

## 3.2 Implementing Procedures

It is recommended that implementing procedures (or instructions) be developed for each specific task conducted as part of the FAC program. These procedures (or instructions) should be organized in the manner most appropriate for the organization of the utility and project. These procedures (or instructions) should recognize any differences between safety-related and balance-of-plant systems and large bore and small bore piping systems.

Procedures (or instructions) should be provided for controlling the major tasks of an effective FAC program:

- Identifying susceptible systems.
- Performing FAC analysis.
- Selecting and scheduling components for initial inspection.
- Performing inspections.
- Evaluating inspection data.
- Evaluating worn components.
- Repairing and replacing components when necessary.
- Selecting and scheduling locations for follow-on inspections.

Recommendations on how to implement these major tasks are provided in Section 4.

## 3.3 Documentation

The results of the major decisions and tasks should be documented, and appropriate records should be maintained. It is recommended that a report be prepared for each inspection outage. This report should identify the components inspected and justify the basis for their selection, (*i.e.*, predictive ranking, industry experience, engineering judgment), the results of those inspections, and an evaluation and disposition of worn components. The plant database of inspection and replacement history should be updated after every outage.

# 4

# RECOMMENDATIONS FOR FAC TASKS

## 4.1 Definitions

As used in the remainder of this document, the following definitions apply:

Predictive Methodology - A predictive methodology uses formulas or relationships to predict the rate of wall thinning and total amount of wall thinning to date in a specific piping component such as an individual elbow, tee, or straight run. The predictions need to be based on factors such as the component geometry, material, and flow conditions. An example of a predictive methodology is the Chexal-Horowitz correlation incorporated in the CHECWORKS™ code (reference 9).

A predictive methodology should incorporate the following attributes:

- Take into account the geometry, temperature, velocity, water chemistry, and material content of each component.
- Address the range of hydrodynamic conditions (*i.e.*, diameter, fitting geometry, temperature, quality, and velocity) expected in a nuclear power plant. It is desirable to have the ability to calculate the flow and thermodynamic conditions in lines where only the line geometry and the end conditions are known.
- Consider the water treatments commonly used in nuclear power plants. The water chemistry parameters that should be addressed are the pH range, the concentration of dissolved oxygen, the pH control amine used (PWR only), the hydrazine concentration (PWR only), and the main steam line oxygen content (BWR only). It is particularly desirable to have a method of calculating the local chemistry conditions around the steam circuit.
- Cover the range of material alloy compositions found in nuclear power plants.
- Use the hydrodynamic, water chemistry, and materials information discussed above to predict the FAC wear rate accurately. To do this, the model may be based on laboratory data scaled to plant conditions. The model should be validated by comparing its predictions with wear measured in power plants.

- Provide the user with the wear rates of components and the time remaining before a specified minimum wall thickness is reached. Various rankings will probably be provided as part of these calculations.

- Provide the capability to use measured wear data to improve the accuracy of the plant predictions.

- The developer of the predictive methodology should also periodically review the accuracy of the predictive correlations and refine it as necessary.

Predictive Plant Model - A Predictive Plant Model is a mathematical representation of the power plant's FAC susceptible lines and systems. Typically it utilizes a computer code which incorporates the attributes defined above. The Predictive Plant Model should also be developed on a component-by-component basis using a logical and unique naming convention for each component.

It is recommended that wherever possible, the Predictive Plant Model utilize the results of wall thickness inspections to enhance the FAC predictions. In CHECWORKS™, this is called a Pass 2 analysis.

Analysis Line - An Analysis Line is one or more physical lines of piping that have been analyzed together in the Predictive Plant Model. In CHECWORKS™ Pass 2 analyses, they utilize a common line correction factor and is called a CHECWORKS™ run.

## 4.2 Identifying Susceptible Systems

### *4.2.1 Potential Susceptible Systems*

The first evaluation task in the plant FAC program is to identify all piping systems, or portions of systems, that could be susceptible to FAC. FAC is known to occur in piping systems made of carbon and low-alloy steel with flowing water or wet steam. All such systems should be considered susceptible to FAC. The plant line list and Piping and Instrumentation Drawings (P&IDs) can be used to ensure that all potentially susceptible systems are included in the program. Note that lines supplied by an equipment vendor, such as gland steam lines, are often not on the plant line list. Additionally, interviews with plant operators and systems engineers are useful to identify how lines and systems are actually being used (or have been used) in the various plant operating modes. Guidelines for such interviews can be found in Reference 20.

Care should be taken to ensure that all such susceptible lines are included in the FAC program. Additionally, this evaluation should be periodically reviewed to ensure that it is kept current with plant design changes and ways that systems are being operated.

### 4.2.2 Exclusion of Systems From Evaluation

Some susceptible systems, or portions of systems, can be excluded from further evaluation due to their relatively low level of susceptibility. Based on both laboratory and plant experience, the following systems can be safely excluded from further evaluation:

- Systems of stainless-steel piping, or low-alloy steel piping with nominal chromium content equal to or greater than 1-1/4 % (high content of FAC resistant alloy). This exclusion pertains only to complete piping lines manufactured of FAC-resistant alloy. If some components in a high-alloy line are carbon steel (*e.g.*, the valves), then the line should not be excluded. Also, in lines where only certain components or sections of piping have been replaced with a FAC-resistant alloy, the entire line, including the replaced components, should be identified as susceptible and analyzed. Note that high chromium materials do not necessarily protect against other damage mechanisms, especially cavitation and liquid impingement erosion. Thus, if the wear mechanism has not been identified it is not prudent to exclude the replaced components from the inspection program.

- Superheated steam systems with no moisture content, regardless of temperature or pressure levels. However, drains, traps, and other potentially high-moisture content lines from superheated steam systems should not be excluded automatically. Further, experience has shown that some systems designed to operate under superheated conditions may actually be operating with some moisture in off-normal or reduced power level conditions. Care must be exercised not to exclude such systems.

- Systems with high levels of dissolved oxygen (oxygen > 1000 ppb), such as service water, circulating water, and fire protection.

- Single-phase systems with a temperature below 200°F (low temperature). Caution—if measurable wear is identified in nearby piping operating slightly above 200°F, it is recommended that the system's exclusion be reconsidered. There is no temperature exclusion limit that can be recommended for two-phase systems. Note that other damage mechanisms, such as cavitation, are predominant below 200°F and need to be taken into account. However, this document does not address these other damage mechanisms.

- Systems with no flow, or those that operate less than 2% of plant operating time (low operating time); or single-phase systems that operate with temperature >200 °F less than 2% of the plant operating time. Caution—if the actual operating conditions of the system cannot be confirmed (*e.g.*, potential leaking valve, time of system operation cannot be confirmed), or if the service is especially severe (*e.g.*, flashing flow), that system should not be excluded from evaluation based on operating time alone. A further caution—some lines that operate less than 2% of the time have experienced damage caused by FAC. These lines include Feedwater Recirculation, startup condensate lines, High Pressure Coolant Injection (HPCI), and Reactor Coolant Inventory Control (RCIC). Such lines should be excluded only if no wear has been observed and continued operation under existing parameters is assured.

- Care should be taken not to exclude piping downstream of leaking valves or malfunctioning steam traps[7]. Leaking valves and steam traps can be identified using means such as infrared thermography or thermocouples, often performed as part of a plant thermal performance evaluation.

It is recommended that a list be developed of the systems excluded from the FAC program and the basis for their exclusion. This list should be appropriately documented and reviewed. It has proven useful to have plant operating personnel review the list of excluded systems.

Systems should not be excluded from evaluation based on low pressure. Pressure does not affect the level of FAC wear. Pressure only affects the level of consequence should a failure occur. A failure in a low-pressure system could have significant consequences (*e.g.*, failure in a low-pressure extraction line). Also, arbitrary ranges of velocity or other operating conditions should not be used to exclude a system from evaluation.

The systems excluded by these criteria will not experience significant FAC damage over the life of the plant. However, it should be noted that such systems could be susceptible to damage from other corrosion or degradation mechanisms. These include cavitation erosion, liquid impingement erosion, intergranular stress corrosion cracking (IGSCC), microbiologically-influenced corrosion (MIC) and solid particle erosion. These mechanisms are not part of a FAC program and should be evaluated separately. In addition, the list of excluded systems should be periodically reviewed to ensure that the effects of any changes in operating practice or plant modifications have been appropriately considered and addressed.

### 4.2.3 Prioritize Systems For Evaluation

The list of susceptible systems for evaluation will be large. All of these systems must be evaluated. However, if time or resources are limited, it may be necessary to prioritize the scheduling of evaluations. The following is a reasonable, first-order listing of priorities:

[7] Following the repair of any leaking valve or steam trap, and inspection of the downstream piping, the downstream piping can again be excluded from the FAC program provided that it meets the exclusion criteria provided herein.

1. Large-bore piping.
2. Susceptible small-bore piping with the most significant consequences of failure.
3. The remaining small-bore piping.

A failure in a large-bore piping system has potentially more significant consequences to plant and personnel safety and should be given first priority. Analysis and inspection of all susceptible large-bore piping systems is recommended. At minimum, initial inspections of large-bore systems should be conducted at the next scheduled refueling outage, if they have not yet been performed. For purpose of FAC evaluation, large-bore piping is defined as piping with a nominal diameter of greater than two (2) inches. Recommendations are provided in Subsections 4.3 through 4.8 for addressing large bore piping.

Although the consequences of failure may be less, problems with small-bore piping in general, and socket-welded fittings in particular, have been experienced. FAC-related leaks and ruptures, some resulting in plant shutdowns, have been reported in small-bore lines. For the purpose of FAC evaluation, small-bore piping is defined as both butt-welded and socket welded piping with a nominal diameter of less than or equal to two (2) inches.

The number of inspections performed for small bore piping is utility dependent. Economics could determine the extent of inspections performed versus wholesale replacement with FAC-resistant materials. A recommended program for small bore piping is provided in Appendix A.

## 4.3 Performing FAC Analysis

Once the susceptible, large-bore piping systems have been identified, it is recommended that, where feasible, a detailed FAC analysis be performed for each system using a predictive methodology such as CHECWORKS™. The purpose of this analysis is to predict the FAC wear rate and to determine the remaining service life for each piping component, including uninspected components. Utilities may select any analytical tool that covers the necessary plant design, operating, and water chemistry conditions.

## 4.4 Selecting And Scheduling Components For Inspection

### *4.4.1 Initial Inspection*

An initial inspection is recommended to determine the level of plant FAC susceptibility, to identify components with unacceptable damage, to collect data to determine FAC trends, and to enhance the Predictive Plant Model with inspection data so as to more accurately predict future wear.

For these recommendations, the initial inspection is defined as the first inspection outage at which the inspection locations for a given "Analysis Line"[8] were selected based upon a Predictive Plant Model. All operating U.S. nuclear power plants have a FAC program in place and have conducted some inspections. However, experience has shown that until a comprehensive analysis of all susceptible systems has been completed, a high degree of confidence cannot be established that all highly susceptible locations have been identified and are being monitored to prevent leakage or rupture. It is recommended that, where feasible, a FAC analysis be performed for each large bore susceptible system using a Predictive Plant Model to help select the inspection locations. The components selected by this process that have not been inspected previously should be inspected at the next scheduled plant outage.

Components are selected for the initial inspection by means of a three-step process for each Analysis Line:

1. Select a sample of the most potentially susceptible components from both the ranking analysis and plant and industry experience.

2. Conduct inspections of this sample. If any of these inspections reveal significant FAC wear, expand the sample to identify significant wear in other components.

3. As the sample inspections are completed, determine the measured wear of each of those components. Enter this wear into the Predictive Plant Model to update the ranking model to a line-specific predictive model and predict the FAC wear rates. Utilize these predicted wear rates to calculate the remaining FAC service life for each component in the Analysis Line. See Subsection 4.7.3 for the method of calculating predicted remaining service life. Resolve those components not already inspected as part of steps (1) and (2) above, for which the analysis predicts a service life of less than the time to the next inspection outage plus a reasonable safety factor. The NUMARC Guidelines (reference 3) recommended a safety factor of 10% on time.

[8] See definition of analysis line in Subsection 4.1.

It is important that data concerning past replacements and leaks (wear = initial thickness minus remaining thickness at time of leak) also be included in the model.

Those components not inspected are, by definition, acceptable for continued service. Service life for these components will exceed the time to the next inspection outage. Those components that were inspected because of short service life should be reevaluated using the measured data, or repaired or replaced as described in Subsection 4.8.

Recommendations for selection of components for the initial sample, and expanded sample, if necessary, are as follows:

#### 4.4.1.1 Sample Selection

The following recommendations are made for selecting components for the inspection sample of each Analysis Line:

1. Select a sample from the components identified in the wear ranking as having the highest relative wear. To the extent practical, the sample should include components from each geometry type present in the Analysis Line (*e.g.*, elbows, reducers, expanders, tees, valves, orifices, equipment nozzles, piping downstream of other components, etc.). Engineering judgment should be employed to ensure that the most representative sample of the items with the highest probability of damage be examined. For example, if the three highest-ranked components are elbows, and the first tee in the rankings is the sixth highest ranked item, then that tee should be inspected in preference to the third ranked elbow. However, if the highest ranked tee is the hundredth item, it should not replace the third ranked elbow.

2. Select one or more components with the shortest relative remaining service life from the time rankings, if they are not included in sample of (1) above.

3. A minimum of one component should be selected from each parallel train in a multi-train line. These components should be in similar locations for the purpose of comparing results. It is recommended that this location be one of the highest ranked items in the relative wear ranking.

4. Include components immediately downstream of control valves and orifices. These locations should be included in each train of multi-train lines. Note that locations downstream of control valves and orifices are often susceptible to damage caused by cavitation or droplet impingement.

5. Minimum of one location in each two-phase line of piping. This is necessary because it is difficult to determine moisture content in two-phase lines.

6. Include all known and potential FAC problem areas based on past plant experience, and past experience in sister plants.

7. Consider all applicable locations known from industry experience to be high-wear areas in other plants.

8. Consider components that have been replaced in the past, the attached downstream pipe, and the next downstream component, or the upstream pipe and component if the replaced component was an expander or expanding elbow.

9. Consider unusual geometries, including field fabricated tees and laterals[9] and locations known to have backing rings.

10. Based on EPRI experience, the size of the sample based on the wear ranking should be a minimum of 3 to 5 components per Analysis Line, depending upon the number of components in the Analysis Line, the predicted wear, and its complexity. CAUTION: The recommended sample size of 3–5 components per Analysis Line is based on the demonstrated accuracy of the CHECWORKS™ code. If other methods are used to select inspection locations, then the sample size used should be justified.

#### 4.4.1.2 Expanded Sample Inspection

1. When inspections of the sample selection detect significant FAC wear, the sample size for that Analysis Line should be increased to include the following:

   a) Any component within two diameters downstream of the component displaying significant wear, or within two diameters upstream if that component is an expander or expanding elbow.

   b) A minimum of the next two most susceptible components from the relative wear ranking in the same train as the piping component displaying significant wear.

   c) Corresponding components in each other train of a multi-train line with a configuration similar to that of the piping component displaying significant wear.

2. When inspections of the expanded sample of (1) above detect additional components with significant FAC wear, the sample should be further expanded to include:

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[9] Special attention is recommended for field fabricated tees and laterals as they sometimes have protuberances into the flow steam (increasing local turbulence) and they often lack structural reinforcement.

a) Any component within two diameters downstream of the component displaying significant wear, or within two diameters upstream if that component is an expander or expanding elbow.

b) A minimum of the next two most susceptible components from the relative wear ranking in the same train as the component displaying significant wear.

3. When inspections of the expanded sample of (2) above detect additional components with significant wear, the sample expansion of (2) above should be repeated until no additional components with significant wear are detected.

The above selection process should be reviewed with other personnel involved in the implementation of the FAC program.

#### 4.4.1.3 Inspection Locations for Lines with Uncertain Operating Conditions

Certain large bore systems, or portions of systems, such as auxiliary steam and gland steam, may have unknown or widely varying operating conditions which prevent the development of reasonably accurate analytical models. These lines are sometimes called susceptible non-modeled lines. Inspection locations on these lines should be conservatively selected using a combination of engineering judgment, industry experience, and plant experience.

The recommendations provided in A5.2 are applicable for selecting initial inspection locations for susceptible non-modeled large bore lines. It is recommended that special consideration be given to the following locations:

- Downstream of orifices
- Downstream of flow control valves and level control valves
- Nozzles
- Tees and laterals, particularly field fabricated tees and laterals
- Complex geometric locations such as components located within two diameters of each other (*e.g.*, an elbow welded to a tee)
- Components with backing rings and counterbores
- Components downstream of replaced components (upstream if expander), and components that have been replaced in the past if not upgraded to resistant material

If initial inspections detect significant FAC caused thinning, then the inspection sample should be expanded using the criteria of Subsection 4.4.1.2 (1) (a) and (c).

### 4.4.2 Second Inspection

A second inspection should be conducted for each Analysis Line. The purpose of the second inspection is to:

1. Confirm the results of the first inspection.

2. Obtain data for trending wear. This is done by inspecting some of the previously inspected, highly-ranked components.

3. Inspect those components with a short remaining service life to confirm that all components are suitable for continued service.

The timing of the second inspection should be conservatively selected considering results from the first inspection, predictions of the Predictive Plant Model, structural margins, presence of any known aggravating conditions (*e.g.*, leaking, flashing, or cycling valves), potential consequences of failure, and plant and industry experience. For example, lines with high wear rates or low structural margins should be reinspected at the next refueling outage.

It is recommended that the following components be included in the second inspection for each Analysis Line:

1. A minimum of three components from the initial inspection having the most FAC wear. This will help confirm predictions made by the Predictive Plant Model and verify the inspection and data acquisition systems used.

2. A representative sample of components for which a Predictive Plant Model enhanced by inspection data shows a remaining service life of less than the amount of time until the next scheduled inspection. This situation can occur in both previously inspected components as well as non-inspected components. See Subsection 4.7.3 for calculations of predicted remaining service life.

   The sample needs to represent factors such as component type, location, upstream influences, train where located, size, operating conditions, etc. For example, results of an inspection of one elbow closely located on the same train with two other elbows (*e.g.*, same predicted wear rate and remaining service life) could serve to represent all three elbows. However, three otherwise identical elbows located on different trains should not be qualified by one inspection.

3. Consideration should also be given to inspecting problem areas that have been experienced at other power plants since the initial inspection.

Regardless of the analytical method used, the analysis should be updated and the revised model used to predict the future FAC wear rates.

### 4.4.3 Follow-On Inspections

Inspections following the second inspection should be scheduled as necessary to monitor plant susceptibility and to inspect wearing components prior to the end of their predicted service life. For each Analysis Line, the interval until the next inspection outage should be based on the results of the prior inspection and any changes in plant design, operating conditions, and water chemistry since then. Industry experience with problem areas in other plants should also be considered.

It is recommended that the next inspection for each component be scheduled for no later than the normally scheduled refueling outage preceding the end of the predicted FAC service life of the component plus an appropriate safety factor. At that outage, it is recommended that the following components, at minimum, be included for inspection:

1. A representative sample of components for which a Predictive Plant Model enhanced by inspection data shows a remaining service life of less than the amount of time until the next scheduled inspection outage, with an appropriate safety factor.

   The sample needs to represent factors such as component type, location, upstream influences, train where located, size, operating conditions, etc. For example, results of an inspection of one elbow closely located on the same train with two other elbows (*e.g.*, same predicted wear rate and remaining service life) could serve to represent all three elbows. However, three otherwise identical elbows located on different trains should not be qualified by one inspection.

2. A minimum of the highest-wear component found in the previous inspection, if it has not already been replaced.

In addition, the following components should be considered for inspection:

1. Straight pipe and the next downstream component of previously replaced components, or the upstream pipe and next component if the replaced component was an expander or expanding elbow.

2. Susceptible piping components immediately downstream of control valves and orifices that showed wear from previous outage inspections for trending of the measured wear.

3. Areas that have experienced problems at other plants since the previous inspection.

4. Components with high predicted or measured wear. High wear tends to increase turbulence, which can accelerate the wear rate.

5. To confirm predictions, consideration should also be given to periodically inspecting previously repaired and replaced components, unless the replacement components are fabricated of a FAC-resistant material.

6. Components (including straight pipe) immediately downstream of components containing chromium greater than 0.1%.

It is recommended that the user monitor plant design and operational changes, and any leaking valves and steam traps, between scheduled inspection outages and update the susceptibility analysis (see Subsection 4.2) and the FAC analysis as appropriate.

If inspection results are consistent with predictions, no further inspections are necessary during this outage. Those components that were not inspected are, by definition, acceptable for continued service, as service life will exceed the amount of time until the next inspection outage. Those components that were inspected due to short remaining service life, and the other components these components represent if an inspection sample was used, should be reevaluated using measured data, or repaired or replaced as described in Subsection 4.8.

If inspection results *are unexpected and inconsistent* with predictions, the reasons for those inconsistencies should be investigated. An updated FAC analysis should be performed, and additional inspections conducted and material determinations made as appropriate.

The above process for follow-on inspections should be repeated for the life of the plant.

## 4.5 Performing Inspections

### *4.5.1 Inspection Technique*

Components can be inspected for FAC wear using ultrasonic techniques (UT), radiography techniques (RT), or by visual observation. Both UT and RT methods can be used to investigate whether or not wear is present. However, the UT method provides more complete data for measuring the remaining wall thickness. RT is commonly used for socket-welded fittings. RT has one advantage of providing broad coverage with a visual indication of any wall loss. Additionally, RT can be performed without removing the pipe insulation and during plant operation, providing cost and outage time savings in certain situations. Nearly all utilities are using the manual UT method with electronic data loggers for performing most of the large-bore inspections. Visual observation is often used for examination of very large diameter piping (*e.g.*, crossunder and crossover piping), followed by UT examinations of areas where significant damage is observed or suspected. Reference 12 provides details of various inspection methods.

For large-bore piping, the recommended UT inspection process consists of marking a grid pattern on the component and using the appropriate transducer and data acquisition equipment to take wall-thickness readings at the grid intersection points. If the readings indicate significant thinning, the region between the grid intersection points should also be scanned, or the size of the grid reduced to identify the extent and depth of the thinning.

Although scanning the entire component and recording the minimum thickness is not recommended, scanning within grids and recording the minimum found within each grid square is an acceptable alternative to the above method.

The inspection data is used for three purposes:

1. To determine whether the component has experienced wear and to identify the location of maximum thinning.

2. To ascertain the extent and depth of the thinning.

3. If data from multiple inspections is available, to evaluate the wear rate and wear pattern to identify any trends.

To attain all three of these objectives, it is recommended that the component be inspected using a complete grid with a grid size sufficiently small as not to miss worn areas (see Subsection 4.5.3). Although scanning will meet the first two objectives, it will not provide sufficient data to determine component wear rates or to develop sufficient data to perform a detailed stress analysis of a worn component. Further, scanning is of limited use in trending the wear found.

High-temperature paints, china markers, or other marking devices should be used to identify the grid intersection points where the measurements will be taken. This will ensure that future inspections can be repeated at the same locations. It is good practice to mark at least one location, such as the grid origin, with a low stress stamp or an etching tool. This provides a means of re-establishing the grid if the markings are obscured. Note that approved marking materials should be used when gridding components. Templates may also be used to achieve repeatable measurements.

FAC has also been observed in pressure vessels and tank walls. Inspection approaches used for this situation are normally internal visual (similar to crossunder piping), and external UT.

When a component is to be replaced with another component made of a non-FAC resistant material, the new component should be appropriately gridded and baseline UT data obtained. The new component should also be examined visually to observe the eccentricity, surface, roughness, local thinning—such as is caused by depressions in the surface, etc. These data should be recorded and will provide a good baseline for determining future component wear. Additionally, if there is any evidence that some of the wear may have been caused by a mechanism other than FAC (*e.g.*, cavitation or droplet impingement), then consideration should also be given to developing an appropriate inspection program to address the suspected phenomenon.

The inspection grid should have a unique identification for each measurement location. For compatibility with the CHECWORKS™ computer code, if it is used, it is recommended that letters be used to designate circumferential locations, and numbers used to designate axial locations on grids. It is also recommended that the origin of the grid be on the upstream side of the component.

For small-bore piping, there are no standardized inspection methods. The most common approaches are:

- Gridding or scanning the downstream piping and expanding to the component if substantial wear is found.
- Gridding the component and recording the readings.
- Scanning the component and recording the minimum measured on the entire component or in quadrants.
- Using RT methods.

Further guidance is provided in Appendix A.

### 4.5.2 Grid Coverage

Experience has shown that it is very difficult to predict where the maximum wear will occur in a given component. (For the purpose of this section, a component refers to both fittings and straight pipes.) To ensure that the maximum FAC wear can be detected, the UT grid should fully cover the component being inspected. A full-coverage grid also provides a good baseline for future inspections. As wear can spread over time, a partial grid, even if larger than the original wear area, may be too small to ensure that the full extent of the wear can be detected in the future.

It is also beneficial to inspect the area on both sides of each pipe-to-component weld. It is desirable to start the grid line on both sides of the weld, as close as possible to the toe of the weld, in order to locate potential thin areas adjacent to the weld. This will help detect the presence of backing rings, the use of counterbore to match the two inner surfaces, or the localized wear that is sometimes found adjacent to welds[10]. Having data on the connected pipe can also be helpful in evaluating whether variation of wall thickness in the component is FAC wear or fabrication variations. In many cases, the grid in the counterbore region will have to be evaluated separately.

It is also suggested that when fittings are welded directly to fittings, the weld area on the downstream fitting be inspected. This will provide the same benefits as discussed above.

The results of EPRI tests, as well as the evaluation of data from a large number of power plant inspections, show that FAC can also extend into the piping downstream of a component. Consequently, it is recommended that the inspection grid extend from two grid lines upstream of the toe of the upstream weld to a minimum of two grid lines or six inches, whichever is greater, beyond the toe of the downstream weld. If there is a straight pipe immediately downstream of the examined component, and the measured wall thickness in the pipe is decreasing in the downstream direction, or if significant wear is present, the inspection grid should be continued downstream until an increasing thickness trend is established. If expanded inspections are performed on the downstream pipe, then the pipe should be separately evaluated for acceptance.

Test results also show that in the case of expanders (or diffusers) and expanding elbows, FAC can occur upstream of the component as well. It is recommended that for these components the wall thickness in the upstream pipe be measured. The grid should be extended upstream 2 grid lines or six inches, whichever is greater. The grid should be expanded further upstream if necessary.

Maximum wear in straight pipe downstream of components typically occurs within two diameters of the connecting weld. Consideration should be given to extending the grid two diameters downstream (or two diameters upstream for expanders and expanding elbows), at least for the first two inspections. This may avoid extra inspection time during the outage to investigate the first two grids and then having to inspect further downstream.

Valves, orifices, equipment nozzles, and other like components cannot be inspected completely with UT techniques due to their shape and thickness. They need to be treated differently. Experience has shown that FAC wear in these components can be

[10] This effect has been most frequently observed at locations where a carbon steel component is downstream of a more resistant component (chromium $\geq 0.1\%$). See reference 24.

gauged from wear that may be present in piping located immediately downstream. It is therefore recommended that for these components the inspection grid be placed on the downstream pipe for a distance of two diameters downstream of the connecting weld, and, if possible, one or two grids in the component itself. If significant wear is detected in the downstream pipe, the component should also be examined. This approach for valves, orifices and equipment nozzles is only applicable if the piping downstream is manufactured of material with equal or higher susceptibility (equal or lower chromium content), and has not been repaired or replaced. A combination of UT, RT and/or visual techniques are typically utilized to inspect valves, orifices and equipment nozzles.

### 4.5.3 Grid Size

To be compatible with CHECWORKS™, if it is used, grid lines must be either perpendicular or parallel to the flow. For elbows, the lines perpendicular to the flow (inspection bands) are radial lines focusing on the center of curvature. This results in the same number of grid intersection points on both the intrados and the extrados of an elbow. The suggested grid layout is shown in Figure 4-1.

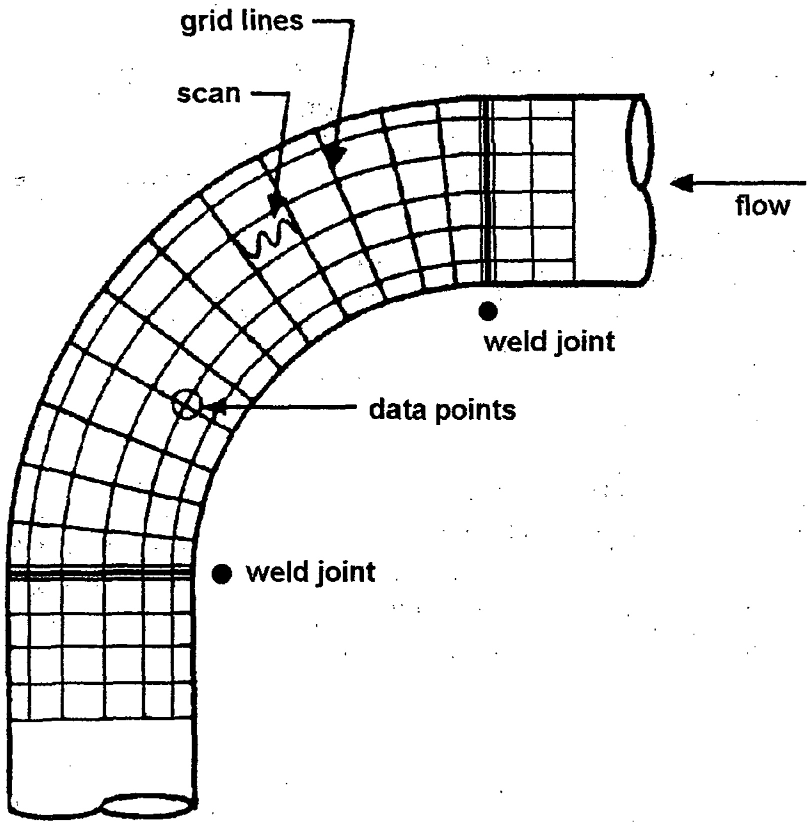


**Figure 4-1**
**Grid Layout for an Elbow**

It is important that the grid size (maximum distance along the component surface between grid lines) be small enough to ensure that the thinned region can be identified. Experience and plant data have shown that the grid size should be such that the maximum distance between grid lines is no greater than $\pi D/12$, where D is the nominal outside diameter. The grid size need not be smaller than 1 inch, and should not be larger than 6 inches. The following table illustrates the maximum grid sizes for standard pipe sizes. The user should select convenient grid sizes equal to or smaller than those tabulated for the pipe sizes of interest.

**Table 4-1**
**Maximum Grid Sizes for Standard Pipe Sizes**

| Pipe Size (inch) | Outside Diameter (inch) | Maximum Grid Size (inch) |
|---|---|---|
| 2 | 2.375 | 1.00 |
| 3 | 3.500 | 1.00 |
| 4 | 4.500 | 1.17 |
| 6 | 6.625 | 1.73 |
| 8 | 8.625 | 2.25 |
| 10 | 10.750 | 2.81 |
| 12 | 12.750 | 3.33 |
| 14 | 14.000 | 3.67 |
| 16 | 16.000 | 4.19 |
| 18 | 18.000 | 4.71 |
| 20 | 20.000 | 5.23 |
| 24 | 24.000 | 6.00 |
| >24 | ----- | 6.00 |

The above grid size is sufficient to detect the presence of wear, but may not be small enough to determine the extent and maximum depth of that wear. Therefore, where inspections reveal FAC wall thinning, the grid size should be reduced to a size sufficient to map the depth and extent of the thinned area. A grid size of one half the maximum size should be sufficient for mapping.

Because of the importance of grid layout in the inspection process and in the interpretation of the obtained data, it is important that the grid layouts used be well thought out and not be changed arbitrarily. This will provide the best possible value from the data sets obtained.

Although the above recommendations should generally be used, occasionally special circumstances—most particularly high radiation fields—may justify the use of a larger grid. If larger grid spacings are used, then the evaluation of the data, the planning of future inspections, and the repair evaluations should be done with additional conservatisms.

### *4.5.4 Measuring Trace Alloy Content*

It is well known that the presence of small amounts of chromium—and to a lesser extent copper and molybdenum—will dramatically reduce the rate at which FAC occurs. Measurements of trace alloy content can be factored into the Predictive Plant Model on a component-by component basis to improve the accuracy of predictions and to ensure that the inspection program is directed at the fittings most likely to fail. These measurements are particularly useful in cases where the measured wear is substantially less than the predicted wear. This will help in both understanding the reason for the differences as well as improving the accuracy of a Predictive Plant Model. Note that material libraries built into computer codes such as CHECWORKS™, normally use minimum specified values for the alloy content. If alloy measurements are used, the analyst must confirm that the measurements are accurate enough to ensure that the predictions remain conservative.

## 4.6 Evaluating Inspection Data

### *4.6.1 Evaluation Process*

The purpose of evaluating the inspection data is to determine the location, extent, and amount of total wear for each inspected component. The evaluation process is complicated by several factors, including the following:

- Unknown initial wall thickness (if baseline data was not taken).
- Variation of as-built thickness along the axis and around the circumference of the component.
- Inaccuracies in NDE measurements.
- The possible presence of pipe to component misalignment, backing rings, or the use of counterbore to match two surfaces.
- Data recording errors or data transfer errors.
- Obstructions that prevent complete gridding (*e.g.*, a welded attachment).

The challenge is to minimize the effect of these problems by applying uniform evaluation methods and utilizing engineering judgment.

The large amount of inspection data can present a substantial data management problem. To manage the data, it is recommended that a scheme be utilized to organize and maintain the data logger files. A database should be used to store past inspection data and contain provisions to accommodate future inspection data. The database will provide an efficient means of organizing and accessing the data.

The evaluation process consists of reviewing the inspection data for accuracy, determining the total wear, and determining the wear rate for each inspected component. These processes are described below.

### 4.6.2 Data Reduction

The inspection data should be carefully reviewed to identify any data that is judged to be in error. Erroneous data points should preferably be reinspected, or if necessary, eliminated to obtain valid readings. High and low readings should be compared to adjacent readings to evaluate their validity. One high or low reading in an area of consistent thickness may indicate an erroneous reading. Finally, depending on the component type, the variation in thickness attributable to manufacturing variations should be separated from the FAC wear. Reviewing data from the attached upstream and downstream pipe can be helpful. Elbows, tees, reducers and expanders are examples of components in which there is significant variation in thickness due to the manufacturing process. The presence of backing rings and counterbore should be noted so that these effects can be excluded.

Once the data set is acceptable, any wear region on the component should be identified. The location of a potential wear region should be compared with the component orientation, flow direction, and attached piping. The variation in thickness within this region should be compared to the adjacent region to confirm the existence of wear. If data from previous inspections are available, they should be compared with the current measurements, and wear trends/patterns should be identified.

### 4.6.3 Determining Initial Thickness and Measured Wear

Wear evaluations fall into two categories. The first category includes those components for which baseline (pre-service) thickness data are available. The second category includes those components for which no baseline data exists. The method used for calculating the component maximum wear (the maximum depth of wall thinning since the component was installed or repaired) will be different for the second case as the initial thickness is unknown.

There are four methods commonly used for determining the wear of piping components from UT inspection data[11]. The methods are:

[11] Validity of the methods to determine wear and estimate the component's initial thickness is based on grid sizes and configurations consistent with that recommended in Subsection 4.5.

- Band Method
- Area Method
- Moving Blanket Method
- Point to Point Method

Three of the methods-band, area and blanket-also estimate the components initial thickness and can be used to evaluate components with single outage inspection data. All the methods are predicated on the theory that the wear caused by FAC is typically found in a localized area or region. The methods are described below:

Band Method

The Band Method is predicated on the assumption that wear caused by FAC is localized. As such, the thickness variations observed around circumferential bands is an indication of the wear experienced by the component. By successively evaluating these circumferential bands, the component wear is determined by the maximum variation observed from all such bands.

The band method divides a component into circumferential bands of one grid width each. Each band is in a plane perpendicular to the direction of the flow. Figure 4-2 shows a cross sectional view of a circumferential band on a component with a localized wear region.

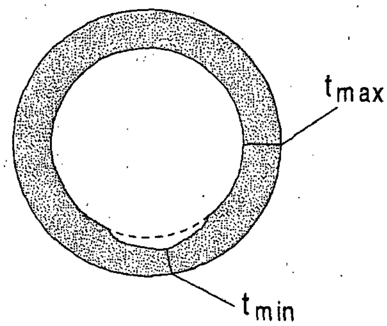


**Figure 4-2**
**Example of Band Method**

The initial thickness of each band is assumed to be the larger of the nominal thickness or the maximum thickness found in the band ($t_{max}$). The band wear is the initial thickness minus the minimum thickness found in the band ($t_{min}$).

For each band: $t_{init}$ = larger of $t_{nom}$ or $t_{max}$

Wear = $t_{init} - t_{min}$

The component maximum wear is the largest of the individual band wear values. The component initial thickness is then the initial thickness from the band of maximum wear. The use of the nominal wall thickness in the above calculations addresses the possibility that an entire band may have thinned uniformly, which may have caused most or all of the thickness to be under the nominal wall thickness.

A variation of the Band Method is the Strip Method. The Strip Method applies the same methodology to determine wear but utilizes longitudinal strips instead of circumferential bands in evaluating the maximum difference in thickness.

Both the band and the strip method are based on the assumption of a uniform initial thickness of the band of strip (*e.g.*, no manufacturing variation). Any such variation is reflected in the calculated wear. An appropriate method should thus be used to determine the measured wear of components suspected to have manufacturing variations (*e.g.*, elbows). Further information is contained in reference 9.

Area Method

The Area Method is a combination of the Band and Strip methods in which a local rectangular region, identified as the wear region, is evaluated for wear. It is based on the assumption that the entire wear area, and a thickness representative of the initial thickness, is encompassed within the rectangular region. More than one area can be defined for a given component. The initial thickness of each area is assumed to be a larger of the nominal thickness or the maximum thickness found in the area. The area wear is the initial thickness minus the minimum thickness found in the area. An example of the Area Method is shown in Figure 4-3.

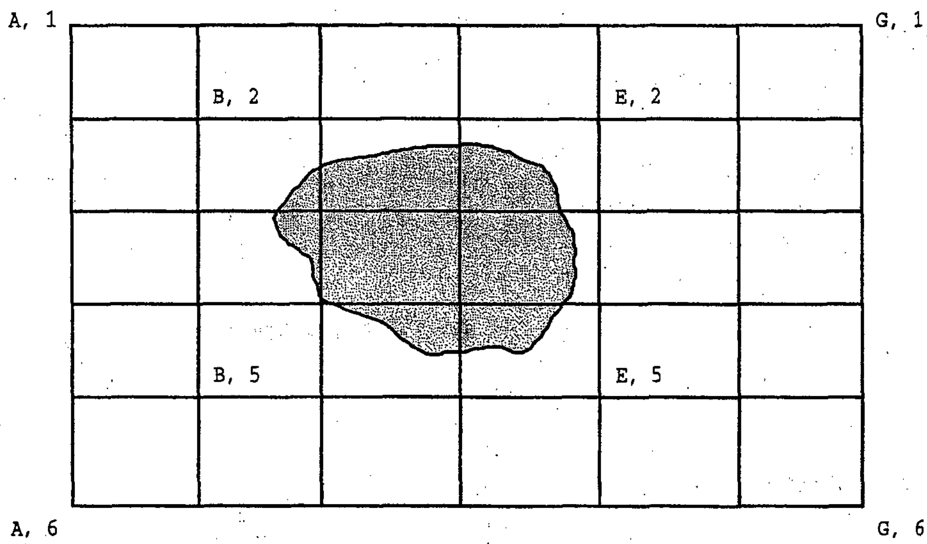


**Figure 4-3**
**Example of Area Method**

For each area: $t_{init}$ = larger of $t_{nom}$ or $t_{max}$

$$Wear = t_{init} - t_{min}$$

The component maximum wear is the largest of the individual area wear values. The component initial thickness is then the initial thickness from the area of maximum wear. The use of nominal wall thickness in the above calculations addresses the possibility that an entire area may have thinned uniformly, which may have caused most or all of the thickness to be under the nominal wall thickness.

Moving Blanket Method

The Moving Blanket Method is a refinement of the Area Method. It automates the process of identifying the region of maximum wear and attempts to minimize the effect of measurement errors. The Moving Blanket Method was developed by reviewing extensive amounts of component data to identify a method that would provide realistic, yet somewhat conservative estimates of initial thickness and wear. The method that was developed consists of placing a predetermined wear area or "blanket" of certain dimensions over the grid data. See Figure 4-4. The data that is within each blanket is evaluated to estimate both the initial thickness and the wear. The blanket is then moved to another location on the component and the process is repeated. The process continues until all possible locations on the component have been covered.

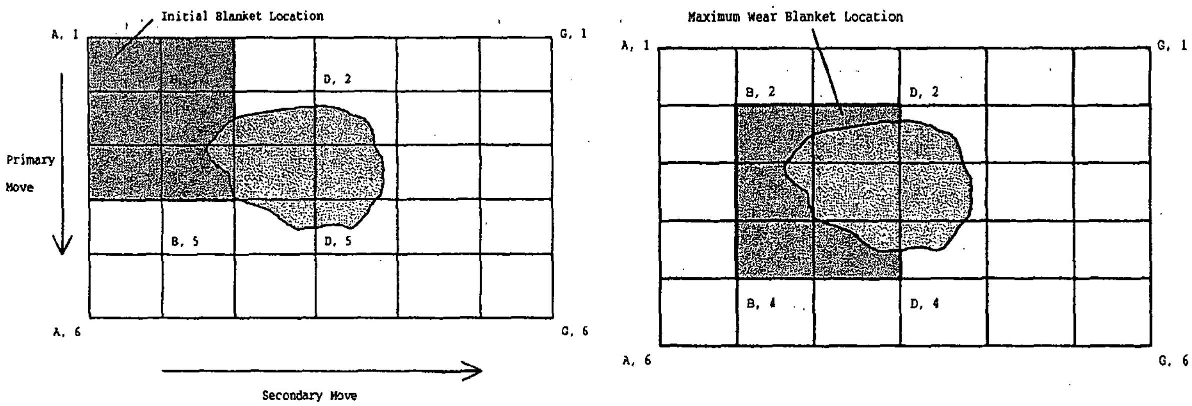


**Figure 4-4**
**Example of Moving Blanket Method**

Point-to-Point Method

The Point-to-Point Method can be used when data taken at the same grid locations exists from two or more outages (or baseline data plus data from one or more outages). In such a case, it is possible to obtain a difference in thickness readings at each of the grid locations. In summary, the wear at each grid location is the thickness taken at the earlier inspection minus the thickness taken at the later inspection. The largest of the grid wear values is the component maximum wear between the two outages. The Point-to-Point Method does not estimate the initial component thickness.

Summary

It is the responsibility of the owner to select the evaluation method for each set of UT data. Further information on each of these methods, along with guidance for evaluating various types of components including counterbore areas, is provided in the modeling guidelines of reference 9.

## 4.7 Evaluating Worn Components

### 4.7.1 Acceptable Wall Thickness

A component can be considered suitable for continued service if the predicted wall thickness, $t_p$, at the time of the next inspection is greater than or equal to the minimum acceptable wall thickness, $t_{accpt}$,

$$t_p \geq t_{accpt}$$

where,

$t_p$ = Predicted remaining wall thickness at a given location on the component

$t_{accpt}$ = Minimum acceptable wall thickness at location of $t_p$

Note that $t_p$ can be rewritten in terms of the current thickness, $t_c$, as:

$$t_p = t_c - \text{"predicted wear"}$$

or

$$t_p = t_c - (R \times T \times SF)$$

where,

$t_c$ = Current wall thickness at location of $t_p$

R = FAC wear rate at location of $t_p$

T = Time until next inspection

SF = Safety Factor

The wear rate and the amount of wear varies throughout a component. However, it is recommended that the component maximum wear rate be assumed to occur throughout The wear rate the component, giving a predicted future thickness profile as shown in Figure 4-5. Note that this approach is conservative, as the amount of wear is overstated at all locations other than the point of maximum wear. See Subsection 4.7.2 for a method to determine the component maximum wear rate. An acceptable approach to determine the future thickness profile would be to use the local wear rate from the band or area under consideration, combined with engineering judgement and a higher factor of safety than if a uniform wear rate is assumed to occur.

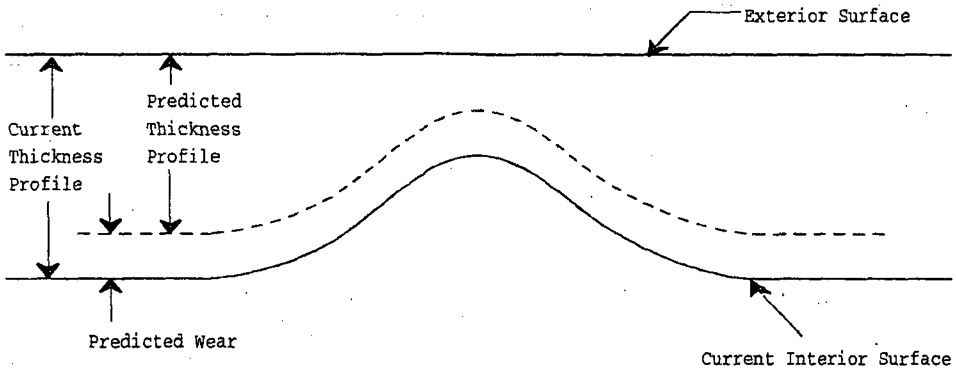


**Figure 4-5**
**Predicted Thickness Profile**

For susceptible components that have not been inspected, the predicted thickness should be used to calculate the lifetime of the component. The component nominal wall thickness should be utilized as the initial thickness unless another value can be justified.

A reasonable safety factor should be applied to the predicted wear rates to account for inaccuracies in the FAC wear rate calculations. This can also provide a mechanism by which the analyst may apply engineering judgment in setting the interval for reinspection. As the plant program matures and several outages of good inspection data are collected, the safety factor can be changed based on the use of actual inspection data.

The minimum acceptable wall thickness for each component should be calculated. For ASME Class 1, 2 and 3 pipe, component acceptance criteria are typically based on the ASME Boiler and Pressure Vessel construction code of record for the plant (reference 13), or using Code Case N-597[12](reference 15), which is based on EPRI report NP-5911 (reference 16). For ANSI B31.1 (reference 14) pipe, component acceptance criteria are typically based on the construction code of record for the plant or from guidance provided by industry standards such as Code Case N-597.

It is recommended that the calculation of $t_{accpt}$ be performed by an engineer with experience in piping stress analysis.

[12] Use of Code Case N-597 may require review and approval by the enforcement and regulatory authorities.

### 4.7.2 Maximum Wear Rate

The Predictive Plant Model should be used to predict the future maximum wear rate for every component analyzed, whether inspected or not. For those components that have been inspected, two methods have been used to determine the wear rate directly from the inspection data.

With the first method, the component maximum wear is divided by the period of service to obtain the average wear rate over the component lifetime. This past rate is then assumed to continue into the future. However, this method may cause several potential inaccuracies:

1. If baseline thickness data is not available, the initial thickness is unknown. Thus the estimated wear may be considerably higher or lower than the actual wear. This effect is smoothed out in CHECWORKS™, by using several components with a statistically calculated line correction factor.

2. This method assumes that operating conditions that affect FAC wear rate, (*e.g.*, water chemistry, plant power level) have not changed since plant startup. If changes did occur, the current wear rate could be considerably different than the average wear rate.

3. The method cannot accommodate potential future changes in operating conditions.

Figure 4-6 shows the potential for error when using an average wear rate based on inspection data and changing operating conditions for determining component lifetimes.

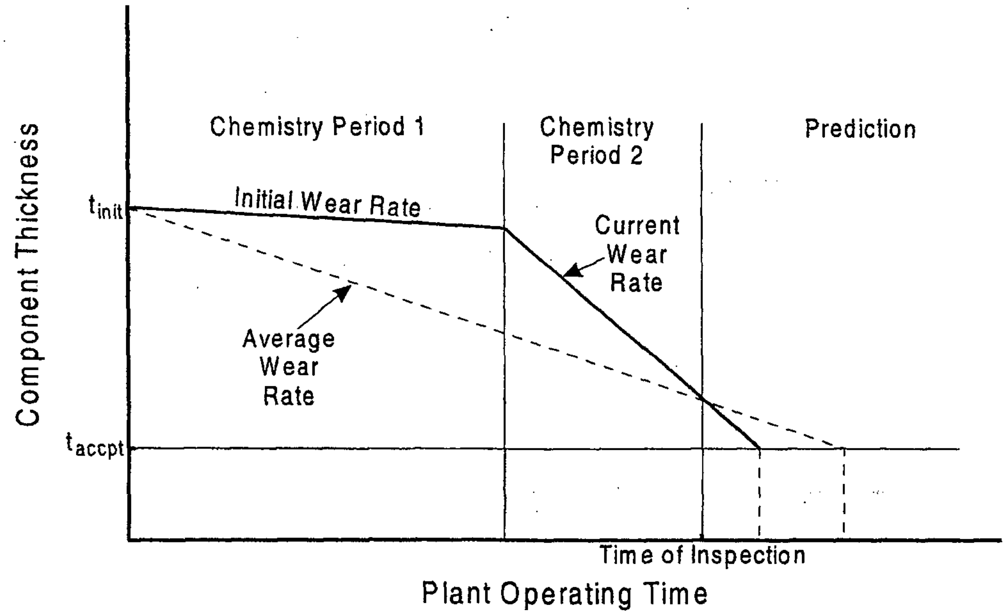


**Figure 4-6**
**Potential for Error When Using Average Wear Rate Based on Inspection Data**

A second method can be utilized if data from more than one inspection is available. The measured thickness at the point of maximum wear from the current outage is subtracted from the value measured at the previous outage. This difference is then divided by the time interval to obtain the average wear rate. This method is known as the point-to-point method. It has the advantage of being mechanical—the maximum wear is simply the maximum difference between two sets of readings at the same location. Note that the user does not have to estimate initial thickness of the component in order to calculate the measured wear. The difficulties in using the point-to-point method occur in cases where the wear between the outages is small. Two large numbers (wall thickness) are subtracted to obtain a small number (wear since previous outage) and then divided by another relatively small number (interval between outages) to determine the wear rate. UT measurement inaccuracies could cause significant calculation error with this method. This is illustrated in Figure 4-7. However, in most cases where inspection data from several inspection outages is available, the point-to-point method will provide more accurate determinations of wear than other methods.

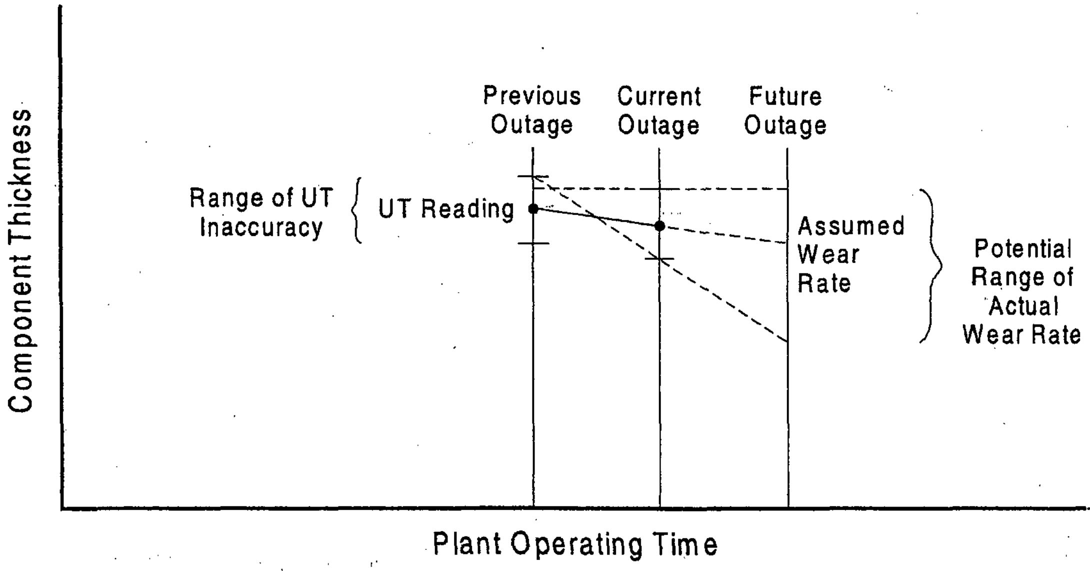


**Figure 4-7**
**Danger Of Using Wear Rate Based On Inspection Data From Two Inspections**

If CHECWORKS™, is used, it is recommended that until data from several inspections are available, the CHECWORKS™ predicted "current" wear rate be used. CHECWORKS™ takes into account past and planned future operational changes and smoothes out some of the temporal variations of the input parameters. If the analyst chooses to use wear rates calculated from inspection data, they should first be compared with the predicted values. Note that the $t_{crit}$ used for each component is defined on a global basis. Thus, $t_{crit}$ of a given component may be different from the actual component-specific $t_{accpt}$ value calculated by an experienced pipe stress analyst.

### *4.7.3 Remaining Service Life*

It is recommended to determine the remaining FAC service life of each component,

where,

$T_{life}$ = remaining service life

$$T_{life} = \frac{\text{current thickness - minimum acceptable thickness}}{\text{current wear rate x safety factor}} \qquad \text{(eq. 4-1)}$$

$$T_{life} = \frac{t_c - t_{accpt}}{R \times SF}$$

For those components that have been inspected, it is recommended that actual measured values be used for $t_c$. For components not inspected, $t_c$ can be predicted utilizing predicted wear rates,

$$t_c = t_{init} - \text{"predicted wear"}$$

$$= t_{init} - (T \times R \times SF)$$

where,

T = component service time to date

R = average wear rate over time T

SF = safety factor

If the predicted remaining service life is shorter than the amount of time until the next inspection, there are three options for disposition of the component:

1. Shorten the inspection interval.
2. Perform a detailed stress analysis to obtain a more accurate value of the acceptable thickness.
3. Repair or replace the component.

## 4.8 Repairing and Replacing Components

The following items should be considered in making replacement decisions:

- The cost and availability of replacement fittings.
- The need for skills and procedures to weld alloy steels and clad material to carbon steel.
- The pre-and post-weld heat treatments generally required for welding chrome-moly fittings[13]. This heat treatment may affect the outage schedule.
- The piping stress analysis required if a large portion of a carbon steel line is replaced with stainless steel.

[13] Some organizations have developed justification and procedures to exempt chrome moly welds of one-half inch and less thickness from pre- and post-weld heat treatments.

- The feasibility of replacing the entire system with a more wear-resistant material.

If repair is decided upon, the weld buildup technique is commonly used for the temporary repair of balance of plant piping. Weld repairs on ASME class piping must be performed in accordance with Section XI (reference 10) requirements. Supplementary rules for exterior weld repair are found in ASME Code Cases N-561-1 and N562-1 (references 21 and 22, respectively). However, interior weld buildup is generally preferred to exterior buildup for the following reasons:

- Interior weld repair results in a smoother internal surface. Conversely, use of exterior buildup and leaving the interior surface irregular, will tend to increase turbulence and accelerate the wear rate.
- By using interior weld repair, the resulting, smoother internal surface reduces the difficulty of making future UT inspections.
- An exterior weld buildup tends to result in a more complex state of stress.
- Exterior weld buildup has not been accepted by the NRC for the long-term repair of safety-grade piping.

However, interior weld build up is often limited by accessibility.

Temporary clamping devices are often used to make temporary repairs to balance of plant piping. Repairs to ASME class piping must be performed in accordance with Section XI (reference 10) and NRC requirements.

If repair or replacement of a component is necessary, it is recommended that the plant owner develop a strategy (*e.g.*, replacement with a more resistant alloy) so that the wear process does not continue. A discussion of long-term options to reduce wear rates is provided in Section 5.0. The use of FAC resistant material, especially when done on a line or spool piece basis, provides the following benefits:

- Assures that FAC is eliminated in this portion of the system,
- Eliminates the need for future inspections in those portions of the line, and
- Reduces iron transport to the steam generators or reactor vessel, as a disruptive deposition on flow measurement nozzles, and to extend the life of demineralizer resin beds.

However, there are cases in which use of like-for-like (*i.e.*, non FAC resistant) material is appropriate. These cases include:

- The plant is now using a significantly better water chemistry or the line will experience less damaging operating conditions (*e.g.*, a higher steam quality) such that the replacement is projected to last the remaining life of the plant.
- Procurement of a resistant material would delay plant restart. In this case, consideration should be given to upgrading the replacement with a resistant material at the next outage.
- The remaining life of the plant, including potential life extension, is such that a like-for-like replacement will perform satisfactorily.
- Life cycle costs and risk considerations associated with like-for-like replacement, including associated inspection costs, do not support change to FAC resistant material.

# 5

# DEVELOPMENT OF A LONG-TERM STRATEGY

## 5.1 Need For A Long-Term Strategy

Development of a long-term strategy is recommended. The strategy should focus on reducing the plant FAC susceptibility. Optimizing the inspection planning process is important, but reduction of FAC wear rates is needed if both the number of inspections and the probability of failure are to be reduced. (See Figure 5-1.)

One mitigating approach that is sometimes used is to replace only those fittings that have experienced significant wear. This approach is satisfactory if the wear is very localized. This is the case in which the wear is concentrated downstream of a flow control valve or an orifice. In most cases, though, the wear is widespread throughout a given system. Since flow conditions and water chemistry in a given line tend to be the same, it is only a matter of time until upstream or downstream fittings will also need to be replaced. This fitting-by-fitting replacement approach is less expensive in the short term, but is generally not cost effective over the long term. Plants using this selected replacement technique have also experienced unexpected failures in components scheduled for future replacement.

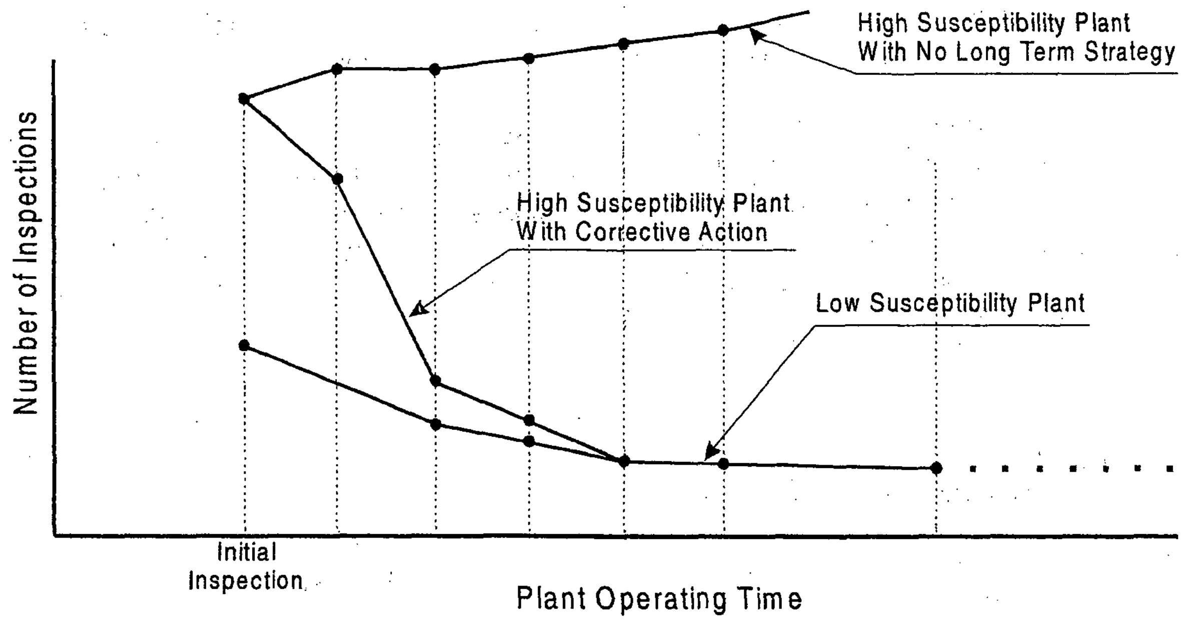


**Figure 5-1**
**Expected Trends for Inspections Over a Plant's Life**

It is recommended that in order to achieve the long-term goals of reduced cost and increased safety, a strategy of a systematic reduction of FAC rates be adopted. Three options are available to reduce FAC wear rates. These are:

1. Improvements in materials.

2. Improvements in water chemistry.

3. Local design changes.

Material improvements can reduce the wear rate to effectively zero. Depending on the location in the system, changes to PWR water chemistry can reduce the wear rate by up to a factor of ten. For BWR's, increases to condensate oxygen can significantly reduce FAC in the feed train. Design changes will result in improvements in specific areas. These three options are discussed in detail in reference 23 and summarized below.

## 5.2 FAC Resistant Materials

It has been widely demonstrated that materials containing chromium are resistant to FAC damage (reference 23). Lesser improvements come from molybdenum and copper. Replacing carbon steel piping with chrome-moly alloy (SA335, Grade P11 or P22) or stainless steel (normally a 304 alloy) should alleviate FAC damage for the life of the plant. The benefit can also be achieved by coating the piping surface with a high-alloy layer (flame spraying or weld overlay) or using a clad pipe with a high-chrome or stainless steel inner layer surrounded by a carbon steel outer layer.

Table 5-1 presents the degree of improvement associated with common piping alloys as predicted by CHECWORKS™ which is based on the data of Ducreux (reference 17). Other studies have found that the Ducreaux data may underestimate the effects of chrome on FAC, particularly trace amounts of chrome. Work is continuing in this area. However, all data has shown that FAC can be effectively eliminated through material improvement.

**Table 5-1**
**Performance of Common FAC-Resistant Alloys**

| Material | Nominal Composition (Chrome & Moly only) | $Rate_{carbon}/Rate_{alloy}$ |
|---|---|---|
| P11 | 1.25% Cr, 0.50% Mo | 34 |
| P22 | 2.25% Cr, 1.00% Mo | 65 |
| 304 | 18% Cr | >250 |

Material changes can be used to replace an entire system or to repair an especially troublesome area. However, material replacement may not reduce the wear rate if the damage is caused by a mechanism other than FAC. This is the case, for instance, if the damage is caused by cavitation or liquid impingement.

## 5.3 Water Chemistry

Changes in plant water chemistry can reduce the rate of FAC damage. Increasing the pH at operating temperature (the hot pH) for a PWR or increasing the amount of dissolved oxygen for a BWR can reduce the rate of FAC damage significantly. Chemistry changes are attractive as they can reduce the damage rate globally, help reduce rates of iron transport and the resulting steam generator sludge, and extend the life of the demineralizers.

### *5.3.1 PWR Plants*

#### 5.3.1.1 Effect of pH and Amines on FAC

For PWRs, one way of achieving a higher pH at temperature is by increasing the cold (control) pH. Figure 5-2 presents a summary of the effects of changing the cold pH on FAC wear rate over a range of temperature for a typical single-phase line. As can be seen, increasing the pH reduces the FAC wear rate significantly.

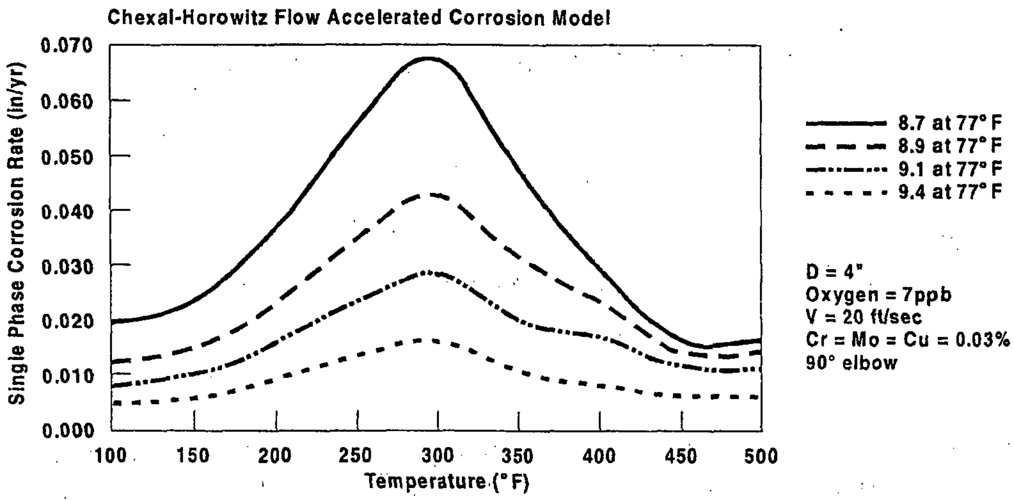


**Figure 5-2**
**Impact of Change in pH Level on FAC (As Predicted by CHECWORKS*)**

Another way of achieving a higher pH at temperature is by changing the pH control amine. This is mostly related to the tendency of amines to partition in two-phase flow conditions. Volatile amines such as ammonia tend to favor the vapor phase and tend not to provide much protection to two-phase lines. Less volatile amines such as morpholine and ethanolamine (ETA) are more effective in two-phase conditions. The selection of optimum water chemistry for PWR plants is a complex decision influenced by presence or absence of copper in the system (*e.g.*, in condenser or feedwater heater tubes), the type and capacity of the condensate polishers or demineralizers, concerns about organic acids produced by the decomposition of certain amines, and the condition of the steam generators. Considerations for selecting optimum chemistry for PWR plants is provided in the EPRI PWR Secondary Water Chemistry Guidelines (reference 18). A comparison of typical FAC wear rates at strategic locations around the secondary system is provided in Figure 5-3. Note that the comparisons shown in Figures 5-2 and 5-3 reflect a specific plant configuration and set of operating conditions, and will be different for other configurations and conditions.

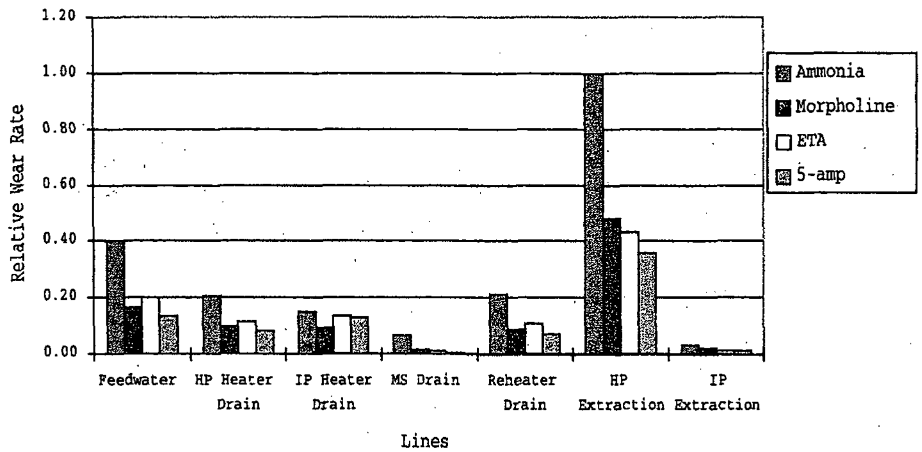


**Figure 5-3**
**Amine Comparison - Typical Conditions at the Same Cold pH**

### 5.3.1.2 Effect of Hydrazine on FAC

Historically, PWR plants located in the United States operated at about 20 ppb of hydrazine as measured in the condensate system. This concentration was implicit in the FAC predictive model included in the CHEC, CHECMATE, and earlier versions of the CHECWORKS code (through Version 1.0E). In an effort to create more reducing conditions in the steam generators, and decrease the susceptibility of the tubes to stress corrosion cracking, many PWR plants have recently increased the concentration of hydrazine. Subsequent laboratory testing found that varying the hydrazine concentration does have an effect on FAC–this has also been confirmed by analysis of plant data.

Below about 150 ppb, a lower hydrazine concentration will decrease the rate of FAC. Above about 150 ppb, the rate of FAC decreases somewhat with an increasing hydrazine concentration. See Figure 5-4. It should be noted that this dependency is the local concentration, which can be quite different from that injected (due to decomposition to ammonia and partitioning wherever flow divides or joins, particularly in two-phase locations).

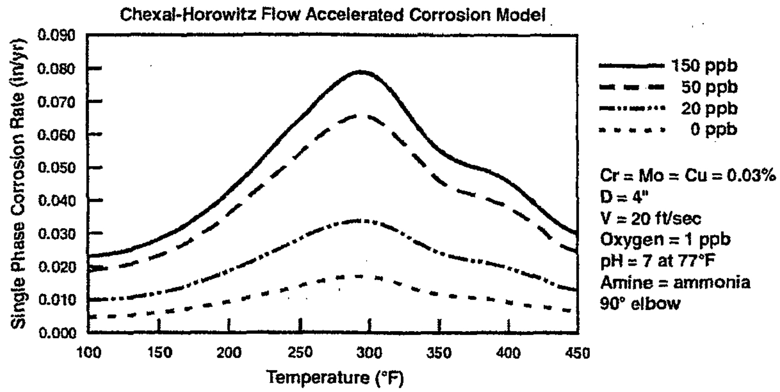


**Figure 5-4**
**Relationship Between FAC and Hydrazine**

FAC can generally be reduced by decreasing the overall quantity of hydrazine injected to the condensate system. However, this reduction must be done while maintaining sufficient reducing conditions in the steam generators to protect the tubes against stress corrosion cracking.

Another option to reduce FAC in the condensate and feedwater systems, while maintaining reducing conditions in the steam generators, is to move the hydrazine injection point to as close as practical to the steam generators. This will reduce the hydrazine concentration upstream of the injection point to only that amount returned by the heater drains and that which is passed through the condensate polishers[14].

### *5.3.2 BWR Plants*

For a BWR, there are two separate issues. These are the levels of oxygen in the feedwater and the levels of oxygen in the steam portions of the steam cycle. The amount of oxygen in the condensate and feedwater systems is primarily determined by the in-leakage of air into the condenser. If the level is too low[15], it can be supplemented by direct injection of oxygen into the condensate. A comparison of typical feedwater wear rates as a function of oxygen concentration is provided in Table 5-2.

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[14] For a plant with full flow polishers and forward pumped heater drains, moving the hydrazine injection point next to the steam generators will nearly eliminate hydrazine in the condensate system and reduce it by about 2/3 in the feedwater system.

[15] The EPRI BWR Water Chemistry Guidelines (reference 19) specify a feedwater oxygen level of between 15 and 200 ppb. From the perspective of FAC, operating at the middle to high end of this range is more desirable.

**Table 5-2**
**Effect of Oxygen on Typical Feedwater Wear Rates**

| Feedwater Oxygen (ppb) | Relative Wear Rate |
|---|---|
| 10 | 1.00 |
| 30 | 0.30 |
| 50 | 0.18 |
| 100 | 0.11 |

For the steam part of the system (extraction and drains) the oxygen level is determined by radiolysis which is occurring in the reactor core and by venting of the moisture separator/reheater and the feedwater heaters. For plants with normal water chemistry (NWC), the steam line oxygen is typically 18 ppm. For plants with hydrogen water chemistry (HWC)[16], the steam line concentration will vary from about 3 to 12 ppm depending on the amount of hydrogen injected. It is normally not possible to control the oxygen levels in the steam part of the system as this level is a function of the neutron and gamma levels within the reactor core. However, if excessive venting of the moisture separator reheaters or feedwater heaters is occuring, than FAC can be reduced in the downstream piping and equipment by reducing the vent rates. The effects of varying steam line oxygen concentration on a typical BWR plant are shown in Figure 5-5. However, it should be noted that these results are for a specific plant and will vary for other plant designs.

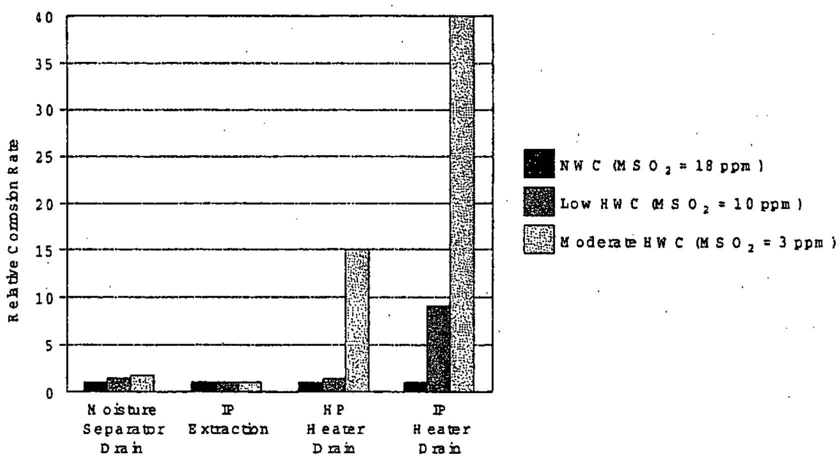


**Figure 5-5**
**Effects of BWR Steam Line Oxygen Concentration**

[16] Hydrogen Water Chemistry (HWC) is used to combat intergranular stress corrosion cracking (IGSCC) in the vessel and in the recirculation piping.

## 5.4 System Design Changes

In general, design changes result in only small reductions to the rate of FAC damage. For example, changing the diameter of a piping system from 12 to 14 inches will only reduce the FAC rate by about 20%. There are instances, however, where design changes can be effective:

- Increasing the pipe diameter to reduce the velocity in control valve stations. Valve stations are typically designed to accommodate the flow capacity of control valves. This typically results in a reduced diameter of about 60% of the line size and a consequent increase in the fluid velocity. This locally increased velocity has often caused damage downstream of the valve. Redesigning the valve station to reduce the local velocity and turbulence can greatly reduce the rate of FAC damage.
- In wet steam lines, the FAC wear rates can be reduced by reducing the local moisture content. This can be achieved by improving the efficiency of the existing moisture separator design or by installing additional moisture separation equipment. This will reduce the number of water droplets that impinge upon the downstream components. This method has been widely used in France and has proven to be effective in reducing the FAC damage in such components as cross-under lines and feedwater heater shells.

## 5.5 Summary

As can be seen from the above discussion, improved water chemistry in combination with highly resistant materials can help mitigate FAC. Utilities should evaluate these options carefully from a technical as well as a financial standpoint and make a determined effort to mitigate FAC.

# 6

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# A

# RECOMMENDATIONS FOR AN EFFECTIVE FAC PROGRAM FOR SMALL BORE PIPING

## A1.0 Introduction

Many of the recommendations for large bore piping can be applied to small bore. However, there are significant differences which must be addressed. For example, analysis of small bore piping typically is not feasible nor practical. Determination of local operating conditions necessary for analysis may prove difficult to obtain or are not consistent, especially in vent lines and downstream of steam traps and leaking, normally closed valves. Also, the lack of knowledge of the actual fit-up gap between a pipe and associated socket-welded fittings is common in small bore piping and limits the applicability of analytical methods and wear trending. In addition, failures in small bore piping are in general of less consequence than large bore piping.

This Appendix provides recommendations for an effective FAC program for small bore piping which takes these differences into account. An illustration of the program is provided in Figure A-1. For purpose of FAC evaluation, small bore piping is defined as piping with a nominal diameter of two inches or less.

## A2.0 Identifying Susceptible Systems

The first task in the recommended program is to identify all small bore piping lines which are susceptible to FAC. This task should be done along with the large bore piping, utilizing the recommendations of Subsection 4.2. Care should be taken to include lines supplied with equipment, as often they are not included in line lists. Also, in applying exclusion criteria, consideration should be given to the fact that operating conditions and maintenance are typically less certain in small bore systems.

## A3.0 Evaluating Susceptible Systems for Consequence of Failure

It is recommended that the small bore program take into account the level of consequence of failure in systems under evaluation. Considerable savings can result without compromising safety or system availability.

Each of the small bore lines identified in A2.0 as susceptible should be evaluated based on the consequence of a failure in the line, and identified as Category 1 or Category 2. An acceptable alternative would be to designate all lines as Category 1.

Category 2 lines are those in which it can be demonstrated that a failure would be of minimal consequence. Lines can be demonstrated to be Category 2 if they meet all of the following:

1. The line is not part of a safety-related system.
2. A failure would not cause a reactor shutdown or measurable loss of power (*i.e.*, a major train shutdown), either by automatic trip or operator action.
3. A failure can be readily isolated or controlled (*i.e.*, repaired on-line) in time to prevent reactor or major train shutdown.
4. A failure would not likely result in personnel injury. The likely injury to personnel can be taken as a function of the line's accessibility and operating temperature. Piping in inaccessible or infrequently accessed areas can be considered unlikely to cause injury upon failure.

Plant owners who have conducted consequent of failure evaluations have reported that a significant number of susceptible small bore lines can be designated as Category 2.

Category 1 lines are the remaining susceptible piping in which, by definition, a failure is potentially greater than of minimal consequence, thus need further consideration.

This prioritization evaluation should be documented in a report, and periodically reviewed for impact of changes to plant design and operating conditions, related plant experience, and related industry experience. The report should include a discussion of the evaluation, identification of the susceptible small bore piping with identification of the Category 1 or 2, and the basis for that categorization.

## A4.0 Scheduling Inspections

### *A4.1 Category 1 Piping*

Category 1 susceptible piping should be inspected. Locations should be selected for initial inspections, the inspections performed, inspection results evaluated, and disposition made as recommended in A5.0 through A8.0 below.

Due to the large volume of small bore piping in a power plant, initial inspections will need to be scheduled over multiple outage periods. The timing of these inspections is the responsibility of the plant owner. However, that timing should as a minimum consider relative level of susceptibility and the most susceptible lines inspected early in the program. The evaluation of A4.2 below can serve as a basis for prioritizing inspection timing.

### *A4.2 Prioritizing Category 1 Piping Based On Level of Susceptibility*

A FAC susceptibility evaluation may be conducted of Category 1 lines and utilized to assist prioritizing inspection scheduling. It is recognized that it is not possible to predict levels of wear rate in most small bore piping with any accuracy. However, experience has shown that it is possible in most situations to categorize lines on a relative basis as potentially highly susceptible, moderately susceptible, or minimally susceptible.

Such an evaluation should consider all design and operating conditions which effect FAC. It is recognized that operating conditions for much of the small bore piping may be difficult to determine, and considerable engineering judgment and conservatism may be required.

This FAC susceptibility level evaluation should be documented in a report. The report should include a description of the evaluation, the assignment of level of susceptibility for all Category 1 piping, and the basis for that assignment.

### *A4.3 Category 2 Piping*

Any further FAC program activities for Category 2 lines may be specified by the plant Owner. Category 2 lines need not be scheduled for inspection due to the minimum consequence from a failure.

## A5.0 Selecting Components for Initial Inspection

### *A5.1 Grouping Piping Lines Into Sub-Systems*

Category 1 piping lines should be grouped into sub-systems with similar flow and operating conditions, such that the sample inspection locations selected will represent the components in that sub-system. As flow and operating conditions in small bore systems are typically not well defined, the boundaries of these sub-systems should be smaller than would be defined for with more rigorous analysis, such as in a CHECWORKS™ run.

### A5.2 Selecting Components For Inspection

Locations should be selected for initial inspection with the objective of identifying a sufficient number, and the appropriate locations, to confirm system susceptibility and to establish the level of wear present. Locations should be selected for each sub-system as follows:

1. An inspection sample of components should be selected to represent the potentially high wear locations in the sub-system. Variables influencing FAC should be considered in the selection. As sub-systems by definition bound piping areas with similar operating conditions, of particular importance are components with high flow velocity and turbulence (*i.e.*, variation in component geometry). As flow and operating conditions for these sub-systems will typically not be well defined, engineering judgment by FAC experienced engineers should be utilized to insure the sample is sufficient. The sample size selected should take into consideration the level of susceptibility as determined in the evaluations of Subsection A4.2 above.

2. Special consideration should be given to including components, along with piping downstream of those components, which are known within the industry to be particularly susceptible, including:

- Control valves
- Component inlet and discharge nozzles
- Orifices
- Steam traps
- Reducing couplings
- Unusual geometry configurations

As with large bore piping, inspections of joints and piping downstream can be utilized as evidence of the state of wear in thick components such as valves and orifices.

3. Consideration should also be given to components, and sections of piping, that have any historical wear, or where similar areas in parallel trains or sister plants have historical wear, or if industry experience has demonstrated potential susceptibility.

4. Where small bore piping sub-systems tie into headers that are of larger diameter piping (*i.e.*, drain headers), consideration should be given to extending inspections into the attached portions of those systems as part of the small bore program.

## A6.0 Performing Inspections

### *A6.1 Radiography Techniques (RT)*

Radiography is recommended for establishing whether or not significant wear is present, including those small diameter piping and socket-weld fittings where UT techniques are impractical. Radiography can be especially beneficial for conducting inspections on line.

### *A6.2 Ultrasonic Techniques (UT)*

In many situations radiography techniques are not practical. UT is also an acceptable method for inspection of small bore components. In addition, UT can be used for measuring remaining wall thickness and thus establishing level of wear. Acceptable approaches for UT inspection include the following:

1. Gridding or scanning the downstream piping and expanding to the component if substantial wear is found.

2. Gridding the component and recording the readings.

3. Scanning the component and recording the minimum measured on the entire component or in quadrants.

Caution should be taken when utilizing UT on socket-welded connections. It is difficult to measure wall thickness close to the toe of the connection weld, where experience has shown significant wear can occur due to gaps caused by pipe to socket mismatch.

### *A6.3 Thermography*

Thermography is a tool that can enhance the identification of potential problem areas in small bore piping. If available, thermography data should be examined to identify any leaking valves or steam traps that could accelerate FAC damage in downstream piping components.

## A7.0 Evaluating Inspection Results

Trying to establish future wear rates is not recommended for small bore piping with socket-welded fittings, or in subsystems where design and operating conditions are not sufficiently defined. Predicted wear rates in systems without known and constant operating conditions, whether calculated (such as with CHECWORKS™) or trended from inspection data, are not considered reliable for any significant length of time.

Consequently, decisions on disposition of small bore piping needs to be made each inspection outage based on the results of inspections during that outage.

Inspection results from the initial inspection of a given sub-system should be evaluated to establish the level of FAC wear present in the components inspected. If little or no wear can be found, the sub-system can be classified as Low Wear. If significant wear is established, the sub-system should be classified as potentially High Wear.

Recommendations for disposition of the subsystem are given in A8.0 below based on their level of wear classification. Inspection data and evaluation results should be documented and maintained.

## A8.0 Disposition of Sub-Systems

### *A8.1 Low Wear Sub-Systems*

Sub-systems in which only low wear is found in the components inspected can be considered acceptable for continued service.

A representative number of the highest ranked components should be re-inspected during the inspection outage following the initial inspection of that subsystem to confirm the level of wear.

If the level of wear is confirmed during the repeat inspection to be low or none, future monitoring can be limited to a minimum level to help ensure any changes in the FAC rate are not missed. The number of components to inspect, and the timing of those inspections, should be consistent with the size of the sub-system, its level of susceptibility, knowledge of the operating conditions present (*i.e.*, systems where operating conditions may have changed, or for which maintenance is unknown, may need to be watched more closely), and related industry and plant experience with that and comparable sub-systems.

If significant wear is discovered during any re-inspection, the sub-system should be reclassified as High Wear and re-evaluated accordingly.

### *A8.2 High Wear Sub-Systems*

Sub-systems in which the components inspected are classified as high wear should be addressed as soon as practical. It is recommended that high wear sub-systems be replaced with FAC resistant material before the sub-system is returned to service. Once that is accomplished, the subsystem can be removed from the further consideration in the FAC program.

If replacement of the sub-system with FAC resistant material is not practical prior to return to service, inspections should be expanded and selected repairs/replacements made as follows:

1. For sections of piping with butt-welded joints, expand the inspections to include components in the vicinity of those inspected components showing significant wear, and in similar locations in sister trains. If significant wear is found in the expanded inspections, the expansion process should be continued to define the limits of the components with significant wear.

2. For sections of piping with socket-welded joints, expand the inspections to include other socket welded locations.

3. Before the sub-system is returned to service, repair or replace components for which the inspections show significant wear, or justify adequacy until the next plant refueling outage. Guidance for repair and replacement is provided in Subsection 4.8.

4. Repeat the above steps in this Subsection A8.2 in each following refueling outage until replacement with FAC resistant material can be accomplished.

## A9.0 Long Term Strategy

The recommendations of Section 5.0 in most cases apply to small bore as well as large bore piping. It is recommended that special consideration be given to replacement of susceptible small bore piping with FAC resistant material. Plant owners have reported that replacement can be significantly more economical that conducting evaluations and performing inspections of such systems.

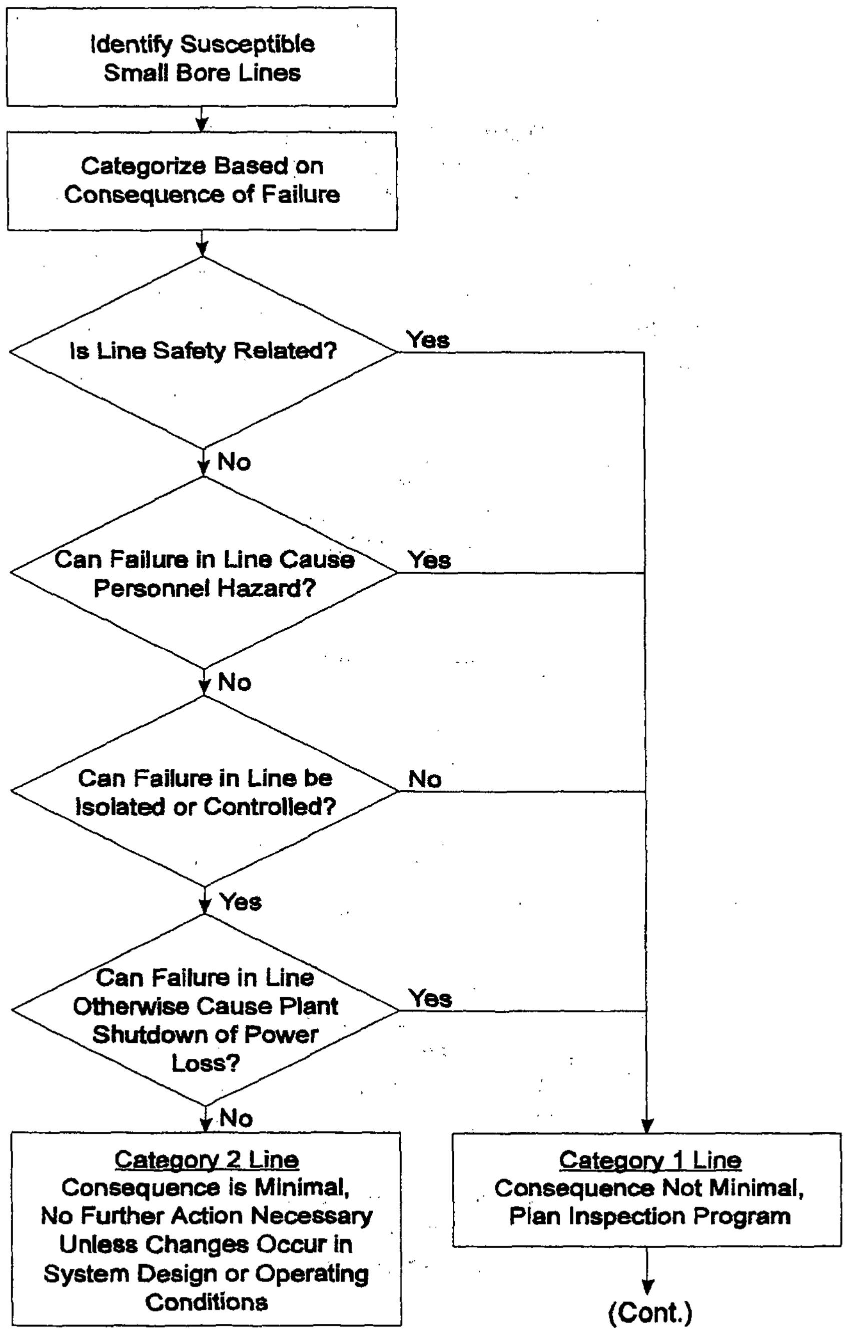



**Figure A-1**
**Small Bore Piping FAC Program**

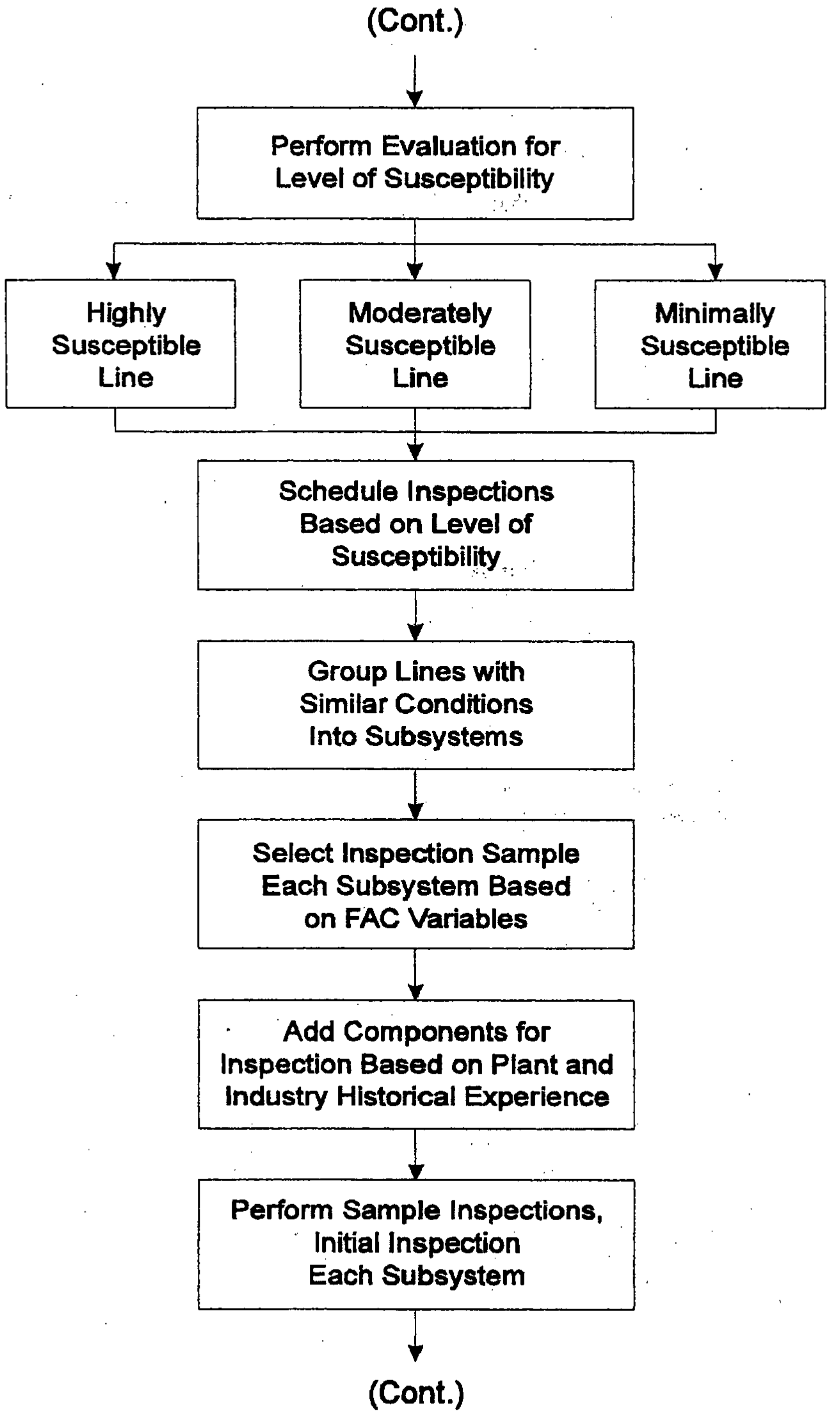



**Figure A-1 continued**

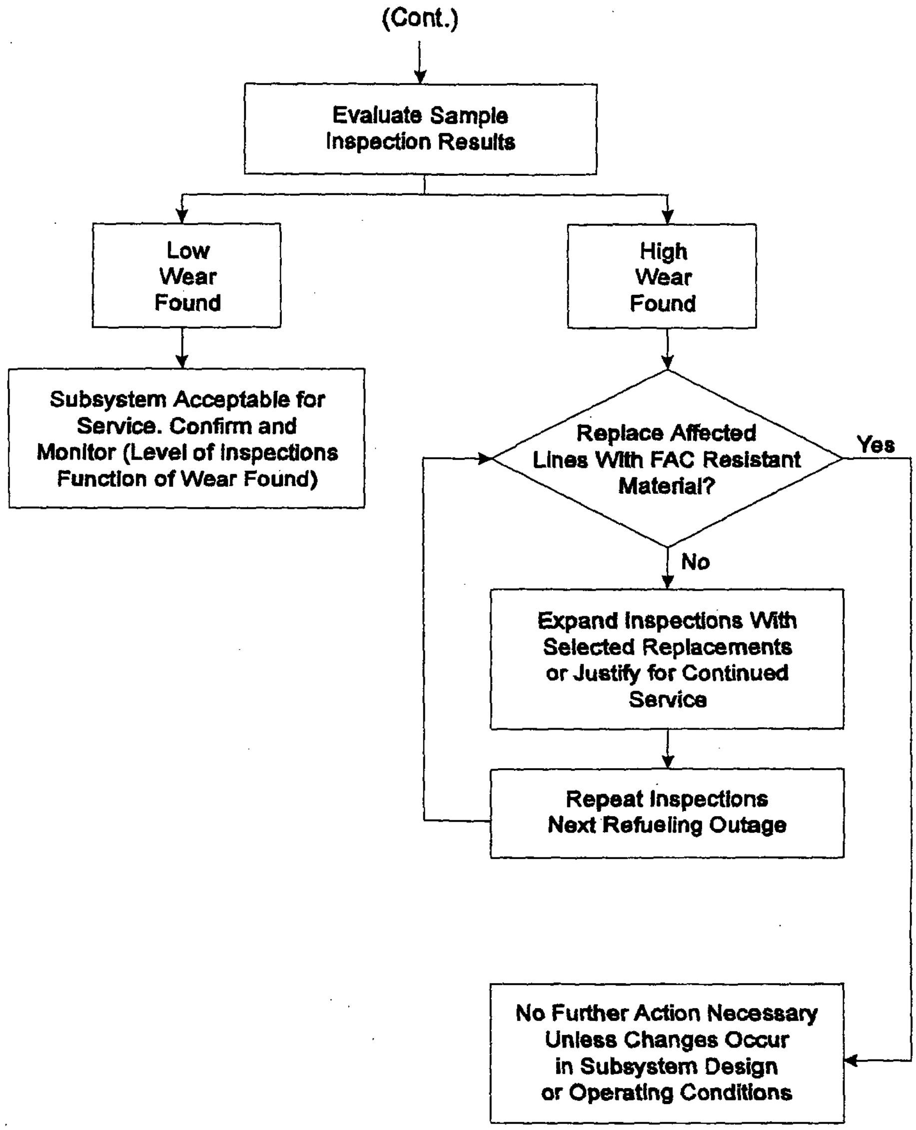



Figure A-1
continued

VERMONT YANKEE NUCLEAR POWER STATION

**PROGRAM PROCEDURE**

**PP 7028**

**ORIGINAL**

# PIPING FLOW ACCELERATED CORROSION INSPECTION PROGRAM

USE CLASSIFICATION: **INFORMATION**

| LPC No. | Effective Date | Affected Pages |
|---|---|---|
| 1 | 12/06/01 | 3-5 & 13-15 of 15 |
| | | |

**Implementation Statement:** This procedure supercedes VY Procedure DP 4023 and use of the Vermont Yankee Piping Flow Accelerated Corrosion Program Manual, Revision 2a, prepared for Vermont Yankee by Yankee Atomic – Nuclear Services Division.

Issue Date: 05/10/01

## TABLE OF CONTENTS

## 1.0 PURPOSE, SCOPE, AND DISCUSSION

### 1.1. Purpose

The purpose of the Vermont Yankee Piping Flow Accelerated Corrosion (FAC) Inspection Program is to provide a systematic approach to ensure that FAC does not lead to degradation of plant piping systems and feedwater heaters. This Program Procedure controls the engineering and inspection activities performed to predict, detect, monitor, and evaluate wall thinning due to FAC at the Vermont Yankee Nuclear Power Station.

LPC 1

### 1.2. Scope

The scope of this program is limited to evaluation and inspection of plant piping systems and feedwater heater shells that could be susceptible to FAC.

LPC 1

FAC is known to occur in piping systems constructed of carbon or low-alloy steels, which carry water or wet steam. All plant piping systems have been screened for susceptibility to damage from FAC. A separate document titled "FAC Susceptible Piping Identification" has been developed to identify, on a line by line basis, the piping which is susceptible to damage from FAC. This document is maintained by the Piping FAC Inspection Program coordinator and is updated as required to reflect changes in plant operation and configuration.

There is no finite scope of piping components to be scheduled for inspection on a periodic basis. Each refueling outage inspection efforts will be optimized to focus on piping components which have been identified as wearing, or potentially wearing due to FAC. The components selected for inspection each refueling outage are identified using:

- Results of ultrasonic thickness (UT) inspections from previous refueling outages.
- Results of the CHECWORKS predictive software, which incorporates actual inspection data.
- Operating conditions at VY, which may indicate FAC damage is occurring.
- Operating experience and events from other plants.

Carbon steel feedwater heater shells have experienced thinning and through wall leaks due to FAC. Vermont Yankee has replaced all low pressure feedwater heaters with new heaters constructed of materials resistant to FAC. The four remaining high pressure feedwater heater shells are carbon steel. Long term monitoring of shell thickness for plant feedwater heaters is included in the scope of this program.

LPC 1

### 1.3. Discussion

Following the December 1986 Surry pipe rupture the industry has worked steadily to develop and implement monitoring programs to prevent the rupture of high energy piping due to single phase erosion-corrosion (FAC). In March 1987 INPO issued Significant Operating Experience Report (SOER) 87-3 which recommended that a continuing program be established at all U.S. nuclear power plants including analyses to predict wear rates and to plan and schedule periodic inspections. USNRC Generic Letter GL 89-08, requires all holders of operating licenses to provide assurances that a systematic program has been implemented to ensure that Flow Accelerated Corrosion does not lead to degradation of plant piping systems.

This Program Procedure (PP) controls engineering and inspection activities performed to assess the susceptible plant piping. This procedure defines the methods and criteria used in the evaluation and inspection of plant piping components which are susceptible to wall thinning due to FAC. The program is based on current industry practice and the latest EPRI recommendations (REF 5.4.8.).

LPC 1

Long term monitoring of plant feedwater heater shell thickness is included in the scope of this program. Previous heater inspection efforts were performed by Project Engineering and Design Engineering in conjunction with feedwater heater repair and replacement efforts. All six of the low pressure feedwater heaters have been replaced with new heaters constructed of materials resistant to FAC. The four remaining high pressure feedwater heater shells are carbon steel. Design criteria used in the feedwater heater repair and replacement activities are included in the documentation for the corresponding design change or work order which implemented the repair or replacement.

Overall health of the feedwater heaters is not only determined by the condition of the shell and nozzles, but is also dependent on the condition of the heater internals: tubes, tube support plates, impingement plates, tie rods, drain cooler end plates, etc. Evaluation of the overall component health is the responsibility of the Maintenance Department. Shell and nozzle inspections of feedwater heaters will be coordinated through the responsible System Engineer and the Maintenance Support Department. UT inspections of the heater shells will be performed in conjunction with internal visual inspections and eddy current testing of the heater tubes under Preventive Maintenance (PM) work orders.

Elements of the program controlled by this procedure are:

- Criteria for selection of piping systems and components susceptible to FAC and for maintenance of a "FAC Susceptible Piping Identification", which identifies all plant piping susceptible to FAC.
- Criteria for ongoing program maintenance including; benchmarking with current industry practice, evaluation of industry events, and participation in industry working groups.
- Criteria for use and control of the CHECWORKS predictive software used to evaluate piping, plan inspections, track inspection results, wear rates, piping component data, and repair and/or replacement history.
- Criteria for selection and scheduling of components to be inspected during refueling outages including initial inspections, follow-on inspections, and scope expansion / reduction.
- Criteria and procedures for evaluation of thinned piping components and, if required, for repair and replacements.
- Documentation requirements and criteria for maintenance and storage of inspection data.

LPC 1

**NOTE**

The program only addresses wall thinning due to FAC in pressure boundary piping components and feedwater heater shells. Wear in other pressure vessels, pumps, valves, and in-line items is not included. However, detected wear in the attached piping may indicate wear in the component and should be pursued.

The primary purpose of performing UT inspections each outage is to locate piping components degraded by FAC prior to the time that an immediate repair or replacement is required. This allows sufficient lead time for a planned replacement which will have a minimum impact on plant operation.

Given the costs of inspection and replacement of piping components, a long term approach for mitigating the effects of FAC taken under this program will be towards reducing component wear rates. To accomplish this, components found with significant wall loss due to FAC under this program, will be preferably replaced with materials which are more resistant to FAC damage.

## 2.0 DEFINITIONS

2.1. Flow Accelerated Corrosion (FAC): A corrosion process that causes thinning of steel piping exposed to flowing water or wet steam. The rate of loss is dependent on several parameters, which include flow regime, service life, water chemistry, piping material, piping geometry, and hydrodynamics.

2.2. Program: A set of activities that benefit from the existence of a formal, high level "Program Document." Such documents are meant to provide for a common understanding of program depth, breath and technical bases as well as the responsibilities of the program owner and those helping to implement the program. "Program Documents" are typically created to ensure regulatory requirements are satisfied. They can also be used to lay out the technical bases and personnel responsibilities related to complex, multi-departmental processes.

LPC 1

2.3. Program Owner: The individual responsible for maintaining the program, program documents, and assuring proper execution of the program requirements. Each program shall have an individual assigned as the program owner. The appropriate job title is determined by the responsible Department Manager. A summary of expectations for the program owner are contained in Appendix A of AP 0098 and shall be referenced in all Program Procedures.

2.4. Single-Phase Flow: The flow in the piping system remains in the liquid phase at all design and operating pressures and temperatures.

2.5. Two-Phase Flow: The flow in the piping system may vary from liquid to wet steam. This depends on the operating pressures and temperatures and varies with the specific location in the piping system.

## 3.0 PRIMARY RESPONSIBILITIES

Implementation of the tasks performed under this program involve several plant departments. The organization for personnel performing tasks under this program is shown in Figure 1.

3.1. The VY Design Engineering Mechanical / Structural (DE M/S) Department is responsible for the Piping FAC Inspection Program. The DE M/S Lead Design Engineer (LDE) has responsibility for the overall program management and administration and, for structural evaluation of thinned piping components.

3.1.1. Establishment and maintenance of criteria and procedures for evaluation of thinned wall piping components.

3.1.2. Performing structural evaluations of thinned wall piping components.

3.2. The Vermont Yankee Piping FAC Inspection Program Coordinator (FACPC) works within the Mechanical Structural (DE M/S) Department under the direction of the DE M/S LDE. The responsibilities of the FAC Program Coordinator are:

3.2.1. Maintenance of the Vermont Yankee Piping FAC Inspection Program Procedure and supporting documents to ensure that program meets commitments to GL 89-08 and the "Expectations of Program Owners" as defined in Appendix A of AP 0098.

LPC 1

3.2.2. Continual assessment of FAC inspection program to insure program effectiveness.

3.2.3. Participation in relevant industry working groups, benchmarking with current industry practice, evaluation of industry events; and implementation of revisions, changes, and process improvements which result from the participation.

3.2.4. Establishment and maintenance of criteria for selection of piping systems and components susceptible to FAC and for maintenance of the "FAC Susceptible Piping Identification" document which screens all current plant piping systems and identifies piping susceptible to FAC.

3.2.5. Establishment and maintenance of criteria for selection and scheduling of components to be inspected during refueling outages including: initial inspections, follow-on inspections, and scope expansion and/or reduction.

3.2.6. Establishment and maintenance of criteria for use and control of the CHECWORKS predictive software used to evaluate piping, plan inspections, track inspection results, wear rates, piping component data, and repair and/or replacement history.

3.2.7. Review of design change and maintenance documents as necessary to assess the impact of the proposed tasks on the inspection program, and recommend action when appropriate.

3.2.8. Ensure that all physical and operational changes or additions to plant piping systems are incorporated into the program.

3.2.9. Analytical evaluation of plant piping systems for FAC using the EPRI CHECWORKS codes as appropriate.

3.2.10. Pre-outage activities including:

- Development of inspection scope for each refueling outage.
- Perform/update analytical evaluations (CHECWORKS models) as required.
- Provide pre-inspection implementation support.

3.2.11. Outage activities including:

- Providing engineering support for inspection implementation.
- Evaluation and disposition of all inspection results.
- Recommend changes to the planned inspection scope upon discovery of unacceptable conditions.
- Providing assistance as required in the development of repair/replacement options.
- Providing written summary of inspection results to ISIPC prior to plant startup.
- Ensure that cognizant departments and the Control Room are informed of unacceptable conditions discovered during evaluation of inspection results and facilitate completion of appropriate paperwork (ER's, WOR, IDR, etc. ).

3.2.12. Post-outage activities including:

- Development of outage inspection report including trending analyses and long term recommendations.
- Update/maintain the plant CHECWORKS models and maintain a history of all piping inspections.
- Update/maintain "FAC Susceptible Piping Identification" document to reflect plant changes as required.

3.2.13. Keep DE M/S LDE informed on the progress of FAC related tasks.

3.3. The Vermont Yankee In-Service Inspection Program Coordinator (ISIPC): works within the System Engineering Department under the direction of the Superintendent of System Engineering. The responsibilities of the ISIPC include:

3.3.1. Provide for overall coordination with the Vermont Yankee In-Service Inspection Program if inspection results on safety class piping indicate violations of the piping design code.

3.3.2. Coordination of pre-outage activities including:

- Input to the development of outage schedules and budgets relative to FAC activities.
- Providing oversight of work order planning and coordination with ISI Program resources.
- Arrange on-site services as required.

3.3.3. Coordination of outage activities including:

- Ensure components scheduled for inspection are properly prepared and accessible.
- Performance of inspections.
- Post inspection restoration of components.
- Repair/replacement effort of unacceptable components.

3.3.4. Interface with the cognizant departments, as needed to insure all safety related repair/replacement ISI examination requirements are satisfied.

3.3.5. Ensure that required piping repairs and/or replacements are performed according to plant procedures and repairs to safety class piping and components are performed in accordance with ASME Section XI requirements.

3.3.6. Ensure that cognizant departments and the Control Room are informed of unacceptable conditions discovered during evaluation of inspection results and facilitate completion of appropriate paperwork (ER's, WOR, IDR, etc. ).

3.3.7. Ensure that inspection records are temporarily stored per AP 6807 and permanently stored per AP 6809 and available for the plant lifetime.

3.3.8. Keep the Superintendent of System Engineering informed on the progress of FAC related tasks.

3.3.9. Provide technical advice on implementation and inspection aspects of the FAC program.

3.3.10. NDE procedure development and maintenance.

3.4. Level III / ISI Supervisor is a certified Level III UT examiner and works under the direction of the ISIPC. The responsibilities of the Level III /ISI Supervisor include:

3.4.1. Review of applicable NDE procedures used in pipe UT wall thickness measurements.

3.4.2. Ensuring that UT inspectors are properly qualified and trained to the applicable inspection procedures.

3.4.3. Review of inspection results for compliance to the applicable procedures.

3.4.4. Resolution of anomalies found in inspection data.

3.4.5. Recommendations for augmented or special NDE procedures or techniques as required.

3.4.6. Direct supervision of inspection personnel to ensure that the inspection personnel accurately and efficiently execute the inspection plan, complete inspections, and appropriately document inspection results.

3.4.7. Control of all inspection data during the refueling outage.

3.4.8. At the completion of inspections forwarding all inspection records to the ISIPC for permanent storage per the requirements of Section 6.2

3.5. Non Destructive Examination (NDE) Personnel

3.5.1. Meet Applicable qualification Standards. Personnel performing ultrasonic inspections shall be qualified to the requirements of NE 8043.

3.5.2. Perform assigned setup, calibrations, and examinations.

3.5.3. Documentation of results in accordance with approved procedures.

3.6. Plant Support Services

The Project Engineering Department is responsible for providing staging, lighting, insulation removal, surface preparation of piping components, and for component restoration after inspections are performed. Activities are controlled through the VY Work Order process in accordance with plant procedures.

## 4.0 PROCEDURE

### 4.1. Program Maintenance

The FACPC shall maintain the Yankee Piping FAC Inspection Program Procedure, PP 7028 and supporting documents to ensure that program meets commitments to GL 89-08 by:

4.1.1. Continual reassessment of the piping FAC inspection program to insure program effectiveness. A FAC Program Self Assessment shall be performed at least once per operating cycle.

4.1.2. Participation in relevant industry working groups, benchmarking with current industry practice, evaluation of industry events; and implementation of revisions, changes, and process improvements which result from the participation.

4.1.3. Adaptation of current or developing industry practices: for selection and scheduling of components to be inspected, follow-on inspections, scope expansion and/or reductions, and criteria and procedures for evaluation of thinned wall piping components.

4.1.4. Review design change and maintenance documents as necessary to assess the impact of the proposed tasks on the inspection program, and recommend action when appropriate.

4.1.5. Incorporate all physical and operational changes or additions to plant piping systems into the program as applicable.

### 4.2. Initial Screening and Identification of FAC Susceptible Piping

4.2.1. A screening and evaluation of all plant piping systems for susceptibility to FAC shall be performed. The screening shall use the EPRI Guidelines from reference 5.4.8., industry experience, and previous Vermont Yankee inspection results. The evaluation shall be performed and reviewed by engineers with FAC experience and familiar with plant systems. The resulting document shall be controlled by the FACPC.

4.2.2. The FACPC shall revise the "FAC Susceptible Piping Identification" document as required to reflect changes in plant operation, piping configuration, and/or materials.

### 4.3. CHECWORKS Modeling

4.3.1. Evaluate the susceptible plant piping systems for FAC using the EPRI CHECWORKS code. The evaluations shall be performed, reviewed, and documented per the requirements of Appendix D.

4.4. Outage to Outage Activities

Inspection and evaluation efforts performed under the program follow a cyclic pattern. Once inspection data from a given outage is obtained, it is incorporated into the appropriate predictive model and the results are then used in conjunction with other FAC related information to establish the inspection scope for the next refueling outage.

> **NOTE**
>
> Each large bore piping component within the scope of this program has been given a unique identification number as described in Appendix A. The location (building and elevation) of each large bore component is obtained from the Component Location Sketches in Appendix A. Small bore piping inspection locations included in the program are identified in Appendix B.

The tasks performed each refueling outage to implement the piping inspections under the FAC inspection program are detailed below. These are also broken out chronologically in a flow chart included here as Figure 2.

4.4.1. The outage inspection scope is determined by the FACPC using previous inspection data, the results of the CHECWORKS models, industry experience , and the guidelines contained in Appendix E.

4.4.2. The outage inspection scope is reviewed by the ISIPC for impact on and conflicts with the overall outage plan. The ISIPC will plan and organize the on-site resources required to implement the piping inspections.

4.4.3. A work package is assembled for each piping component or group of components. This package includes component location sketches, support requirements such as scaffolding, lighting, etc., surface preparation and gridding requirements, and any special inspection requirements as determined by the FACPC.

4.4.4. Prepare piping components for inspection.

4.4.4.1. As directed by the ISIPC, scaffolding, lighting, insulation removal, and surface preparation of each piping component to be inspected are performed by on-site services in accordance with the applicable plant procedures.

4.4.4.2. Surface preparation and gridding of piping components for inspection shall conform to the guidelines in NSAC 202L (reference 5.4.8.). Specific instructions for surface preparation are given in NE 8044. Specific instructions for gridding of piping components are given in Attachment A of NE 8053, or as further directed by the FACPC.

4.4.5. Perform UT inspections.

4.4.5.1. Piping wall thickness shall be determined using ultrasonic testing (UT). Personnel performing ultrasonic or other inspections shall be qualified to the requirements of NE 8043. Wall thickness measurements made by UT shall be performed in accordance with NE 8053.

4.4.5.2. Inspection will be performed by using a 100% scan of the area between the grids lines. The lowest measurement in each area will be recorded as the measured thickness.

4.4.5.3. An inspection results package shall be assembled for each large bore component and for each group of small bore components inspected. The form and content of the inspection results package shall be per NE 8053.

4.4.6. The Level III / ISI Supervisor shall review all UT inspection data for procedure compliance, anomalies, and completeness.

4.4.6.1. Ensure discrepancies are resolved, and any missing data are supplied.

4.4.6.2. The completed examination report shall be forwarded to the FACPC for evaluation.

4.4.7. The inspection data for each piping component shall be evaluated for structural integrity by qualified Mechanical/Structural Design Engineering personnel in accordance with DP 0072.

4.4.7.1. Per DP 0072 all components inspected will be classified as either "acceptable as is", "acceptable for continued operation" (with future inspections required), or "repair or replacement is required".

4.4.7.2. If significant wear is found in a component, additions to the planned inspection scope may be required. The FACPC shall use the criteria for sample expansion in Appendix E for selection of additional components.

4.4.7.3. Deletions in the planned inspection scope may be warranted based on the inspection results of similar piping components. The FACPC shall provide written justification to the ISIPC and the DE M/S LDE for all scope reductions.

4.4.8. Piping components determined to be "accept as is" by DE M/S can be restored (replace insulation, etc.) for operation.

4.4.8.1. If future inspections on a component are required or anticipated, then consideration should be given to installing removable insulation blankets.

4.4.9. For piping components determined to need repair or replacement, the FACPC will notify the ISIPC, the DE M/S LDE, the cognizant departments and/or the Control Room of unacceptable conditions discovered during evaluation of inspection results by completion of appropriate paperwork (ER's, WOR, IDR, etc. ).

4.4.10. Piping repairs and/or replacements shall be performed in accordance with the applicable design codes and plant procedures.

4.4.10.1. Safety class piping and components under ASME Section XI requirements shall be dispositioned in accordance with DP 4027.

4.4.10.2. Repair of safety related components shall be performed per AP 0070.

4.4.10.3. Baseline Inspections (wall thickness measurements) shall be performed for all new piping components installed to replace worn piping. Measurements shall be made using approved procedures. The baseline inspection measurements and the replacement material data shall be forwarded to the FACPC.

4.4.11. Prior to plant startup the FACPC shall:

4.4.11.1. Ensure all inspection results are assessed for piping code compliance, impact on plant operability, and personnel safety.

4.4.11.2. Provide the ISIPC and the DE M/S LDE with a written summary of inspection results. The summary will identify all thinned components found, and any required repairs and/or replacements performed during the outage.

4.4.12. Within 90 days of plant startup the FACPC shall prepare an outage inspection report. The contents of the outage inspection report shall be per Section 6.3.

4.4.13. The FACPC will, as applicable, incorporate the inspection results into the CHECWORKS models for use in planning the scope of the next refueling outage.

## 5.0 REFERENCES AND COMMITMENTS

5.1. Technical Specifications and Site Documents

5.1.1. VOQAM – Appendix D

5.2. Codes, Standards, and Regulations

5.2.1. USAS B31.1.0 - 1967, Power Piping Code
5.2.2. ANSI B31.1 - 1977, Power Piping Code
5.2.3. ASME Code Case N-597, Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1

5.3. Commitments

5.3.1. USNRC Generic Letter 89-08, Erosion/Corrosion-Induced Pipe Wall Thinning, dated May 2, 1989
5.3.2. Vermont Yankee letter to the USNRC, Vermont Yankee Response to NRC Generic Letter 89-08: "Erosion/Corrosion-Induced Pipe Wall Thinning, dated July 14, 1989
5.3.3. USNRC Bulletin No. 87-01, Thinning of Pipe Walls in Nuclear Power Plants, dated July 9, 1987
5.3.4. Vermont Yankee letter to the USNRC, Vermont Yankee Response to NRC Bulletin No. 87-01: Thinning of Pipe Walls in Nuclear Power Plants, dated September 11, 1987
5.3.5. Vermont Yankee letter to the USNRC, Supplement to Vermont Yankee Response to NRC Bulletin No. 87-01: Thinning of Pipe Walls in Nuclear Power Plants, dated December 24, 1987
5.3.6. USNRC Generic Letter 90-05, Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping, dated June 15,1990
5.3.7. Vermont Yankee Letter to the USNRC, Request for Relief from the ASME Code to Use Code Case N-597, dated March 19, 2001, BVY 01-12
LPC 1
5.3.8. USNRC Letter to Vermont Yankee, Vermont Yankee Nuclear Power Station - Relief Request for Use of ASME Code Case N-597 as an Alternative Analytical Evaluation of Wall Thinning (TAC No. MB1530), dated July 27, 2001, NVY 01-74
5.3.9. VY Memo: J.F. Calchera to OEC (R. McCullough), Subject: Response to Commitment Item: ER-990876_01, Reevaluate Feedwater (Heater) Inspection Program to Address Ownership, dated April 25, 2000

5.4. Supplemental References

5.4.1. Vermont Yankee FAC Susceptible Piping Identification, Rev. 0, Dated May 15, 2000
5.4.2. Vermont Yankee CHECWORKS MODELS, Rev.0, Dated June 30, 2000
5.4.3. VY Small Bore Piping Component Selection Review, Revision 1, dated December 6,1999
5.4.4. Institute of Nuclear Power Operations (INPO), Significant Operating Experience Report (SOER) No.87-3, Pipe Failures in High Energy Systems Due to Erosion/Corrosion, dated March 20, 1987
5.4.5. W.Stuart, et al, NUMARC Working Group on Erosion-Corrosion Summary Report, June 1987
5.4.6. Boiling Water Reactor Ebasco Specification for Piping, Piping Components, Hangers and Supports for Station Piping Systems, Specification No. BWR QC-10 9/15/68, by EBASCO Services Inc.
5.4.7. Acceptance Criteria for Structural Evaluation of Erosion-Corrosion Thinning in Carbon Steel Piping, EPRI NP-5911SP, Project 1757-61, Final Report, July 1988
5.4.8. Recommendations for an Effective Flow-Accelerated Corrosion Program, NSAC-202L-R2, Final Report, April 1999, Electric Power Research Institute
5.4.9. CHECWORKS - Computer Program User Guide, TR 103496, August 1994 by Altos Engineering Applications Inc. for EPRI.
5.4.10. CHECWORKS FAC Application Guidelines for Plant Modeling and Interpretation of Inspection Data, Draft Report, By Altos Engineering for EPRI, dated February 3,1997
5.4.11. AP 0009, Event Reports
5.4.12. AP 0017, Calculations and Analyses
5.4.13. AP 0070, ASME Section XI Repair and Replacement Procedure
5.4.14. DP 0072, Structural Evaluation of Thinned Wall Piping Components
5.4.15. DP 4027, Disposition of Inservice Inspection Findings
5.4.16. AP 6024, Plant Housekeeping and Foreign Material Exclusion/Cleanliness Control
5.4.17. AP 6045, Engineering Record Correspondence (ERC) and Technical Evaluations (TE)
5.4.18. AP 6807, Collection, Temporary Storage and Retrieval of QA Records
5.4.19. AP 6809, Plant QA Records Management System
5.4.20. NE 8043, Training, Qualification and Certification of NDE Personnel

5.4.21. NE 8044, Preparation of Examination Surfaces and Reference Marking of Welds for Nondestructive Examination
5.4.22. NE 8047, Visual Examination Procedure for VT-3 and General Visual
5.4.23. NE 8053, Ultrasonic Thickness Measurement
LPC 1 5.4.24. EPRI CHUG Position Paper No. 3, Recommendations for Inspecting Feedwater Heater Shells for Flow Accelerated Corrosion Damage, dated February 2000

## 6.0 FINAL CONDITIONS

The following requirements apply to all permanent documents for the Piping FAC Inspection Program.

Inspection records including personnel, equipment, and material certifications, calibration sheets, inspection data sheets, records of repairs, and other records required by the applicable piping codes are submitted to the ISIPC for filing in accordance with the applicable implementation procedures.

6.1. Systems Screening, Predictive Models, and Wall Thinning Evaluations

6.1.1. The "FAC Susceptible Piping Identification" shall be maintained by the FACPC. A copy shall be forwarded to Records & Information Management Services (RIMS) for permanent storage. LPC 1

6.1.2. The CHECWORKS predictive models and FAC evaluations of plant piping systems shall be documented maintained by the FACPC. A copy shall be forwarded to DCC for permanent storage.

6.1.3. All evaluations of pipe wall thinning below code minimum wall thickness (Level 3) shall be performed and documented in a VY Calculation per the requirements of AP 0017 and DP 0072.

6.2. UT & VT Inspection Data

6.2.1. The official inspection record for each large bore component or group of small bore components is the UT Inspection Report developed per NE 8053.

6.2.2. For each component inspected, the complete record of instrument data and thickness measurements from the data loggers as applicable shall be stored on disk or for future retrieval.

6.2.3. During the refueling outage all inspection records are controlled by the ISI Supervisor and are stored per AP 6807.

6.2.4. At the completion of the inspections, all records and forms required by the applicable UT & VT, procedures used to perform the inspections shall be forwarded to the ISIPC for permanent storage per the requirements of AP 6809.

6.3. Refueling Outage Inspection Reports

An Inspection Report shall be generated after each refueling outage to summarize the inspection activities performed, and to provide a formal means for documentation of the inspection results. LPC 1 The Piping Inspection Report shall identify the following:

- Total number of piping components inspected, including a summary of measured thickness data.
- Components which were repaired or replaced.
- Components designated as requiring future monitoring.
- Components or portions of piping systems which UT measurements indicate repair or replacement will be required.
- Components added or deleted from the planned Inspection Scope. Also provide the basis for adding or deleting each component.
- Unexpected measurement results/problems.
- Recommended changes/revisions to the Inspection Program to be implemented in future outages.
- Reference to applicable VY Calculations.

LPC 1 A copy shall be forwarded to RIMS for permanent storage.

6.4. Supplemental Program Data

The FACPC shall maintain files for any other FAC related correspondence and documents such as:

- QA audit reports and NRC Inspections
- Program Self Assessments
- Evaluation of FAC related Industry Events
- Documentation of additional activities to supplement the FAC Inspection Program

**7.0 ATTACHMENTS**

7.1. Figure 1 Piping FAC Inspection Site Organization
7.2. Figure 2 Piping FAC Inspection & Evaluation Process Flow Chart
7.3. Appendix A Large Bore Piping Component Location Sketches
7.4. Appendix B Small Bore Piping Inspection Location Database
7.5. Appendix C Identification of FAC Susceptible Systems and Piping Components
7.6. Appendix D Use and Control of CHECWORKS Models
7.7. Appendix E Criteria for Selection of Piping Components for Inspection and sample Expansion Guidelines

# FIGURE 1

## PIPING FAC INSPECTION SITE ORGANIZATION

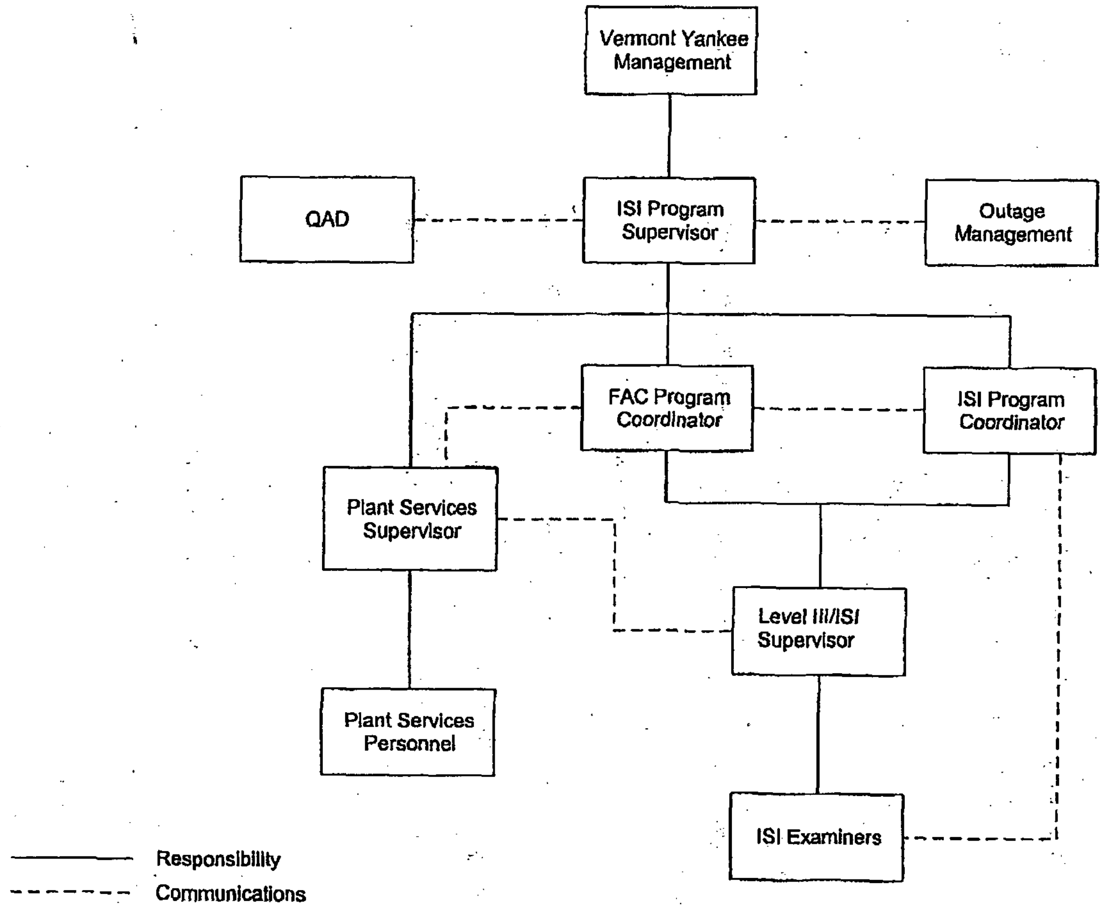
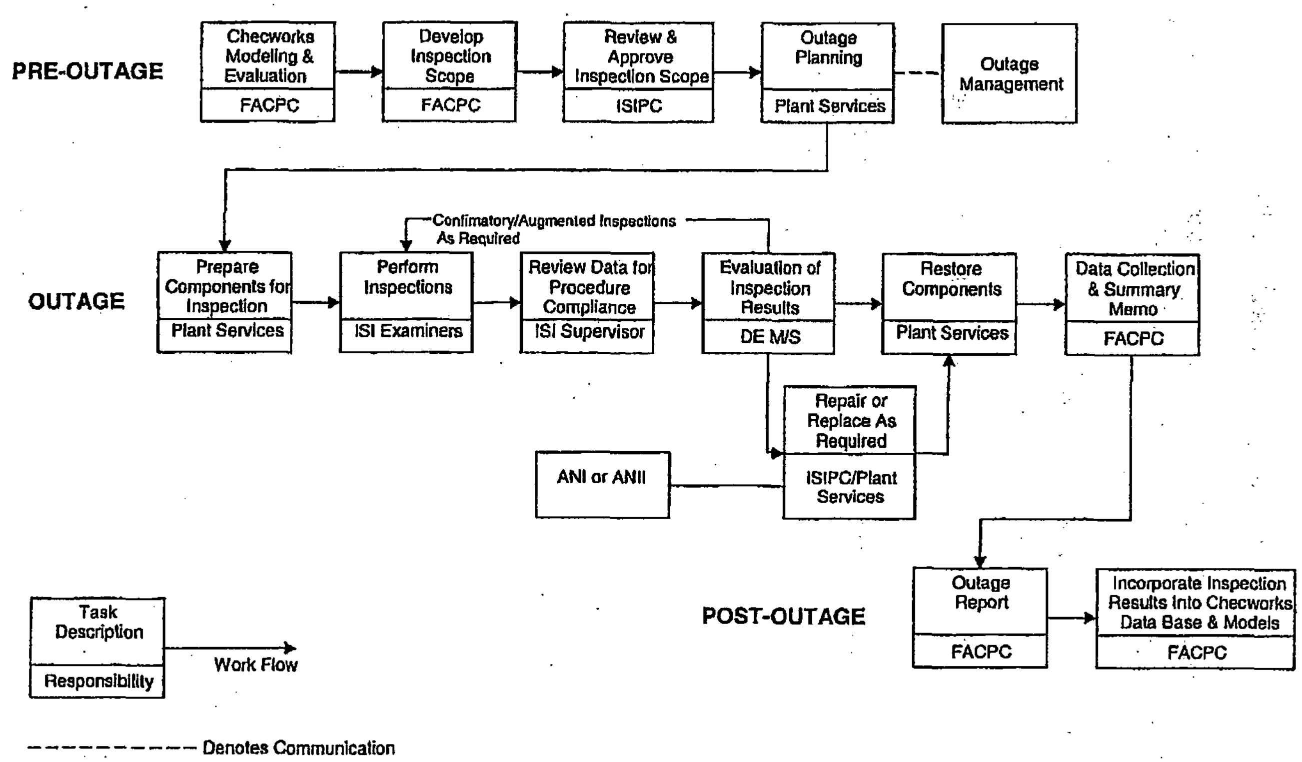


FIGURE 2

PIPING FAC INSPECTION & EVALUATION PROCESS FLOW CHART



## APPENDIX A

## LARGE BORE PIPING COMPONENT LOCATION SKETCHES

### Notes For Component Locations Sketches

1. The Component Location Sketches contained in this Appendix are to be used only for identification and location of specific piping components which are modeled, inspected, and evaluated under this program.

2. The sketches are not to be used for design work. Refer to the Plant Drawings referenced on each Sketch.

3. The Component Location Sketches are in the form of partial piping isometric drawings. Lengths shown are approximate.

4. The piping component numbering scheme is shown on page 2 of this Appendix.

## Piping Component Numbering Scheme

Each large bore piping component (elbow, valve, reducer, straight run, etc.) has been given an 8 or 10 character identification number based on the following convention:

Component I.D. Number : FD 01 SP 01 (Sample)

- System Identification → FD
- Line Number from Flow Diagrams (See Note 1) → 01
- Component Identification by type → SP
- Component number on this line by component type, generally in sequence, and in the direction of flow (Note 2) → 01

System Identification:

| | |
|---|---|
| FD | Feedwater |
| CD | CONDENSATE |
| MS | Main Steam |
| HD | Heater Drains |
| ES | Extraction Steam |
| CU | Reactor Water Cleanup |
| CAR | Turbine Cross-around Piping |
| HV | Feedwater Heater Vent Piping |
| MD(MSD) | Main Steam Drain Piping |
| HH | House Heating Steam |

Component Type:

| | |
|---|---|
| SP | Straight Pipe |
| EL | ELBOW |
| VA | Valve |
| TE | Tee |
| RD | Reducer |
| OR | Orifice |
| FE | Flow Element |
| BL | Bellows |

Notes on Numbering Scheme:

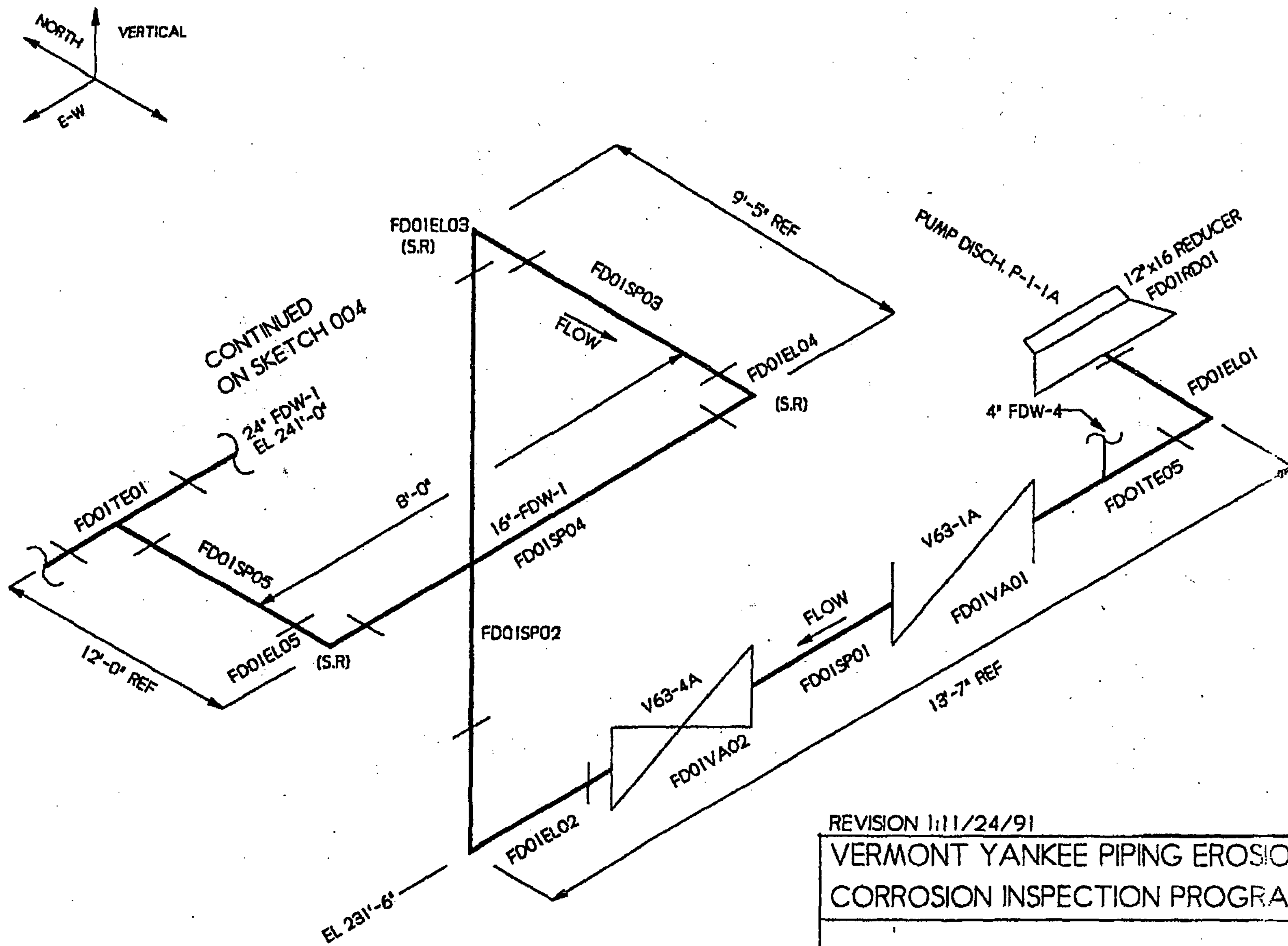
1. At the time this numbering system was developed, the original data logging equipment had an 8 character limitation. Piping systems with multiple trains are numbered 1A, 2A, 3A, etc. For multiple trains with line numbers 10 and above, (10A, 10B, 10C, etc.) components are generally identified in order by train (line 10A, 10B, 10C, etc.) in the direction of fluid flow.

2. Straight pipe segments longer than about 15 diameters in length have subsequently been modeled as two distinct piping locations. The same first 8 characters are used with the addition of "US" for the upstream end of the pipe run and "DS" for the down stream end of the pipe run. ( Example: "FD01SP01US" )

| SKETCH No. | TITLE | REVISION |
|---|---|---|
| 001 | FEEDWATER LINE 16" FDW-1 | 1 |
| 002 | FEEDWATER LINE 16" FDW-2 | 1 |
| 003 | FEEDWATER LINE 16" FDW-3 | 1 |
| 004 | FEEDWATER HEADER 24" FDW-1 | 1 |
| 005 | FEEDWATER LINE 18" FDW-7 | 1 |
| 006 | FEEDWATER LINE 18" FDW-7 (CONT) | 2 |
| 007 | FEEDWATER LINE 18" FDW-12 | 1 |
| 008 | FEEDWATER LINE 16"-FDW-14 | 1 |
| 009 | FEEDWATER LINES 16" FDW-14 & 16 | 1 |
| 010 | FEEDWATER LINES 10"-FDW-19 & -21 | 1 |
| 011 | FEEDWATER LINE 18"-FDW-8 | 1 |
| 012 | FEEDWATER LINE 18" FDW-8 (CONT) | 2 |
| 013 | FEEDWATER LINE 18" FDW-13 | 2 |
| 014 | FEEDWATER LINE 16"-FDW-15 | 1 |
| 015 | FEEDWATER LINES 16" FDW-15 & 17 | 1 |
| 016 | FEEDWATER LINES 10"-FDW-18 & 20 | 1 |
| 017 | FEEDWATER LINE 4"-FDW-4 | 1 |
| 018 | FEEDWATER LINE 4"-FDW-5 | 1 |
| 019 | FEEDWATER LINE 4"-FDW-6 | 1 |
| 020 | FEEDWATER LINES 6"-FDW-9 & 18" FDW-10 | 1 |
| 021 | FEEDWATER LINES 18"-FDW-10 & 10" FDW-11 | 1 |
| 022 | FEEDWATER LINES 8"-FDW-22A & 10" FDW-23A | 2 |
| 023 | FEEDWATER LINES 8"-FDW-22B & 10" FDW-23B | 1 |
| 024 | CONDENSATE LINES 20"-C1 & C2, 36"-C-3, 24"-C4, AND 24"-C5 | 0 |
| 025 | CONDENSATE LINES 18"-C-6,7,8, 24"-C-8, 12"-C-9,10,11 | 0 |
| 026 | CONDENSATE LINES 12"-C-13,14,15, 24"-C-15 AND 24"-C-16 | 0 |
| 027 | CONDENSATE HEADER TO DEMINS. | 0 |
| 028 | CONDENSATE LINE 24"-CD-3 & 24"-C-18 | 0 |
| 029 | CONDENSATE LINE 24"-C-18 & 20"-C-19 | 0 |
| 030 | CONDENSATE LINE 20"-C-25 | 1 |
| 031 | CONDENSATE LINE 20"-C-26 | 0 |
| 032 | CONDENSATE LINE 20"-C-27 | 0 |
| 033 | CONDENSATE LINE 20"-C-28 | 0 |
| 034 | CONDENSATE LINE 20"-C-29 | 1 |
| 035 | CONDENSATE LINE 20"-C-30 | 1 |
| 036 | CONDENSATE LINE 24"-C-30 | 0 |
| 037 | CONDENSATE LINE 20"-C-30 (CONTINUED) | 0 |
| 038 | CONDENSATE LINE 20"-C-31 | 0 |
| 039 | CONDENSATE LINE 20"-C-32 | 0 |
| 040 | CONDENSATE LINE 14"-C-21 | 1 |
| 041 | CONDENSATE LINES 14"-C-21, 10"-C-21& 10"-C-22 | 0 |
| 042 | CONDENSATE LINE 12"-C-23 | 0 |
| 043 | HEATER DRAIN LINES 6"-HD-1A & 6"-HD-2A | 1 |
| 044 | HEATER DRAIN LINES 10"-HD-3A & 10"-HD-4A | 2 |
| 045 | HEATER DRAIN LINES 14"-HD-5A & 14"-HD-6A | 1 |
| 046 | HEATER DRAIN LINES 16"-HD-7A & 20"-HD-25A | 1 |

| SKETCH No. | TITLE | REVISION |
|---|---|---|
| 047 | HEATER DRAIN LINES 16"-HD-8A, 12"-HD-9A, & 18"-HD-21A | 1 |
| 048 | HEATER DRAIN LINES 12"-HD-9A & 4"-HD-10A | 1 |
| 049 | HEATER DRAIN LINES 20"-HD-14A, 16"-HD-14A, AND & 24"-HD-17A & C | 0 |
| 050 | HEATER DRAIN LINES 6"-HD-1B & 6"-HD-2B | 1 |
| 051 | HEATER DRAIN LINES 10"-HD-3B & 10"-HD-4B | 2 |
| 052 | HEATER DRAIN LINE 14"-HD-5B & 14"-HD-6B | 1 |
| 053 | HEATER DRAIN LINES 16"-HD-7B & 20"-HD-25B | 2 |
| 054 | HEATER DRAIN LINES 16"-HD-8B, 12"-HD-9B, & 18"-HD-21B | |
| 055 | HEATER DRAIN LINES 12"-HD-9B & 4"-HD-10B | 1 |
| 056 | HEATER DRAIN LINES 20"-HD-14B, 16"-HD-14B, AND 24"-HD-17B & D | 0 |
| 057 | HEATER DRAIN LINES 6"-HD-11A, 6"-HD-12A, 6", 6"-HD-13A, AND 6"-HD-16A | 1 |
| 058 | HEATER DRAIN LINES 6"-HD-11B, 6"-HD-12B, 6"-HD-13B AND 6"-HD-16B | 1 |
| 059 | HEATER DRAIN LINE 6"-HD-11C, 6"-HD-12C, 6"-HD-13C, 6"-HD-16C | 2 |
| 060 | HEATER DRAIN LINES 6"-HD-11D, 6"-HD-12D, 6"-HD-13D, 6"-HD-16D | 1 |
| 061 | HEATER DRAIN LINES 6"-HD-12A, 6"-HD-12B, AND 14"-HD-15B | 2 |
| 062 | HEATER DRAIN LINES 6"-HD-12C, 6"-HD-12D, AND 14"-HD-15A | 1 |
| 063 | EXTRACTION STEAM LINE 12"-ES-1A | 1 |
| 064 | EXTRACTION STEAM LINE 12"-ES-1B | 1 |
| 065 | EXTRACTION STEAM LINE 10"-ES-2A | 1 |
| 066 | EXTRACTION STEAM LINE 10"-ES-2B | 1 |
| 067 | EXTRACTION STEAM LINE 20"-ES-3A | 2 |
| 068 | EXTRACTION STEAM LINE 20"-ES-3B | 2 |
| 069 | EXTRACTION STEAM LINES 20"-ES-4A & 30"-ES-4A | 1 |
| 070 | EXTRACTION STEAM LINES 30"-ES-4B | 0 |
| 071 | EXTRACTION STEAM LINES 20" & 26"-ES-5A, 5B, 5C, 5D | 1 |
| 072 | EXTRACTION STEAM LINES 20" & 26"-ES-5E, 5F. 5G, 5H | 1 |
| 073 | EXTRACTION STEAM LINE 12"-ES-6 | 1 |
| 074 | MAIN STEAM LINE 18"-MS-1A & 18"-MS-7A | 0 |
| 075 | MAIN STEAM LINE 18"-MS-1A (CONTINUED) | 0 |
| 076 | MAIN STEAM LINE 18"-MS-1B & 18"-MS-7B | 0 |
| 077 | MAIN STEAM LINE 18"-MS-1B (CONTINUED) | 0 |
| 078 | MAIN STEAM LINE 18"-MS-1C & 18"-MS-7C | 0 |
| 079 | MAIN STEAM LINE 18"-MS-1C (CONTINUED) | 0 |
| 080 | MAIN STEAM LINE 18"-MS-1D & 18"-MS-7D | 0 |
| 081 | MAIN STEAM LINE 18"-MS-1D (CONTINUED) | 0 |
| 082 | 30" & 36" TURBINE CROSS AROUND PIPING, "A" LINE | 0 |
| 083 | 30" & 36" TURBINE CROSS AROUND PIPING "B" LINE | 0 |
| 084 | 30" & 36" TURBINE CROSS AROUND PIPING "C" LINE | 0 |
| 085 | 30" & 36" TURBINE CROSS AROUND PIPING "D" LINE | 0 |
| 086 | REACTOR WATER CLEANUP 4" CUW-54 & 55 | 0 |
| 087 | BPV 1 10"-MS-3A | 0 |
| 088 | BPV 2 10"-MS-3B | 0 |

| SKETCH No. | TITLE | REVISION |
|---|---|---|
| 089 | BPV 3  10"-MS-3C | 0 |
| 090 | BPV 4  10"-MS-3D | 0 |
| 091 | BPV 5  10"-MS-3E | 0 |
| 092 | BPV 6  10"-MS-3F | 0 |
| 093 | BPV 7  10"-MS-3G | 0 |
| 094 | BPV 8  10"-MS-3H | 0 |
| 095 | BPV 9  10"-MS-3I | 0 |
| 096 | BPV 10  10"-MS-3J | 0 |
| 097 | 8"-MSD-9 | 0 |



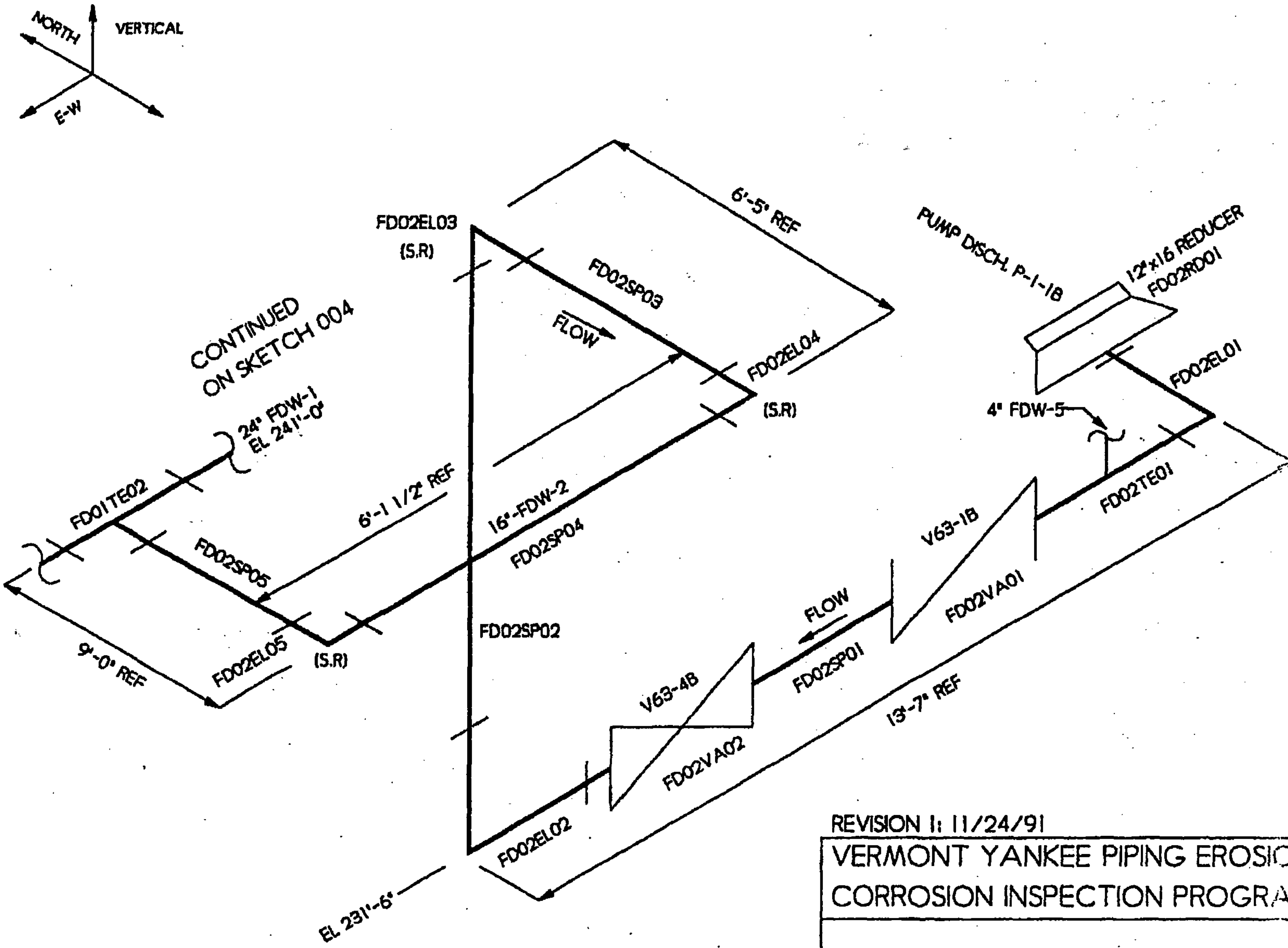

TURBINE BUILDING-FEEDWATER PUMP ROOM.
REFERENCES: G191157,G191182,G191183,5920-FS-124

REVISION 1:11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 16" FDW-1

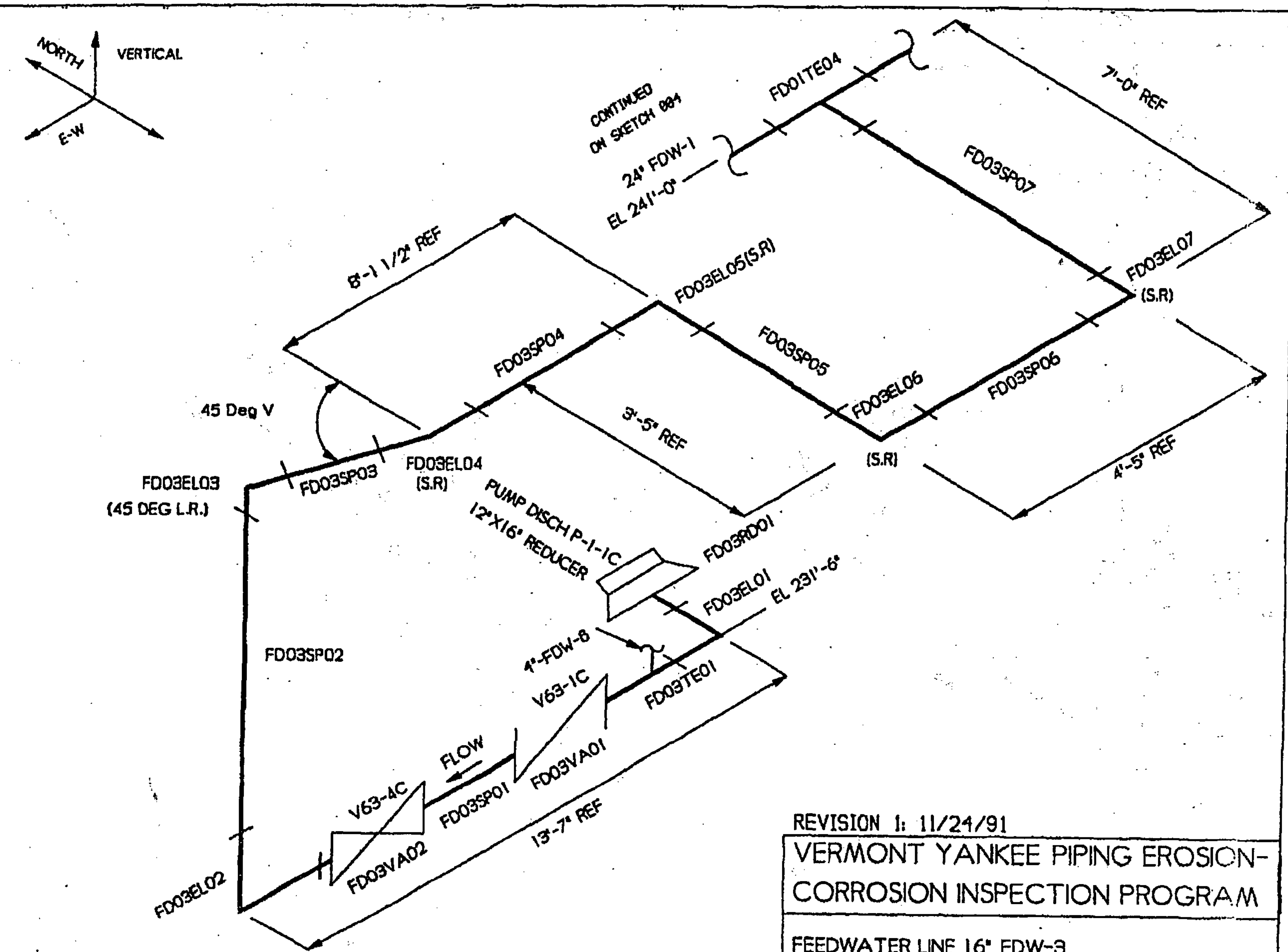
COMPONENT LOCATION SKETCH No.001




REVISION 1: 11/24/91

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| FEEDWATER LINE 16" FDW-2 |
| COMPONENT LOCATION SKETCH No.002 |

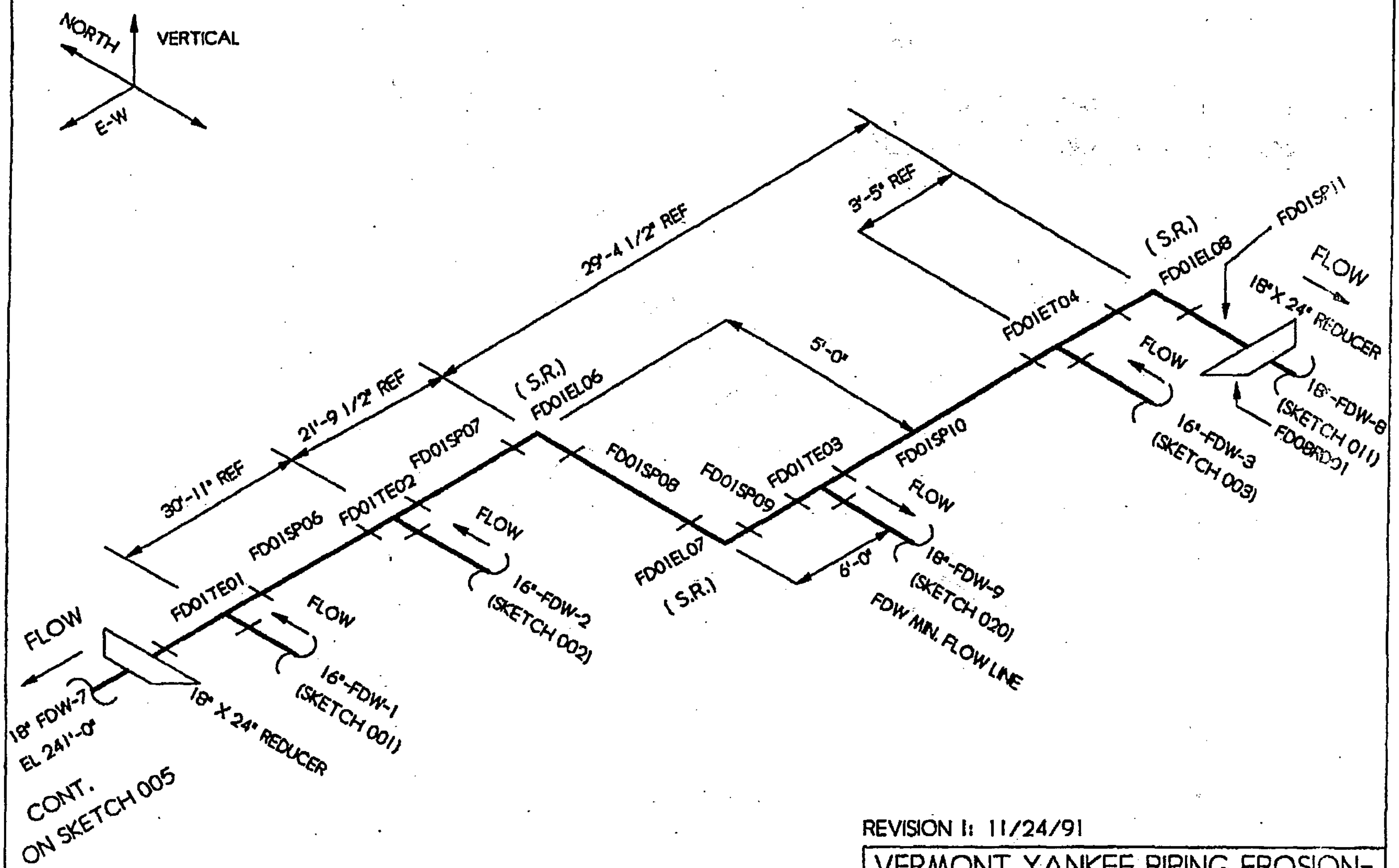
TURBINE BUILDING-FEEDWATER PUMP ROOM.
REFERENCES: G191157,G191182,G191183,5920-FS-124




REVISION 1: 11/24/91

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| FEEDWATER LINE 16" FDW-3 |
| COMPONENT LOCATION SKETCH No.003 |

TURBINE BUILDING-FEEDWATER PUMP ROOM
REFERENCES: G191157,G191182,G191183,5920-FS-124



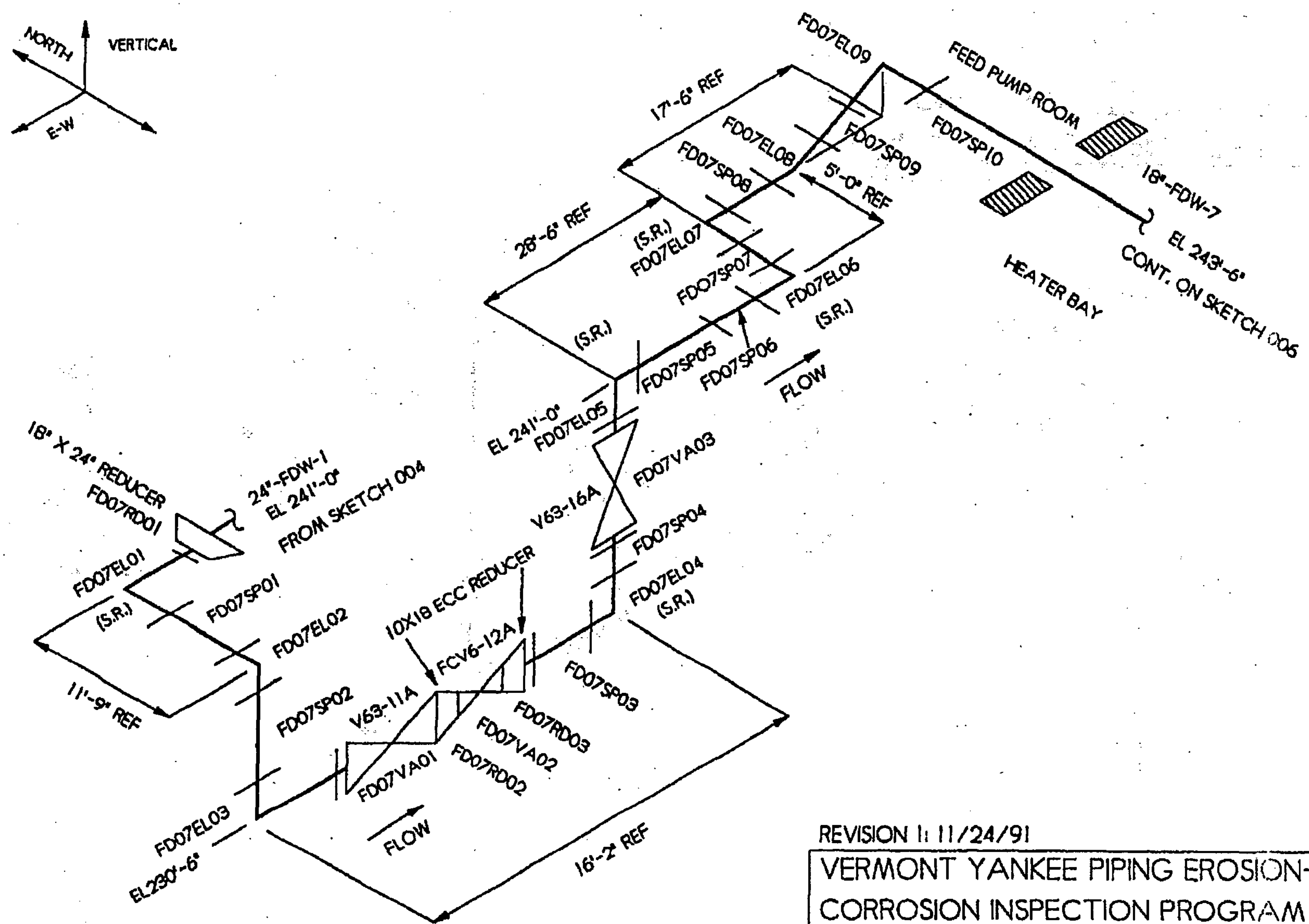

REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER HEADER 24" FDW-1

COMPONENT LOCATION SKETCH No.004

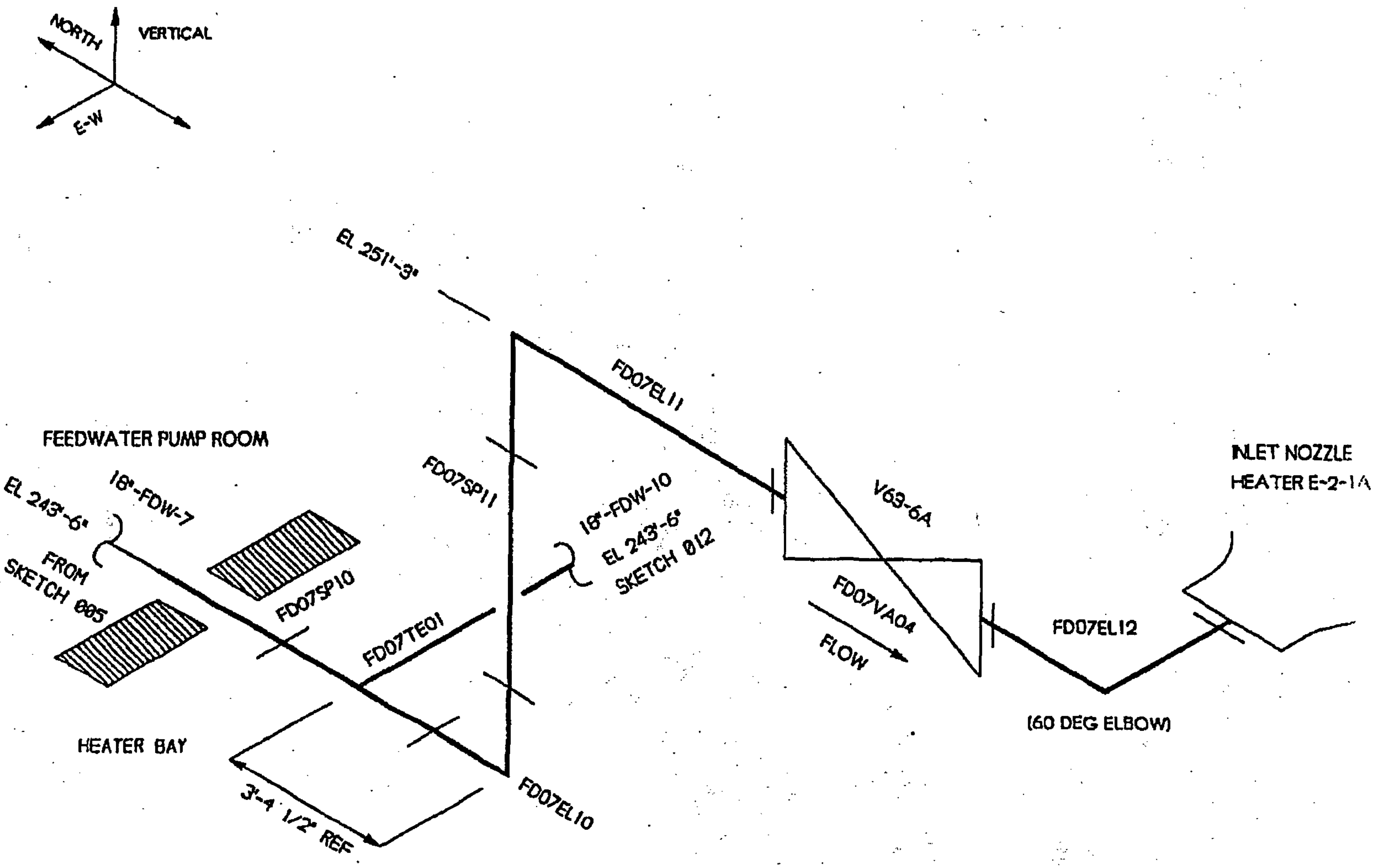
TURBINE BLDG FEEDWATER PUMP ROOM.
REFERENCES: G191157,G191182,G191183,5920-FS-124




REVISION 1: 11/24/91

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| FEEDWATER LINE 18" FDW-7 |
| COMPONENT LOCATION SKETCH No.005 |

TURBINE BLDG FEED PUMP ROOM/HEATER BAY.
REFERENCES: G191157,G191182,191183,5920-FS-124



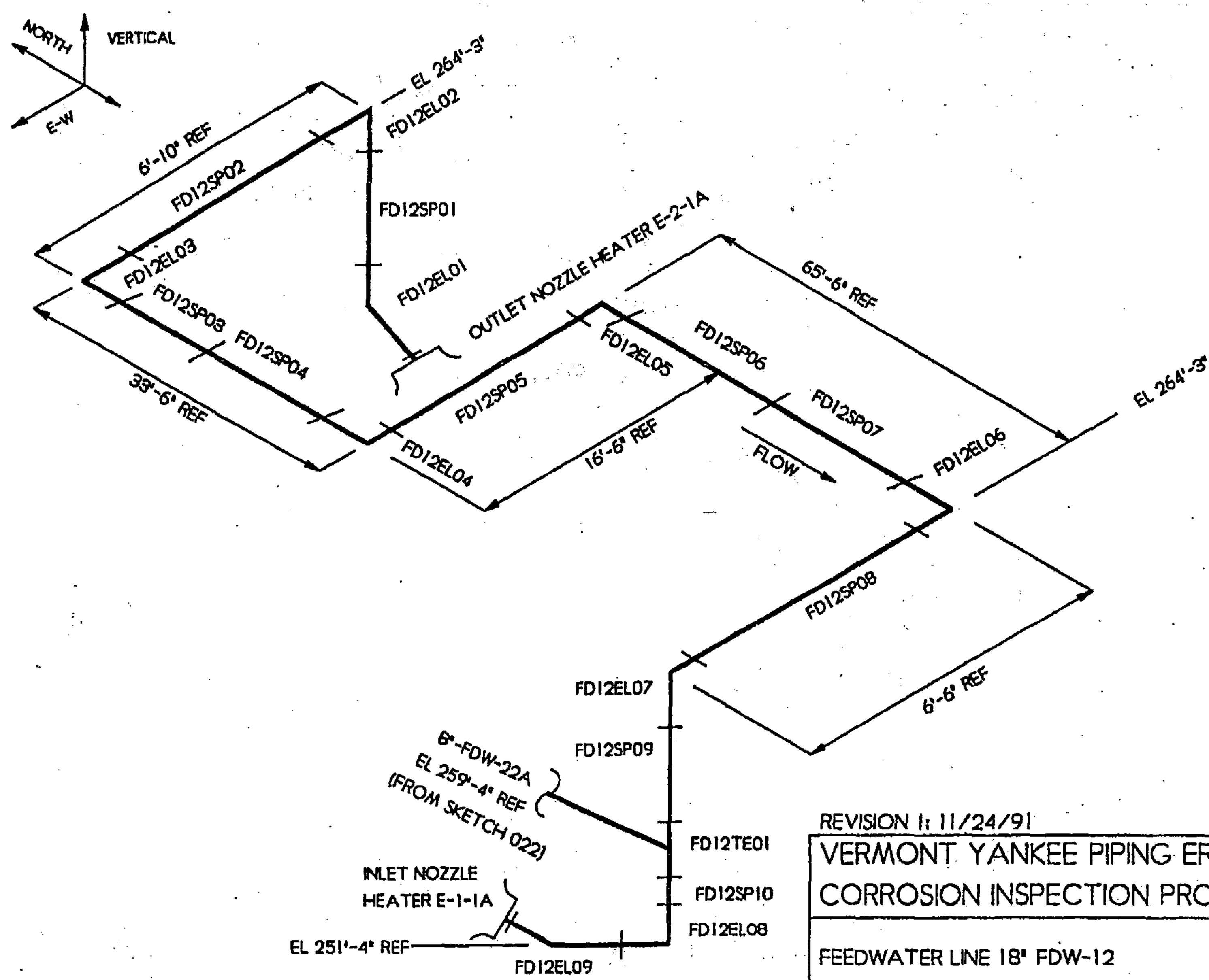

REVISION 2: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 18" FDW-7 (CONT)

COMPONENT LOCATION SKETCH No. 006

TURBINE BUILDING/HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125




TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125

REVISION 1: 11/24/91

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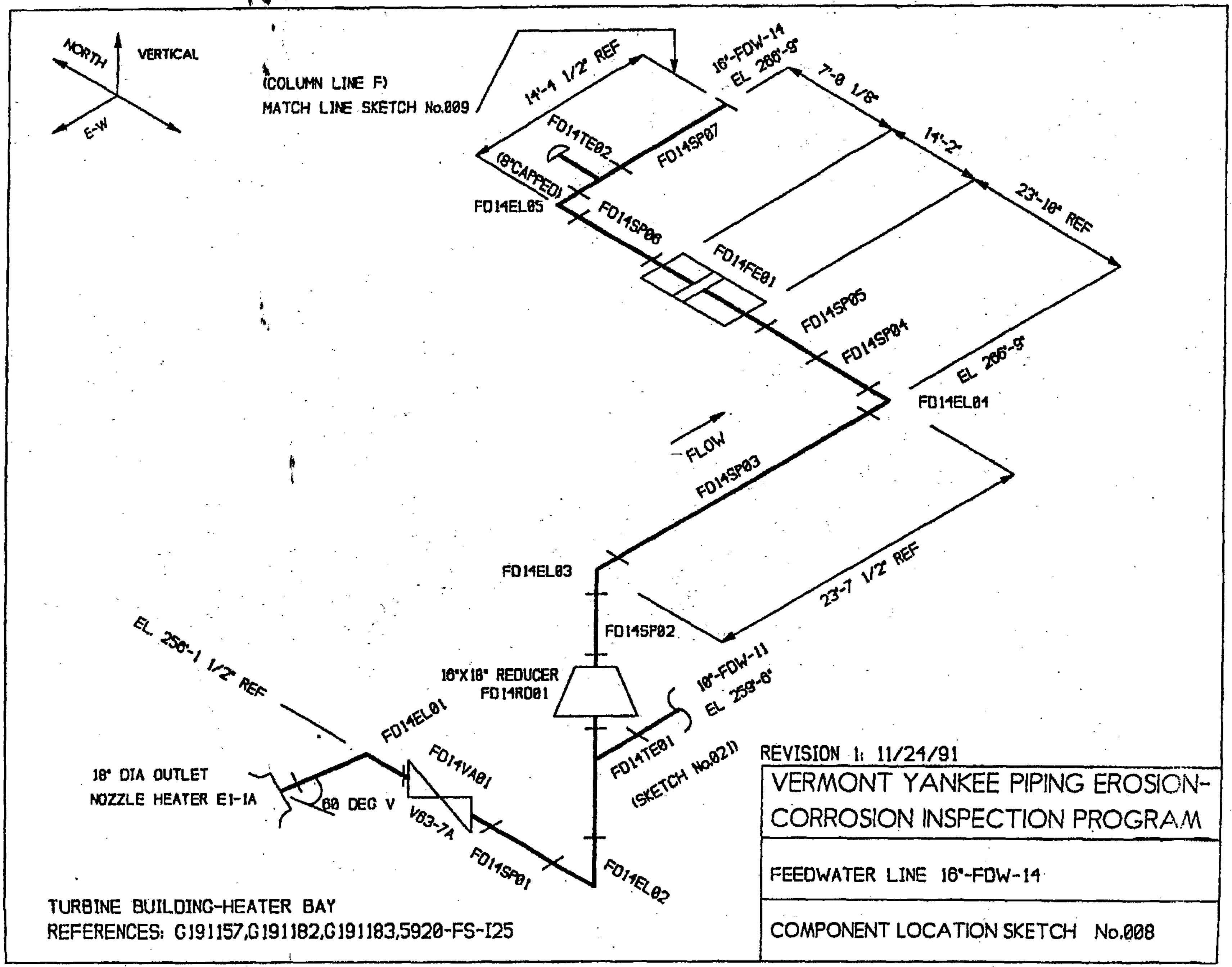
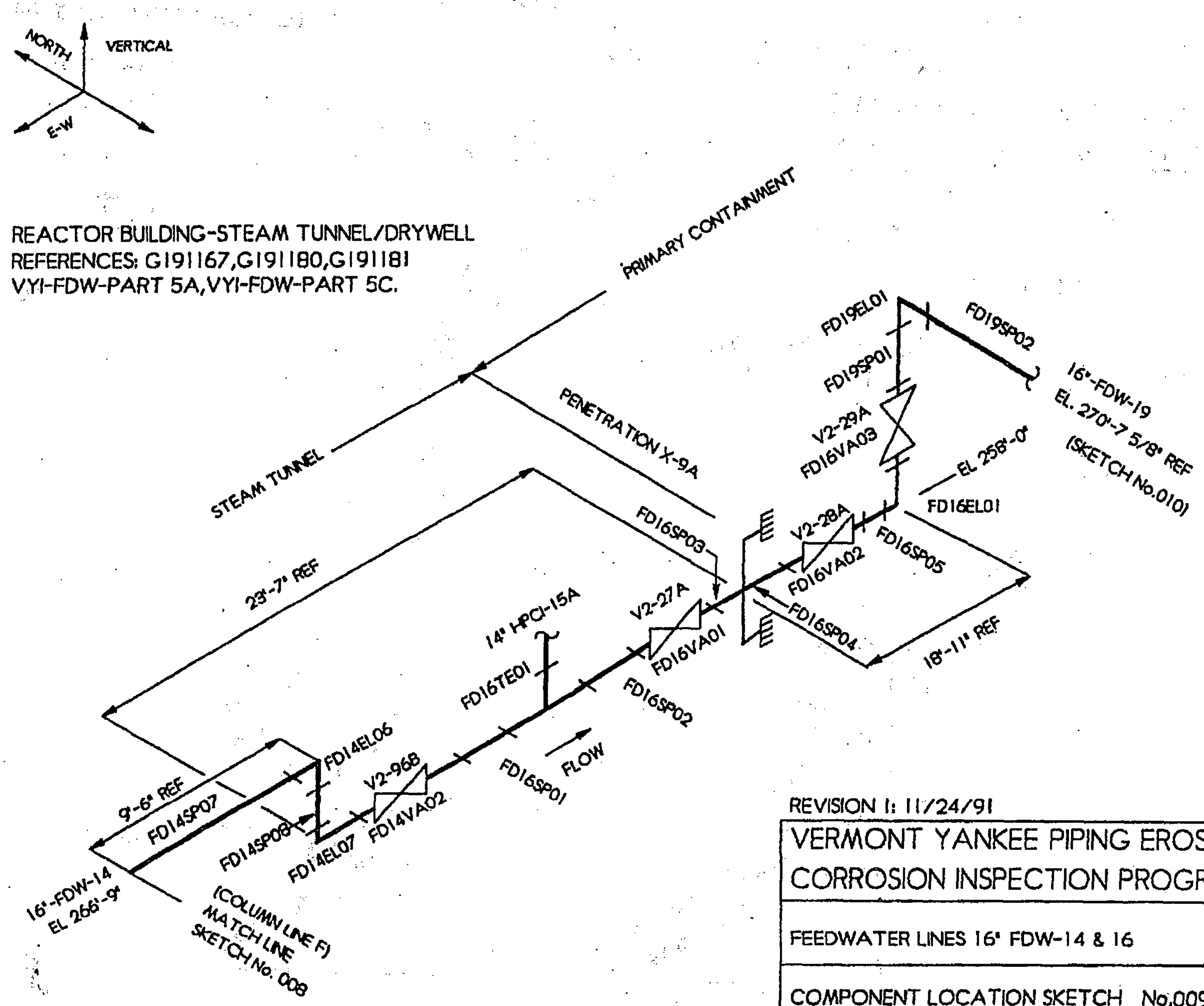
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| FEEDWATER LINE 18" FDW-12 |
| COMPONENT LOCATION SKETCH No.007 |


NORTH
VERTICAL
E-W
(COLUMN LINE F)
MATCH LINE SKETCH No.009
14'-4 1/2" REF
16"-FDW-14
EL 286'-9"
7'-0 1/8"
14'-2"
23'-10" REF
FD14TE02
(8"CAPPED)
FD14SP07
FD14EL05
FD14SP06
FD14FE01
FD14SP05
FD14SP04
EL 286'-9"
FD14EL04
FLOW
FD14SP03
FD14EL03
23'-7 1/2" REF
FD14SP02
16"X18" REDUCER
FD14RD01
10"-FDW-11
EL 258'-6"
FD14TE01
(SKETCH No.021)
EL. 256'-1 1/2" REF
FD14EL01
FD14VA01
18" DIA OUTLET
NOZZLE HEATER E1-1A
60 DEG V
V63-7A
FD14SP01
FD14EL02
TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-I25
REVISION 1: 11/24/91
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
FEEDWATER LINE 16"-FDW-14
COMPONENT LOCATION SKETCH No.008

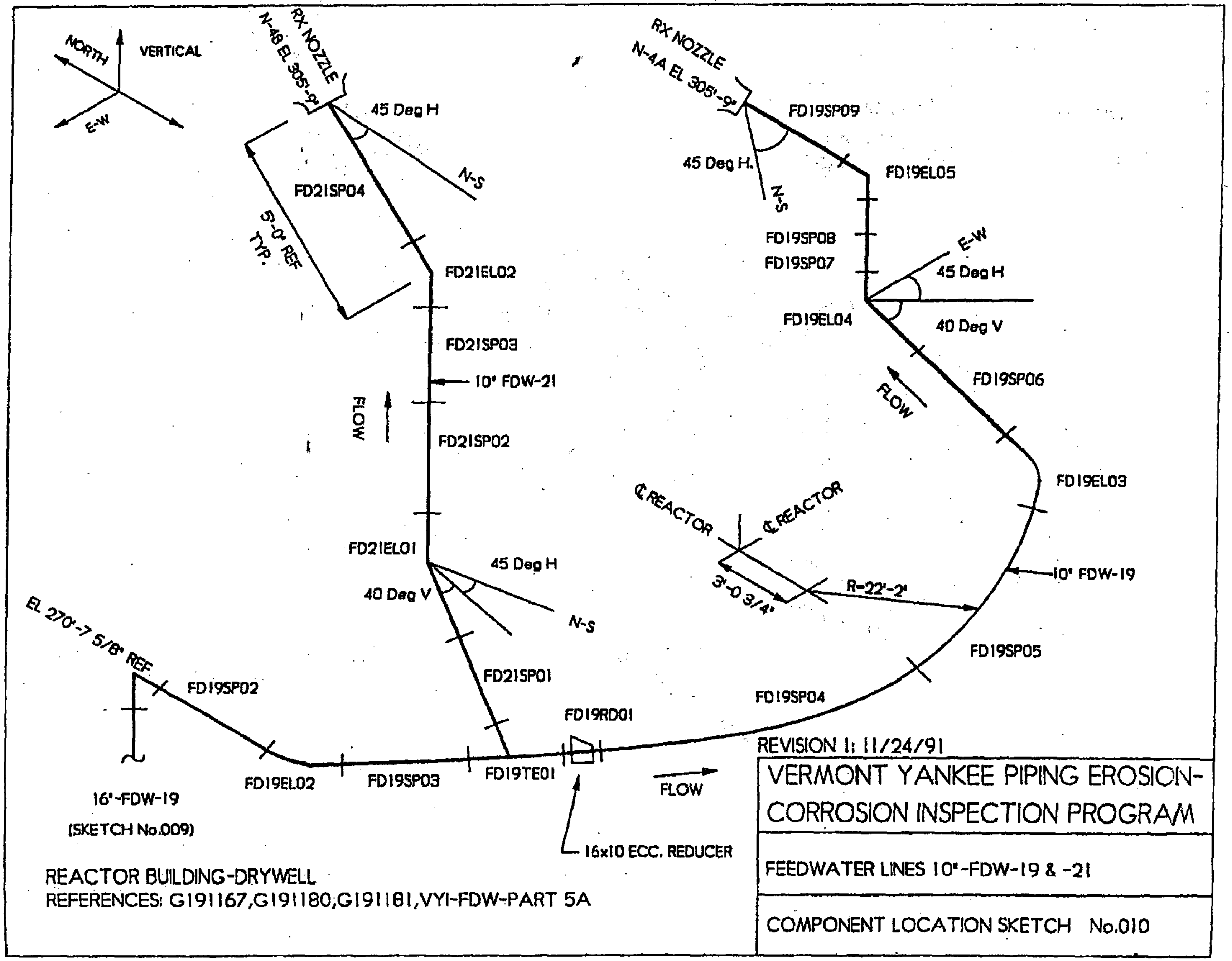


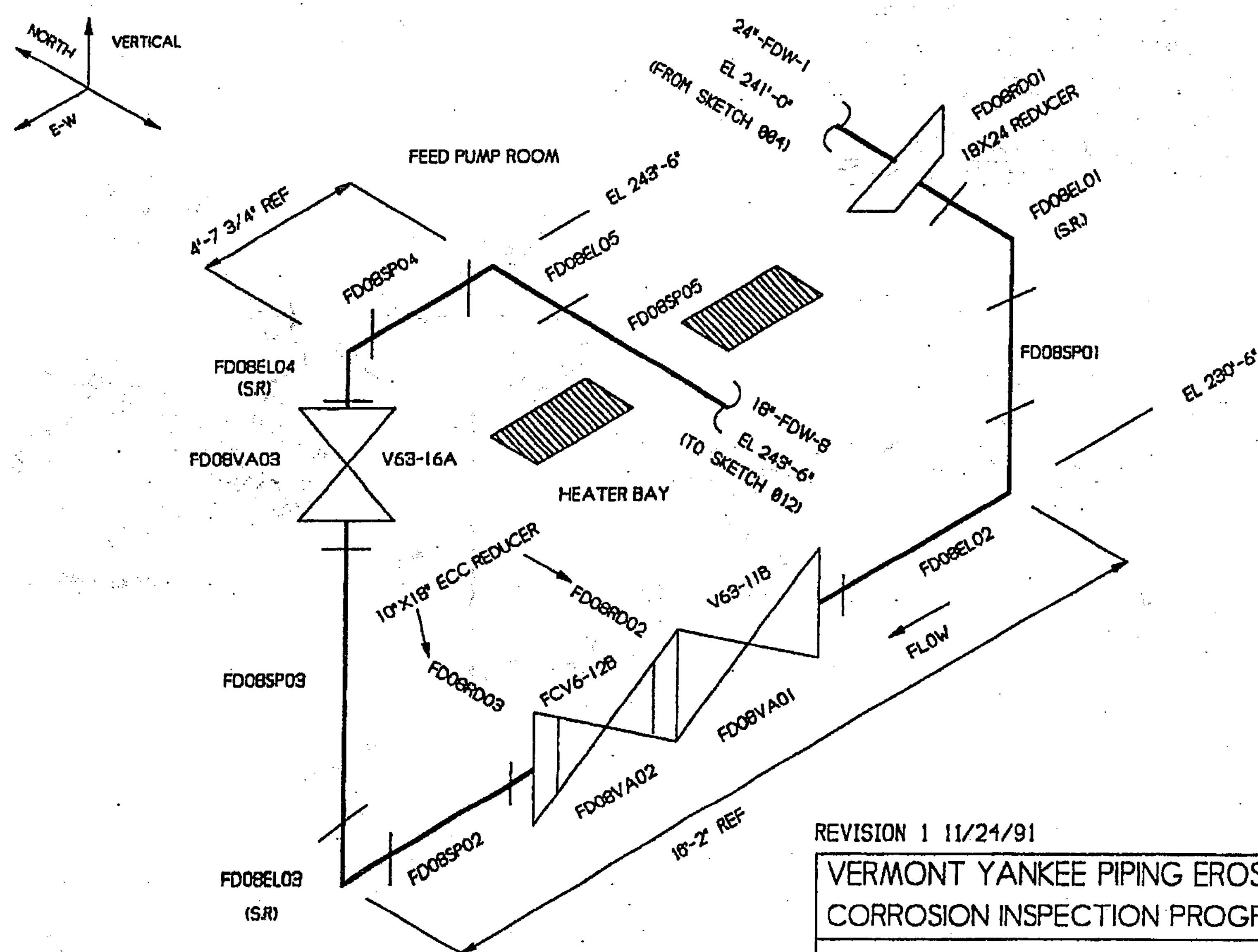

REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINES 16" FDW-14 & 16

COMPONENT LOCATION SKETCH No.009


NORTH
VERTICAL
E-W
RX NOZZLE
N-4B EL 305'-9"
45 Deg H
N-S
FD21SP04
5'-0" REF
TYP.
FD21EL02
FD21SP03
10" FDW-21
FLOW
FD21SP02
FD21EL01
45 Deg H
40 Deg V
N-S
FD21SP01
EL 270'-7 5/8" REF
FD19SP02
FD19EL02
FD19SP03
FD19TE01
FD19RD01
16"-FDW-19
(SKETCH No.009)
16x10 ECC. REDUCER
FLOW
RX NOZZLE
N-4A EL 305'-9"
FD19SP09
45 Deg H.
N-S
FD19EL05
FD19SP08
FD19SP07
E-W
45 Deg H
FD19EL04
40 Deg V
FLOW
FD19SP06
FD19EL03
℄ REACTOR
℄ REACTOR
3'-0 3/4"
R=22'-2"
10" FDW-19
FD19SP05
FD19SP04
REVISION 1: 11/24/91
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
FEEDWATER LINES 10"-FDW-19 & -21
COMPONENT LOCATION SKETCH No.010
REACTOR BUILDING-DRYWELL
REFERENCES: G191167,G191180,G191181,VYI-FDW-PART 5A




TURBINE BUILDING-FEED PUMP ROOM
REFERENCES: G191157,G191182,G191183,5920-FS-124

REVISION 1 11/24/91

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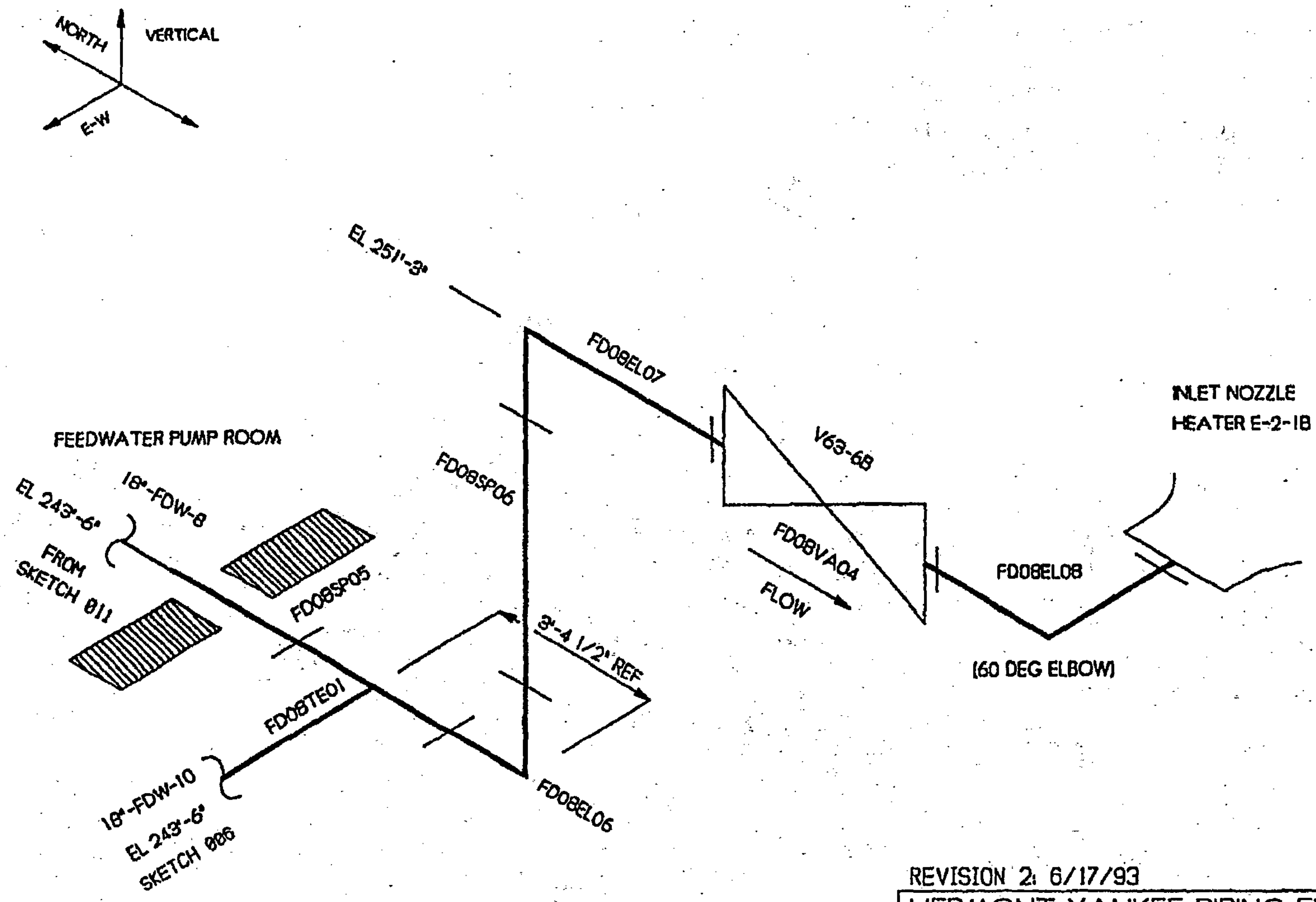
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| FEEDWATER LINE 18"-FDW-8 |
| COMPONENT LOCATION SKETCH No.011 |



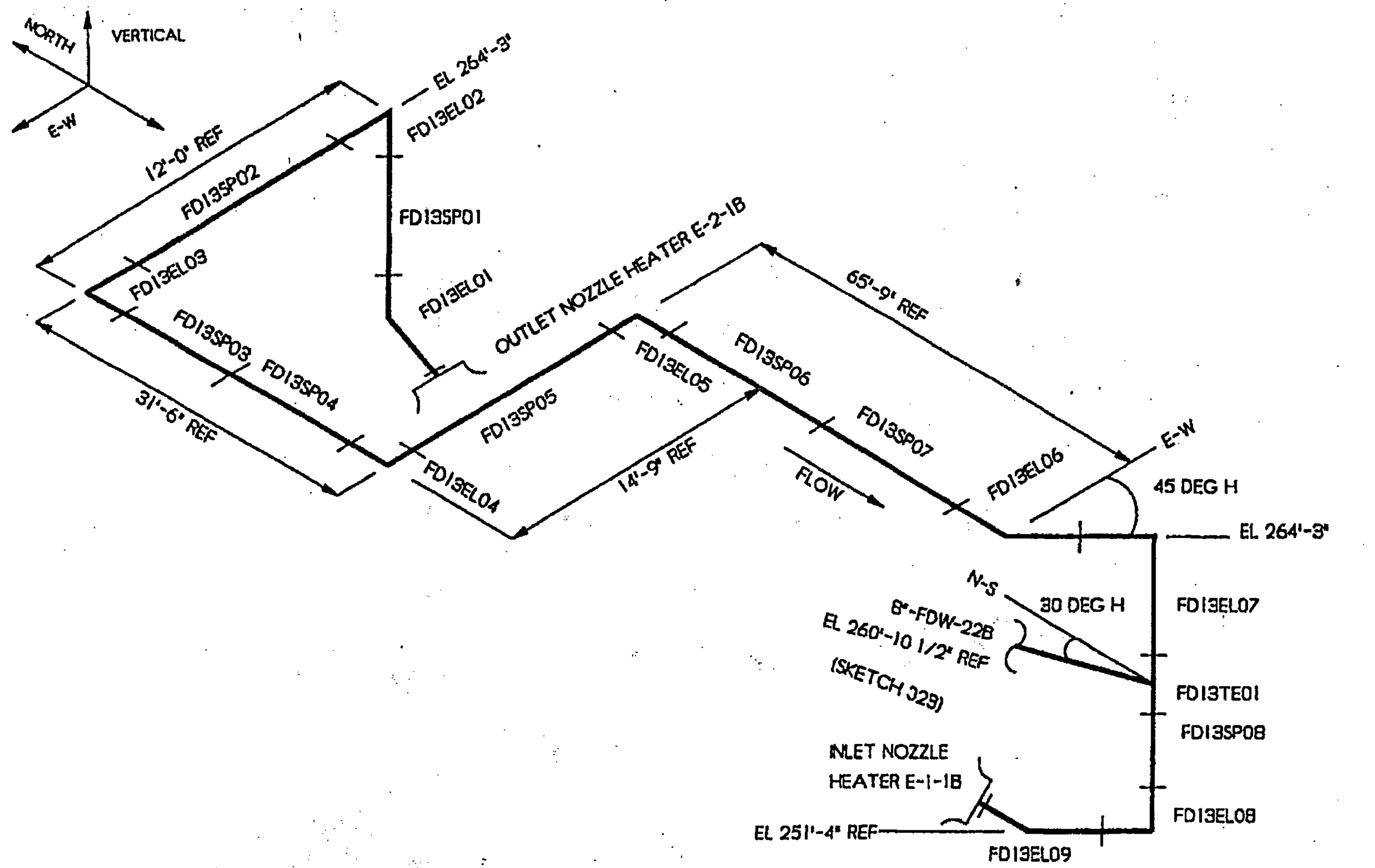

REVISION 2: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 18" FDW-8 (CONT)

COMPONENT LOCATION SKETCH No. 012

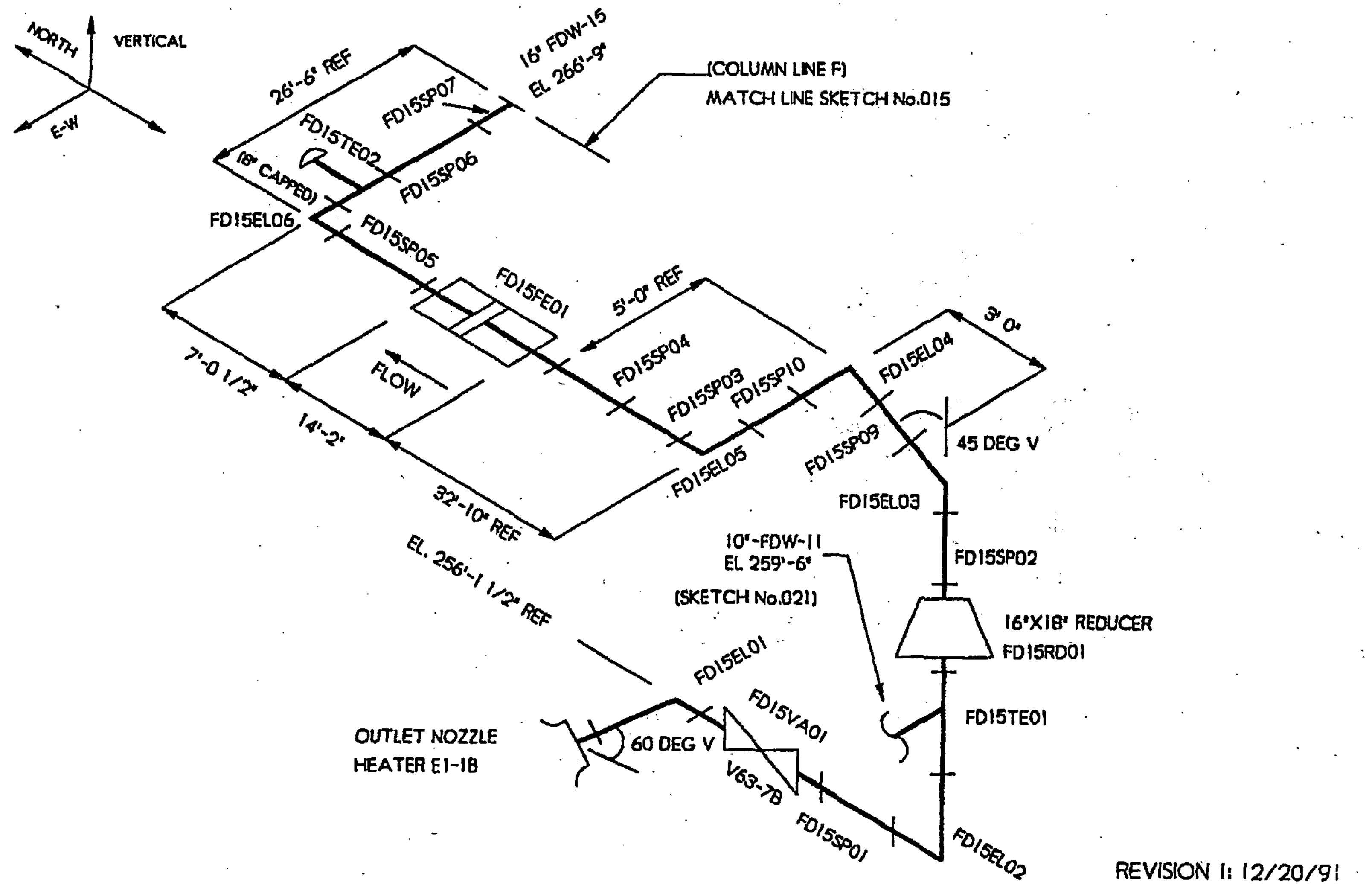
TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125




REVISION 2: 6/17/93

TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| FEEDWATER LINE 18" FDW-13 |
| COMPONENT LOCATION SKETCH No.013 |



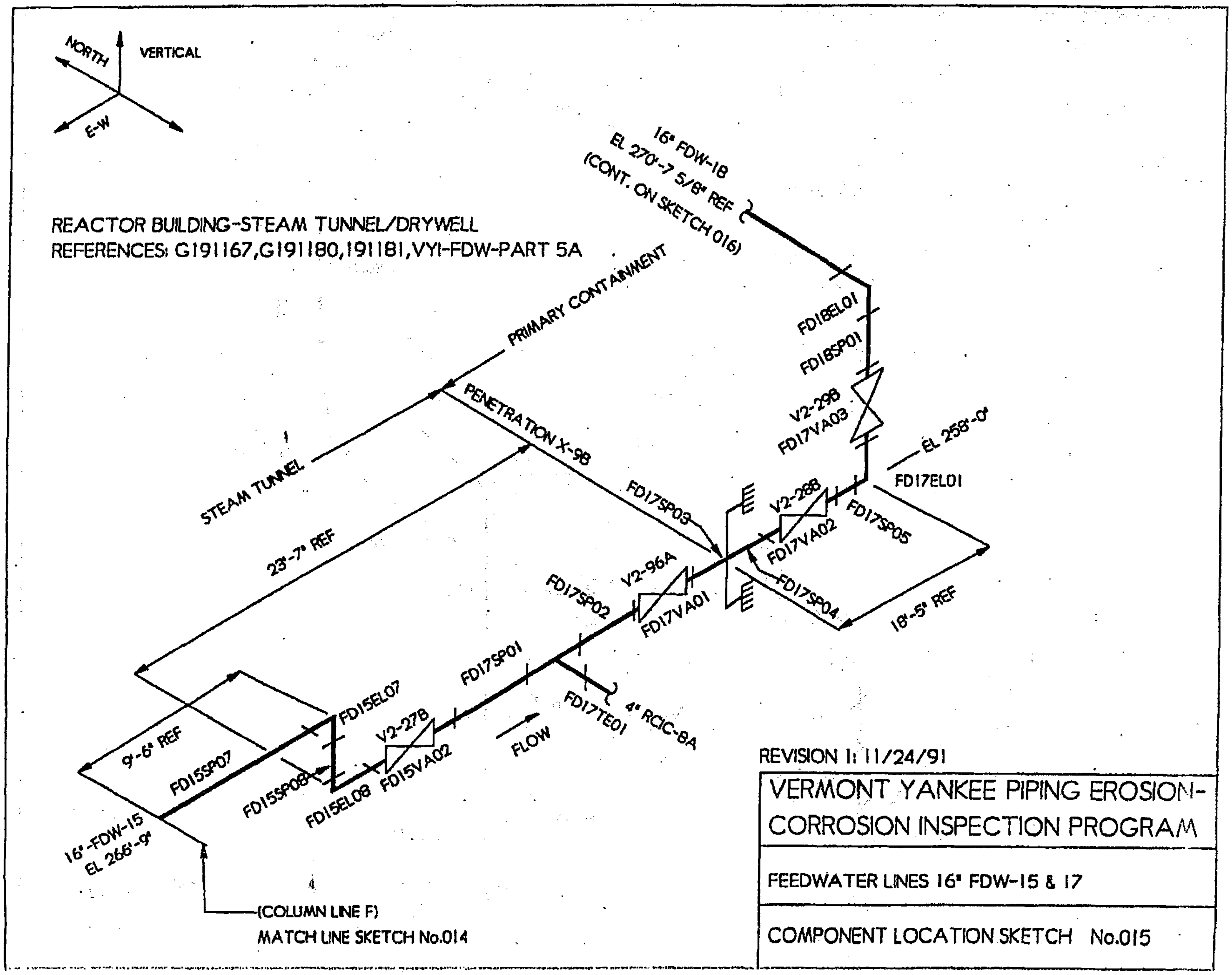

REVISION 1: 12/20/91

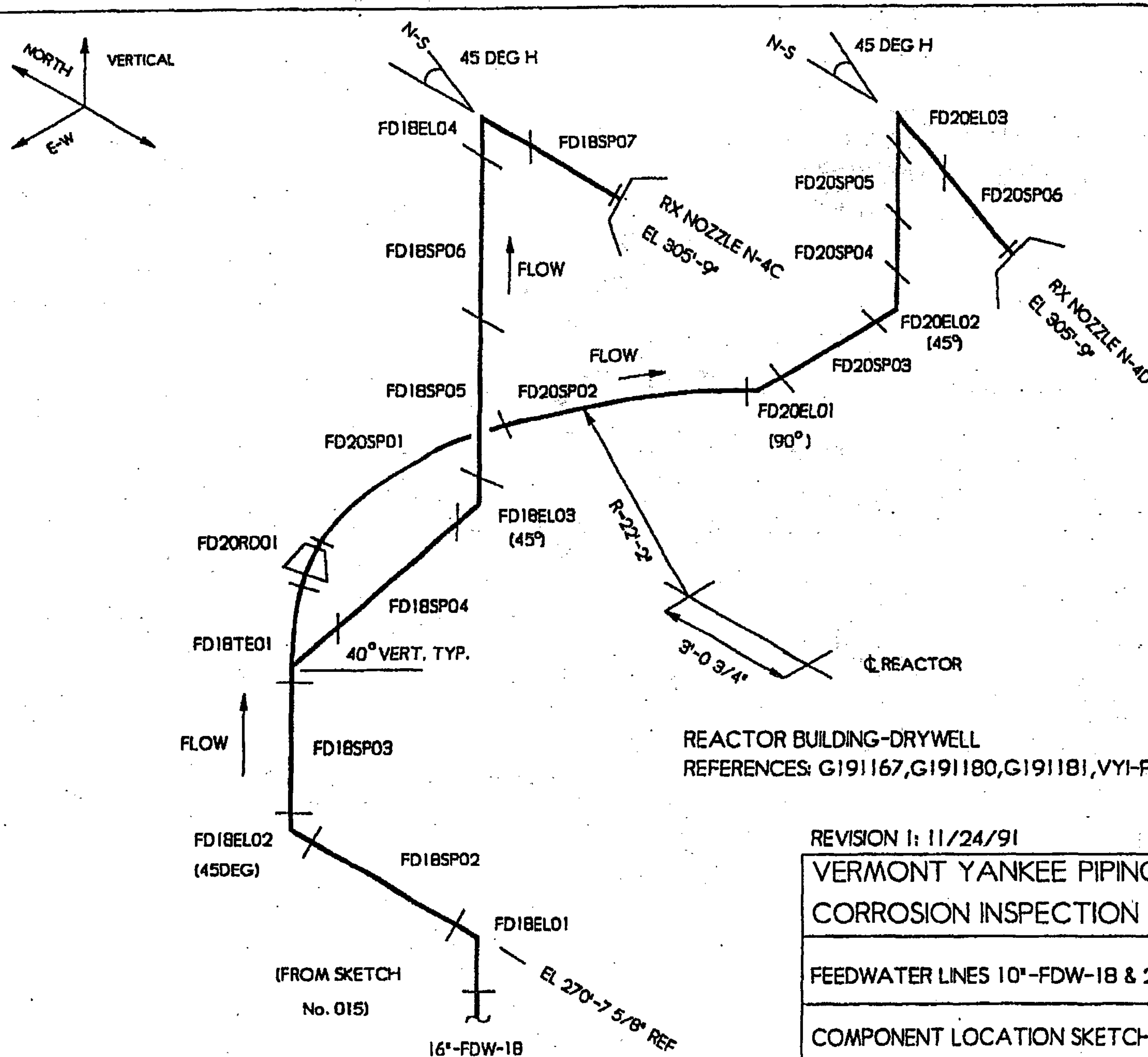
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 16"-FDW-15

COMPONENT LOCATION SKETCH No.014

TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125

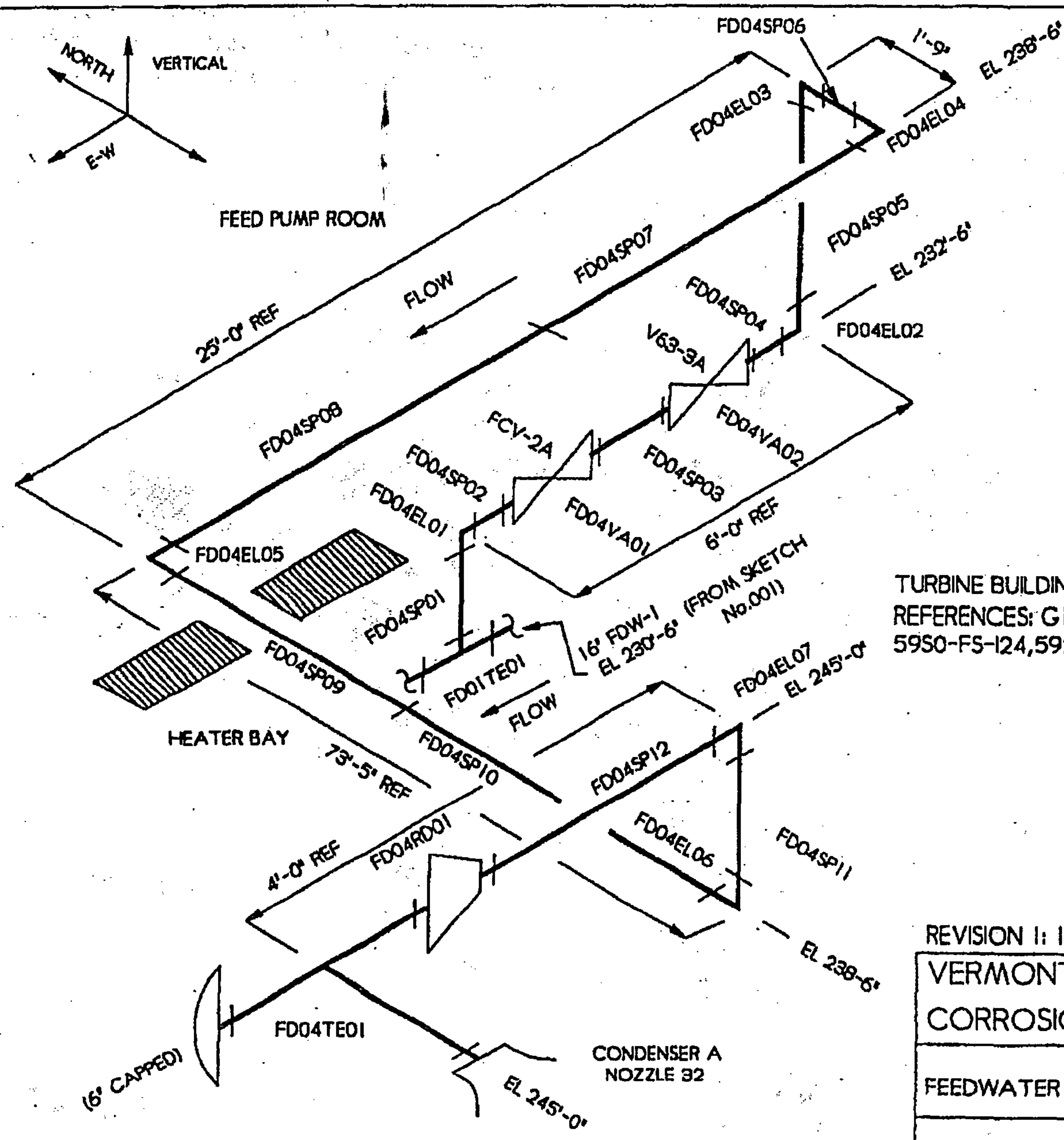

NORTH
VERTICAL
E-W
REACTOR BUILDING-STEAM TUNNEL/DRYWELL
REFERENCES: G191167,G191180,191181,VYI-FDW-PART 5A
16" FDW-18
EL 270'-7 5/8" REF
(CONT. ON SKETCH 016)
PRIMARY CONTAINMENT
PENETRATION X-9B
STEAM TUNNEL
23'-7" REF
FD18EL01
FD18SP01
V2-29B
FD17VA03
EL 258'-0"
FD17EL01
FD17SP03
V2-28B
FD17VA02
FD17SP05
FD17SP04
18'-5" REF
V2-96A
FD17VA01
FD17SP02
FD17SP01
FD17TE01
4" RCIC-8A
FLOW
FD15EL07
V2-27B
FD15VA02
FD15SP08
FD15EL08
FD15SP07
9'-6" REF
16"-FDW-15
EL 266'-9"
(COLUMN LINE F)
MATCH LINE SKETCH No.014
REVISION 1: 11/24/91
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
FEEDWATER LINES 16" FDW-15 & 17
COMPONENT LOCATION SKETCH No.015




REACTOR BUILDING-DRYWELL
REFERENCES: G191167,G191180,G191181,VYI-FDW-PART 5A

REVISION 1: 11/24/91

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| FEEDWATER LINES 10"-FDW-18 & 20 |
| COMPONENT LOCATION SKETCH No.016 |



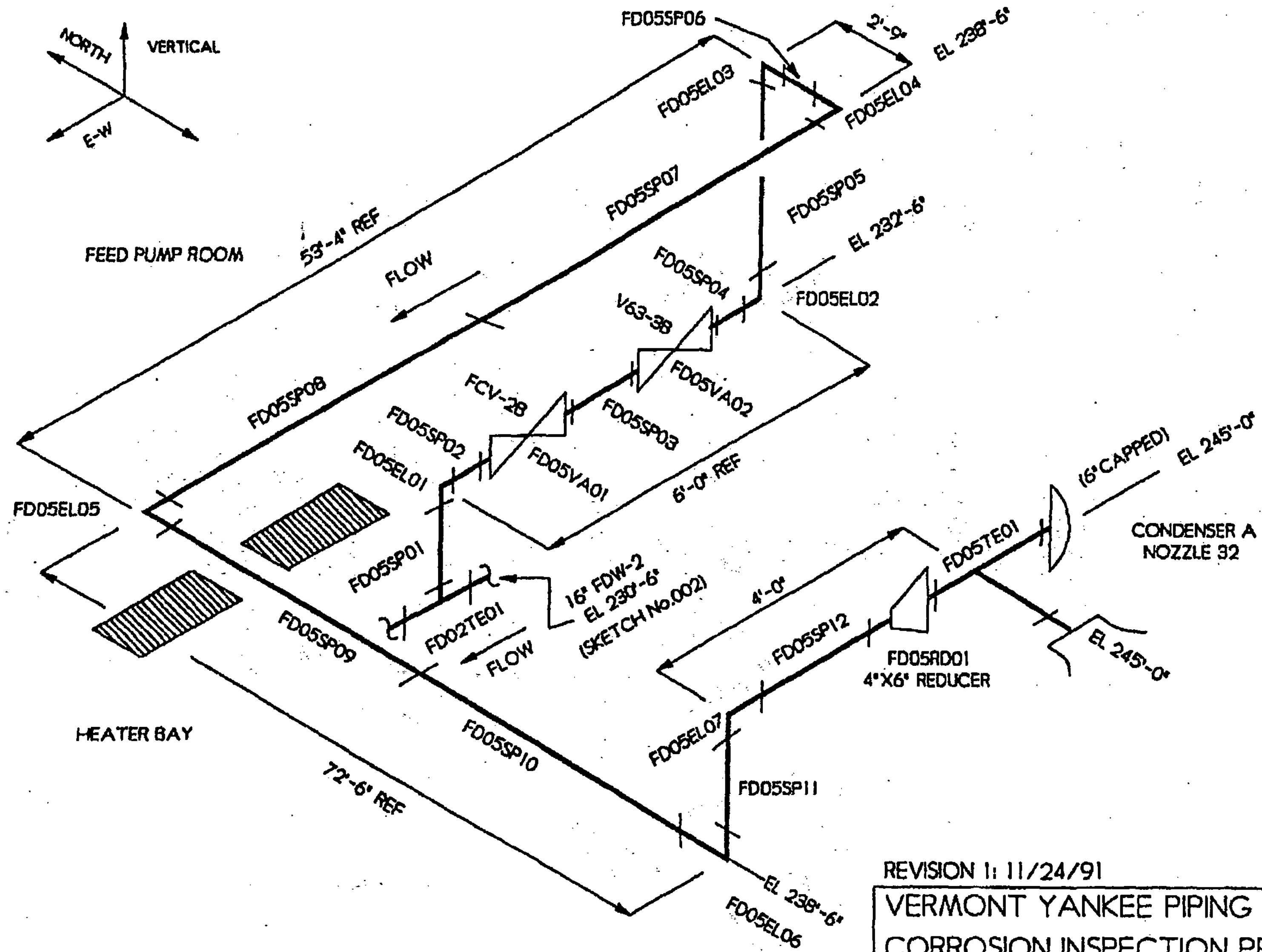

TURBINE BUILDING-FEED PUMP ROOM/HEATER BAY
REFERENCES: G191157,G191182,G191183
5950-FS-124,5920-FS-125

REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 4"-FDW-4

COMPONENT LOCATION SKETCH No.017



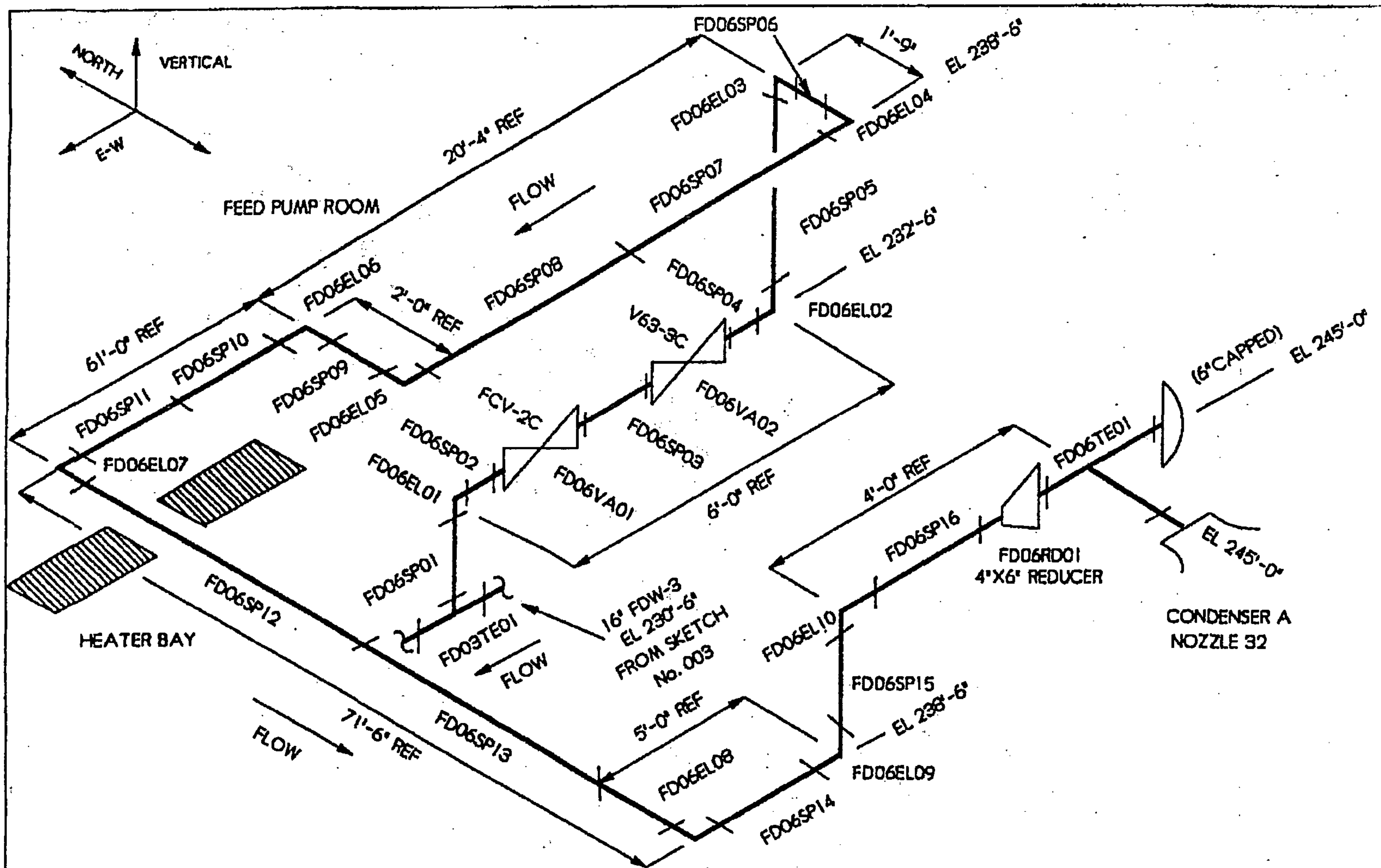

REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 4"-FDW-5

COMPONENT LOCATION SKETCH No.018

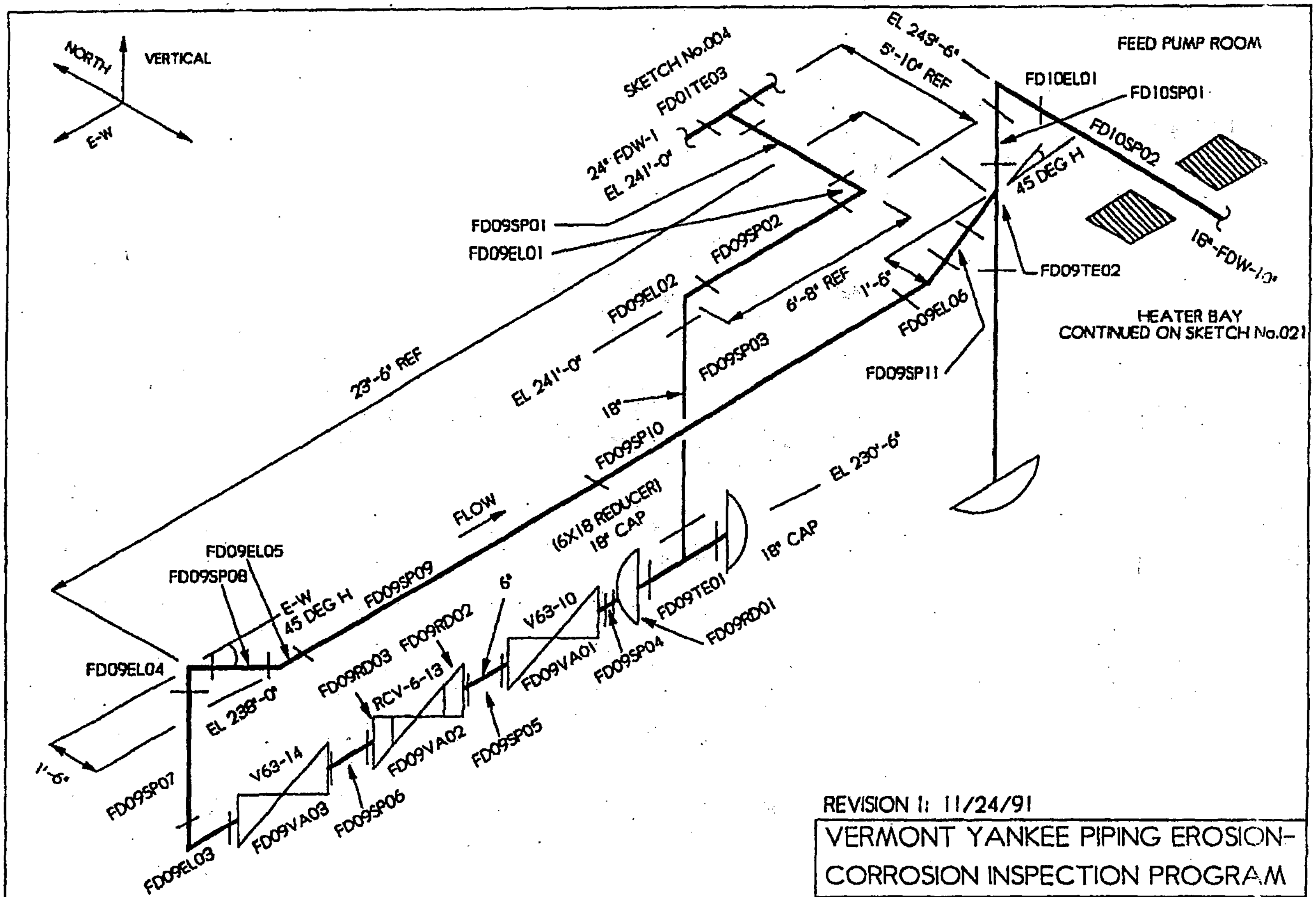
TURBINE BUILDING-FEED PUMP ROOM/HEATER BAY
REFERENCES: G191157,G191182,G191183
5950-FS-124,5920-FS-125




REVISION 1: 11/25/91

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| FEEDWATER LINE 4"-FDW-6 |
| COMPONENT LOCATION SKETCH No.019 |

TURBINE BUILDING-FEED PUMP ROOM/HEATER BAY
REFERENCES: G191157,G191182,G191183
5950-FS-124,5920-FS-125



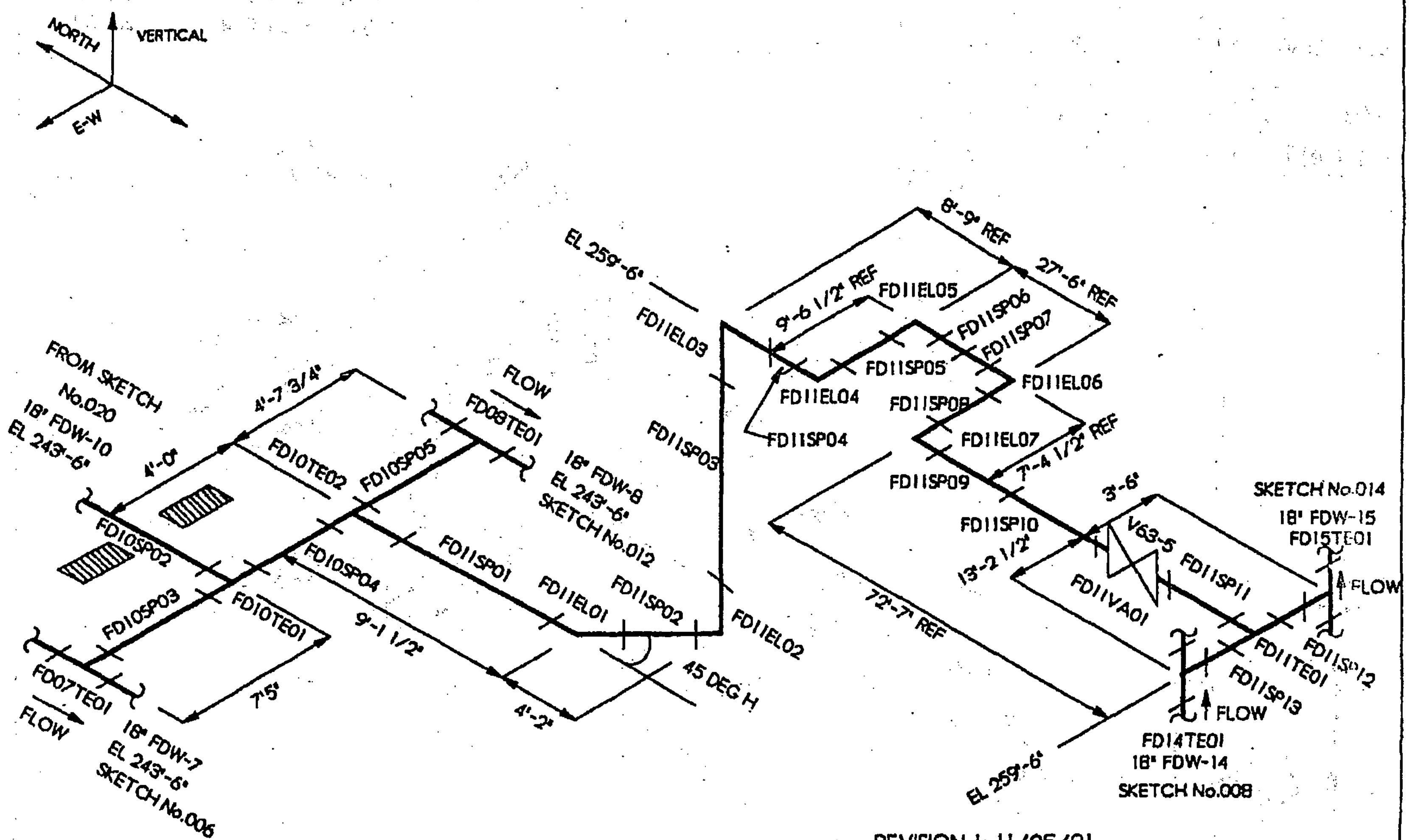

REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINES 6"-FDW-9 & 18" FDW-10

COMPONENT LOCATION SKETCH No.020

TURBINE BUILDING-FEED PUMP ROOM
REFERENCES: G191157,G191182,G191183
5920-FS-125



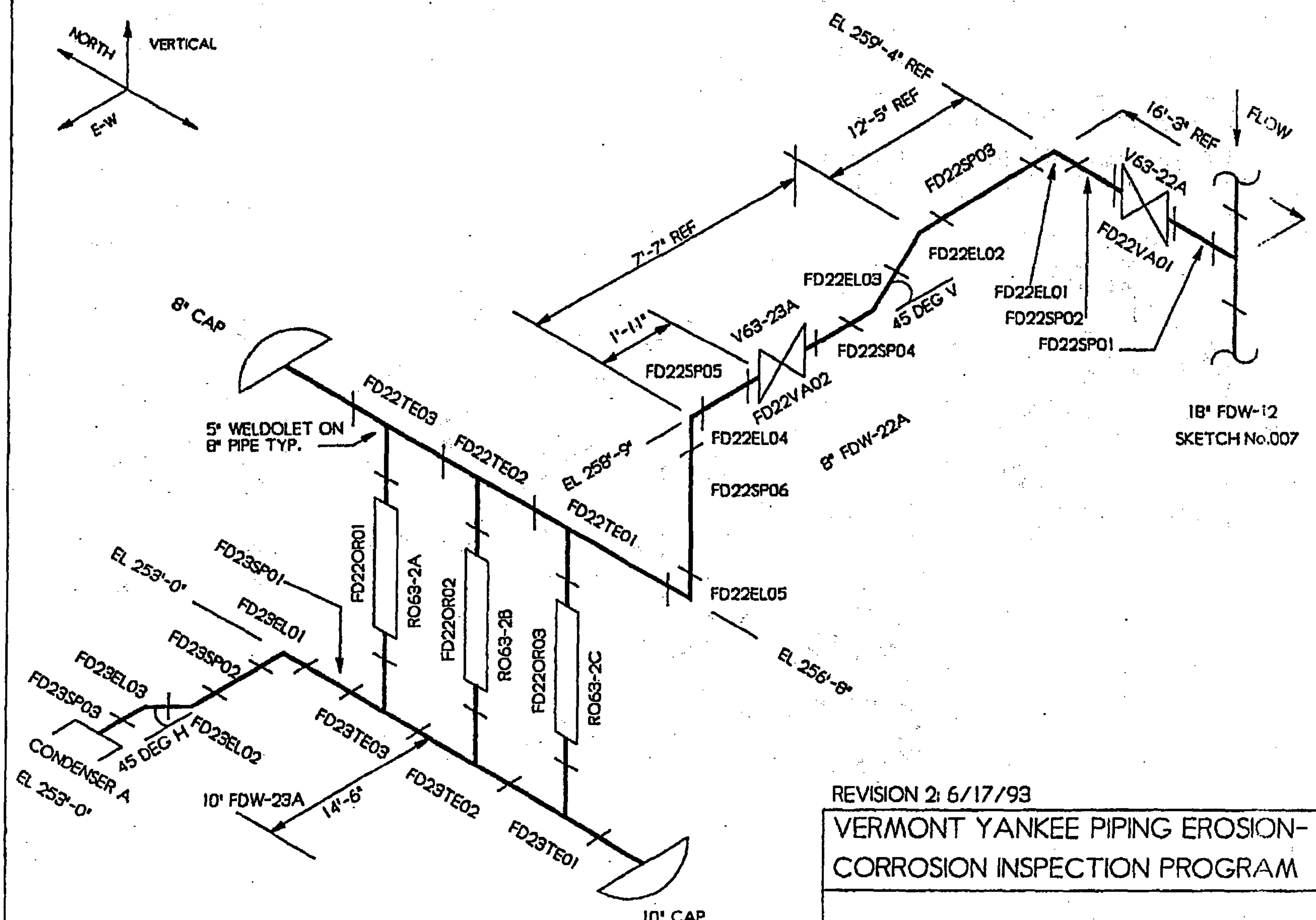

REVISION 1: 11/25/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINES 18"-FDW-10 & 10" FDW-11

COMPONENT LOCATION SKETCH No.021

TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,VYI-FDW-PART 5C(2/2)



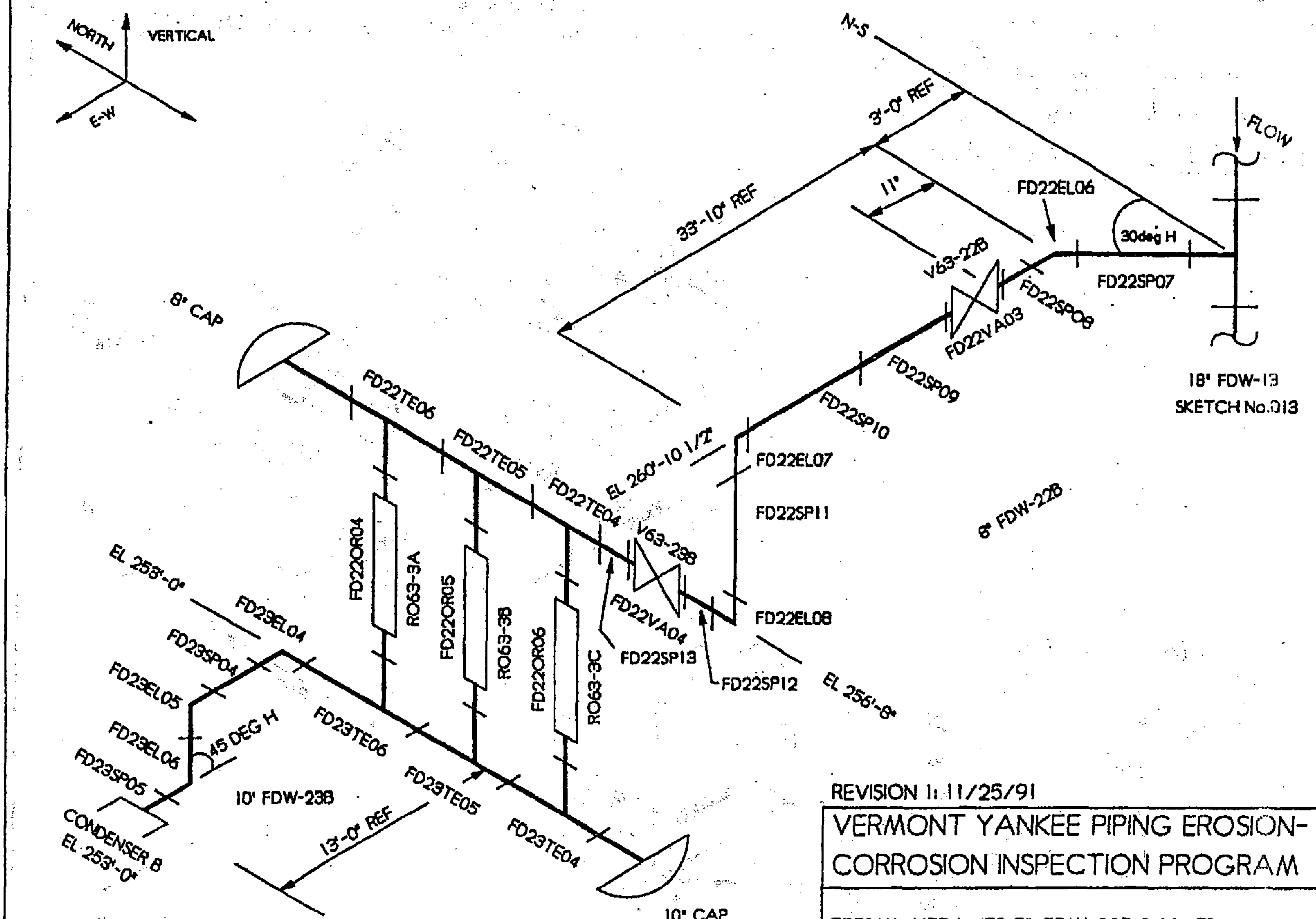

TURBINE BUILDING-HEATER BAY
REFERENCES: G191157,G191182,G191183,5920-FS-125 ,
VYI-FDW-PART-22A

REVISION 2: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINES 8"-FDW-22A & 10" FDW-23A

COMPONENT LOCATION SKETCH No.022




TURBINE BUILDING-HEATER BAY

REFERENCES: G191157,G191182,G191183,5920-FS-125

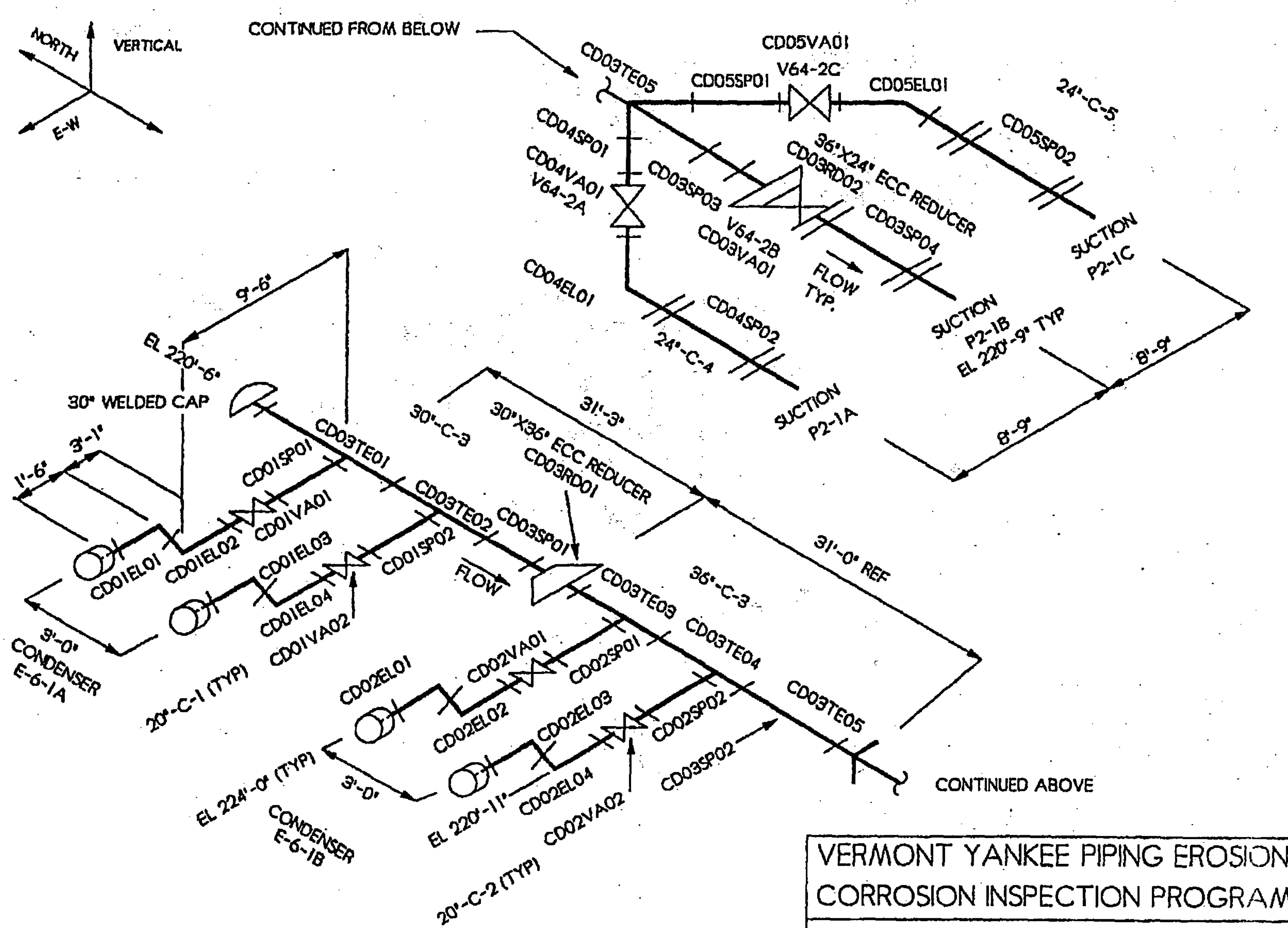
VYI-FDW-PART-22B

REVISION 1: 11/25/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

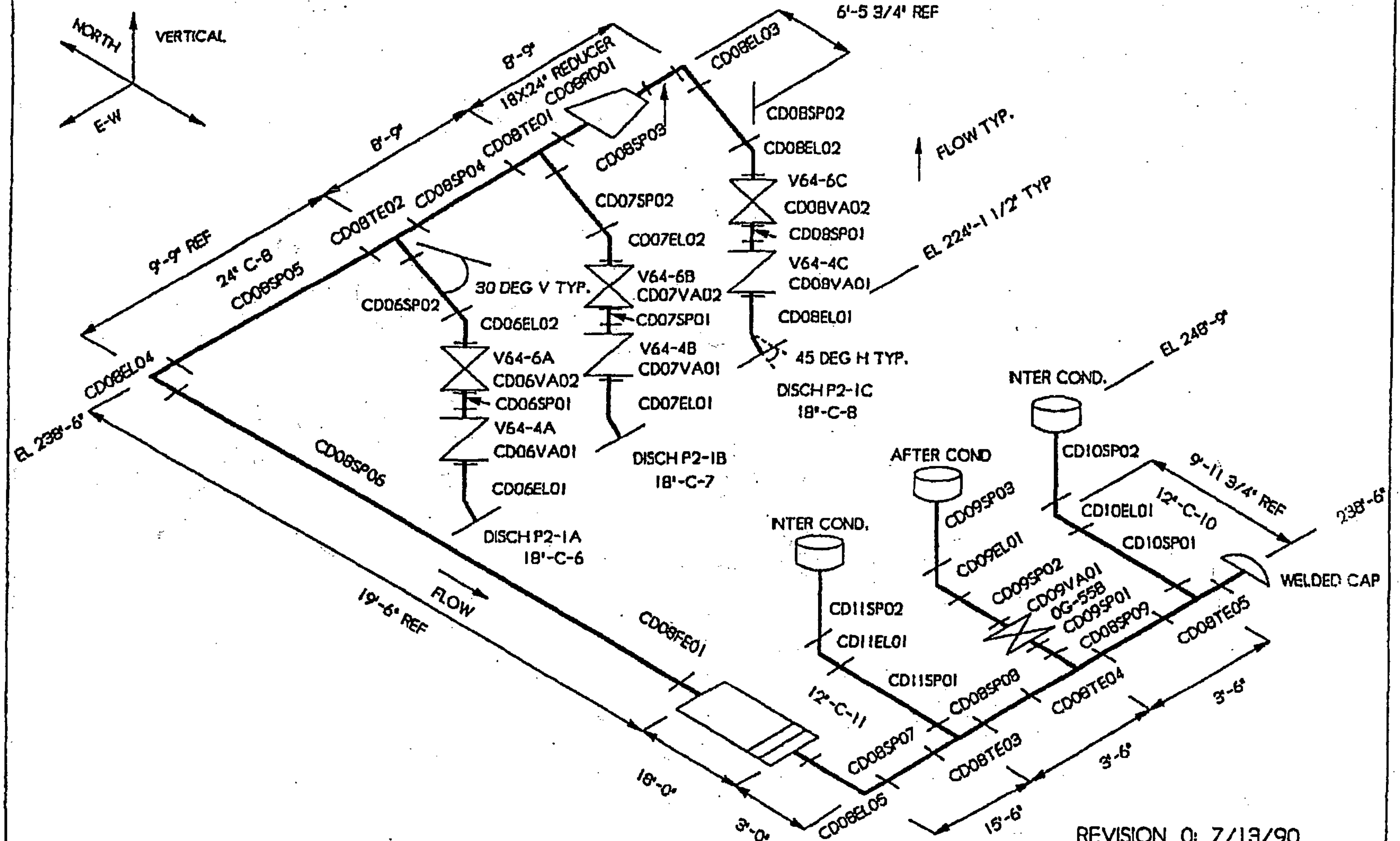
FEEDWATER LINES 8"-FDW-22B & 10" FDW-23B

COMPONENT LOCATION SKETCH No.023




TURBINE BULDING-HEATER BAY (TRENCH) & CONDENSATE PUMP ROOM
REFERENCES: G191157,G191186,G191187,5920-FS-116

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINES 20"-C1 & C2, 36"-C-3<br>24"-C4, AND 24"-C5 |
| COMPONENT LOCATION SKETCH No. 024 |



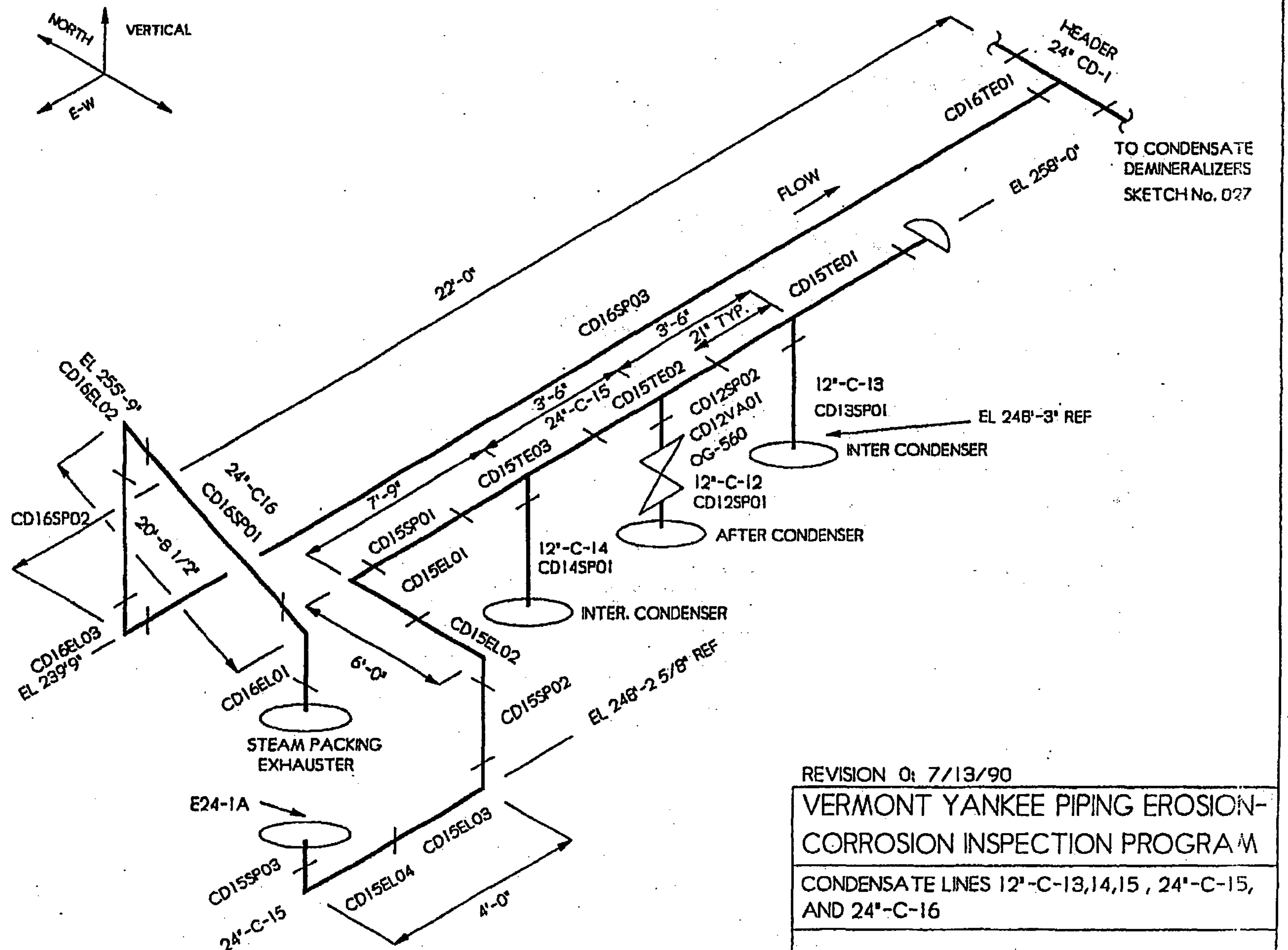

REVISION 0: 7/13/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINES 18"-C-6,7,8, 24"-C-8, 12"-C-9,10,11

COMPONENT LOCATION SKETCH No.025

TURBINE BULDING-CONDENSATE PUMP ROOM
REFERENCES G191157,G191186,G191187,5920-FS-117




REVISION 0: 7/13/90

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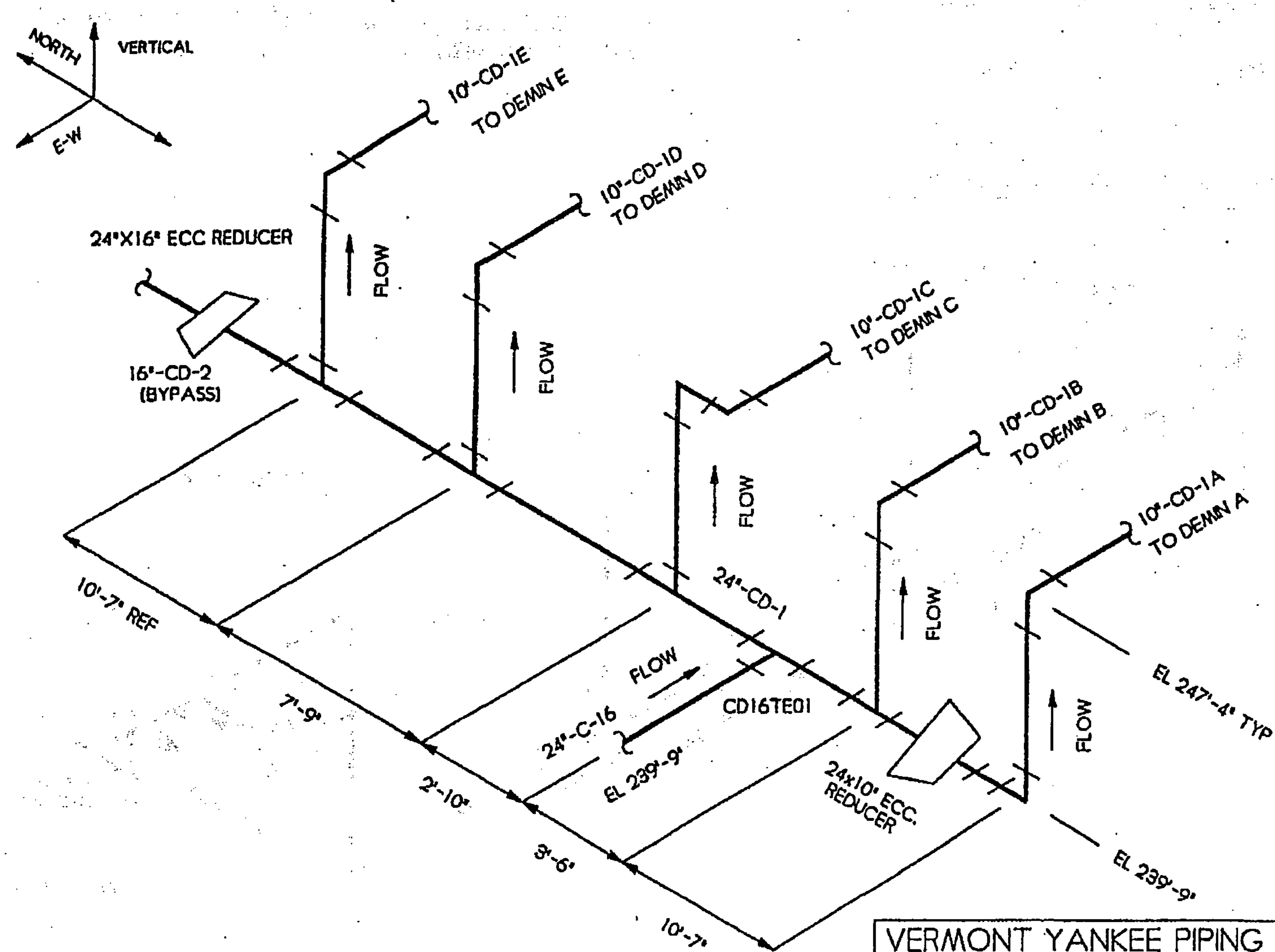
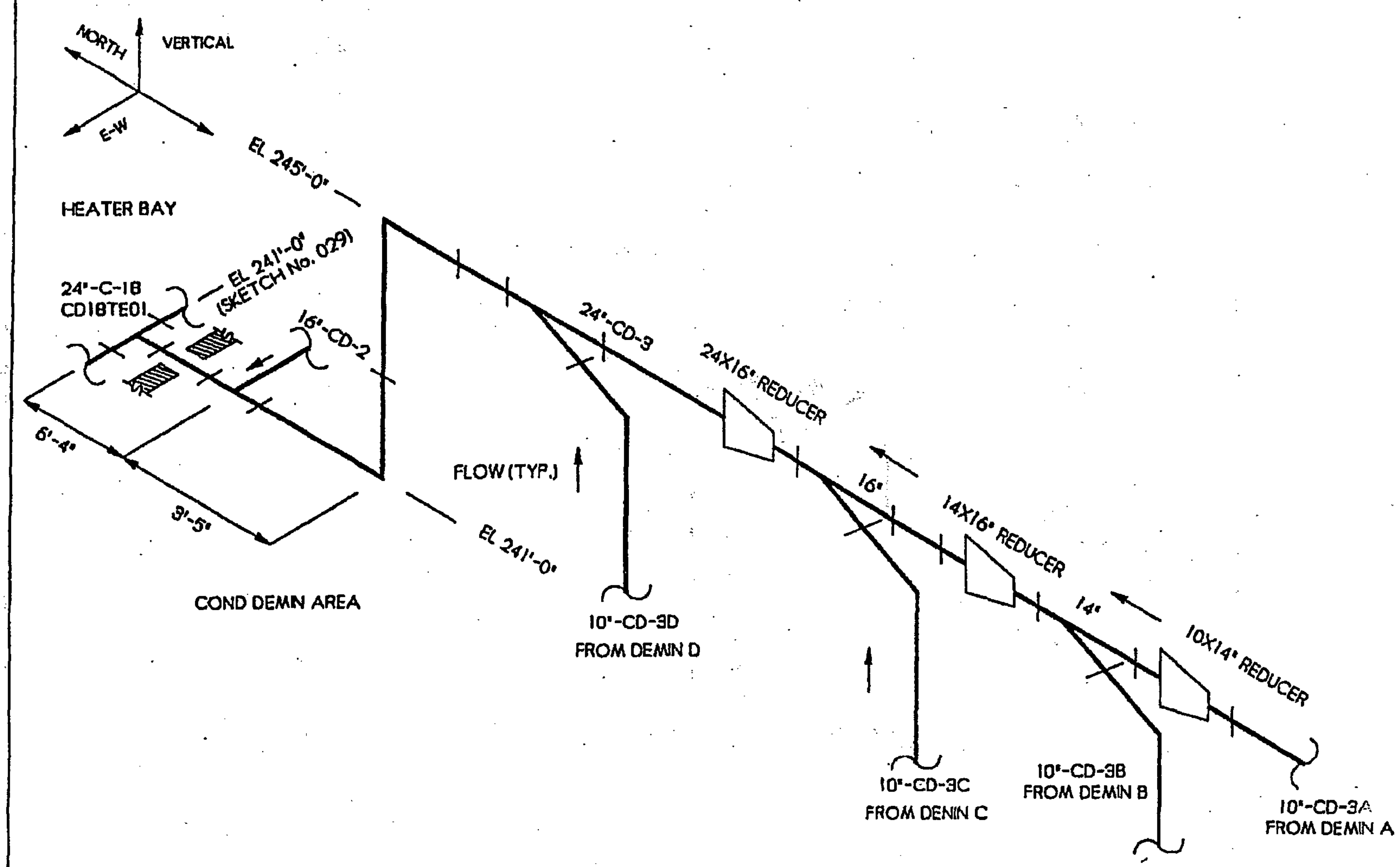
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINES 12"-C-13,14,15 , 24"-C-15, AND 24"-C-16 |
| COMPONENT LOCATION SKETCH No.026 |




TURBINE BULDING-CONDENSATE DEMIN AREA
REFERENCES: G191157,G191186,G191275,5920-FS-178A

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE HEADER TO DEMINS. |
| COMPONENT LOCATION SKETCH No.027 |



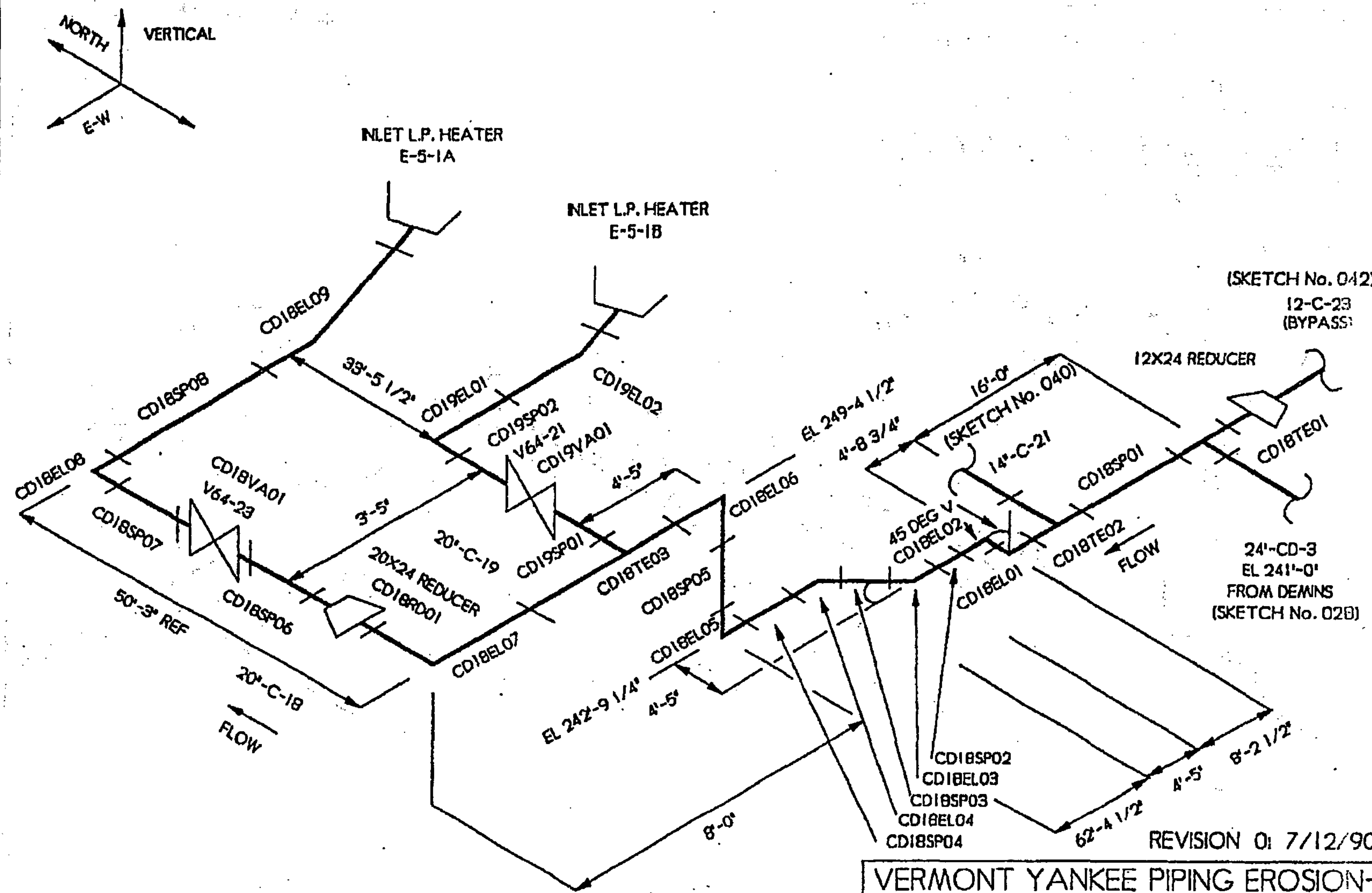

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 24"-CD-3 & 24"-C-18

COMPONENT LOCATION SKETCH No.028

TURBINE BULDING-HEATER BAY/CONDENSATE DEMIN AREA
REFERENCES: G191157,G191275,5920-FS-179A,5920-FS-116

REVISION 0: 7/13/90



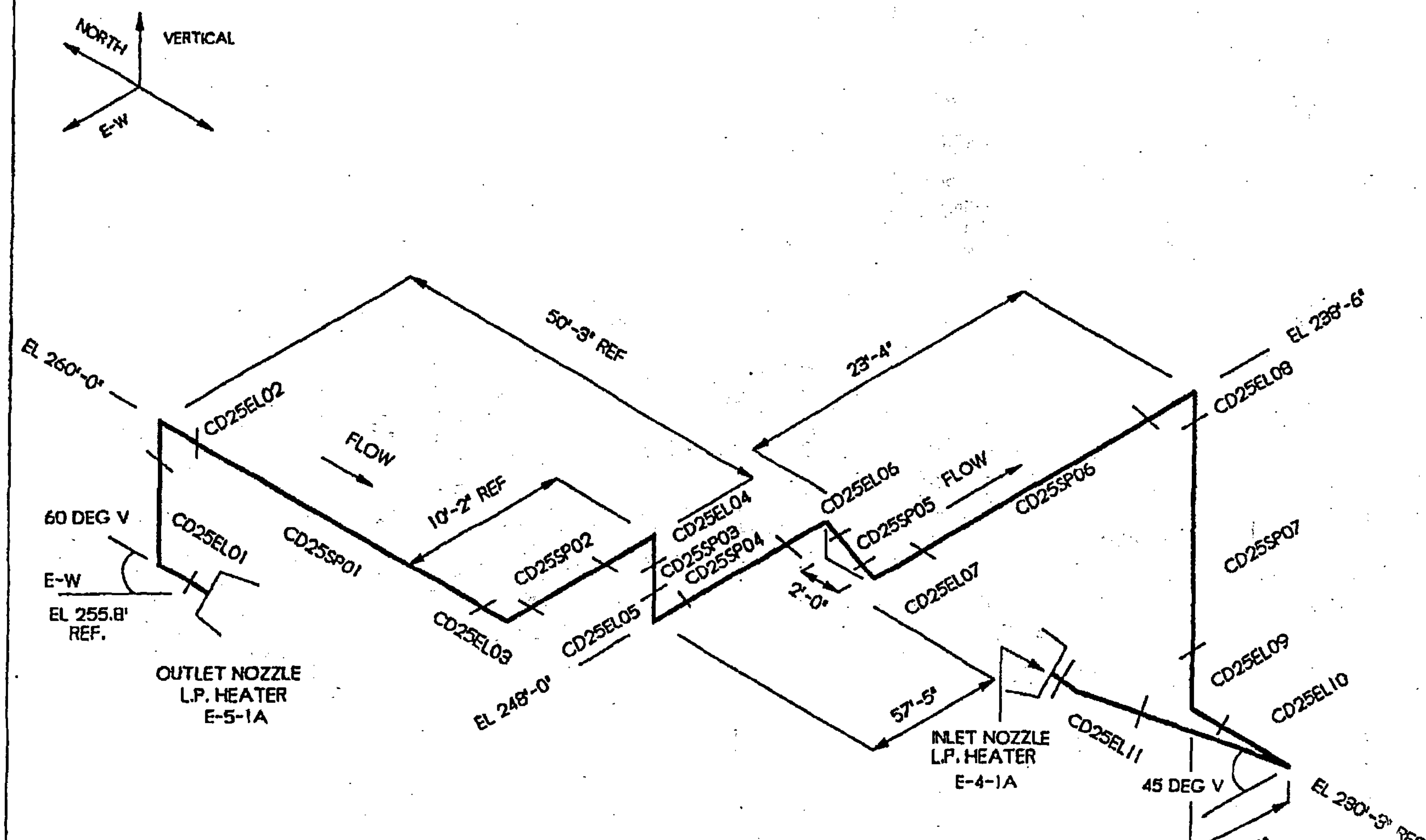

REVISION 0: 7/12/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 24"-C-18 & 20"-C-19

COMPONENT LOCATION SKETCH No. 029

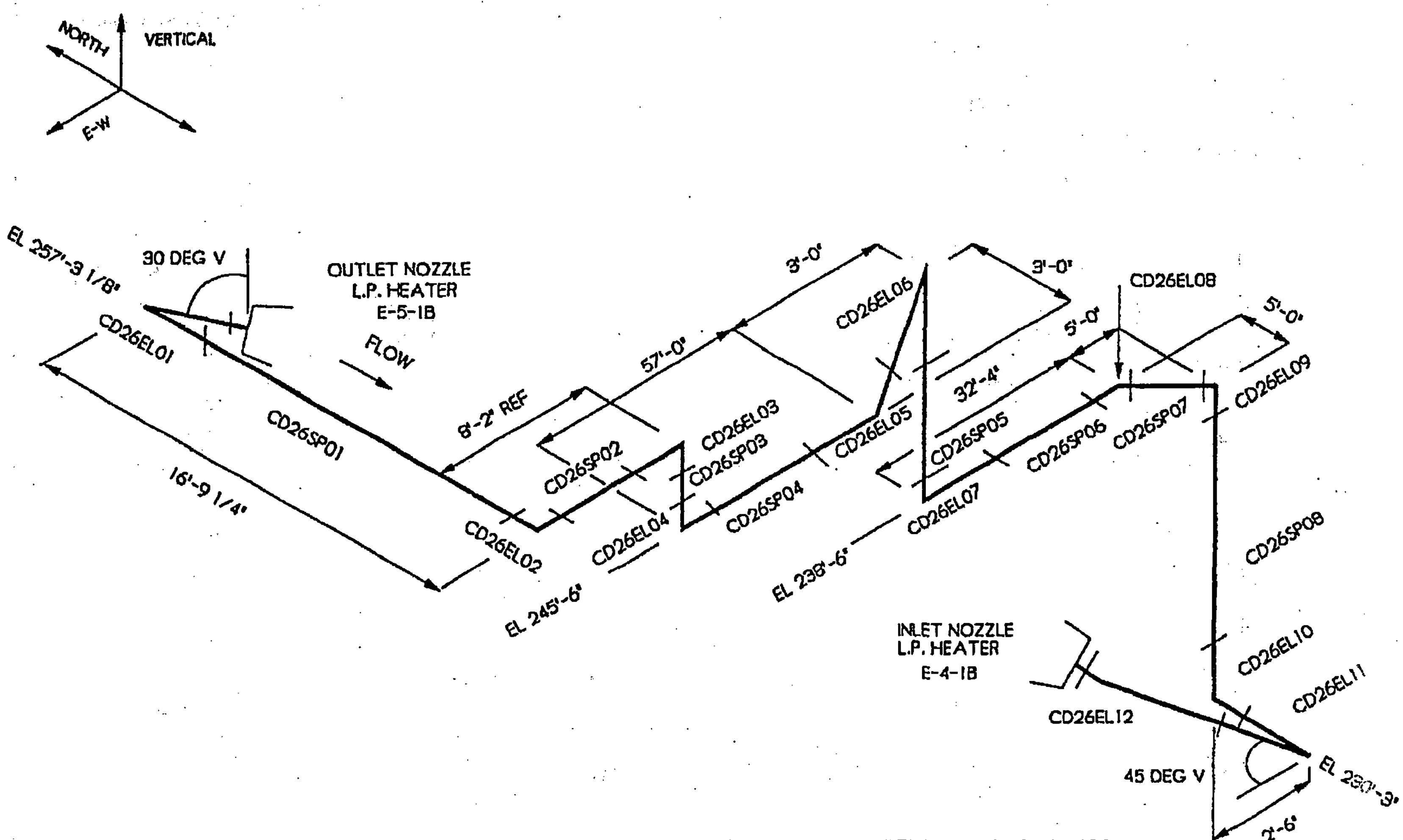
TURBINE BULDING-HEATER BAY
REFERENCES: G191157,G191186,G191187,5920-FS-I16,5920-FS-I17




REVISION 1: 6/17/93

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINE 20"-C-25 |
| COMPONENT LOCATION SKETCH No.030 |

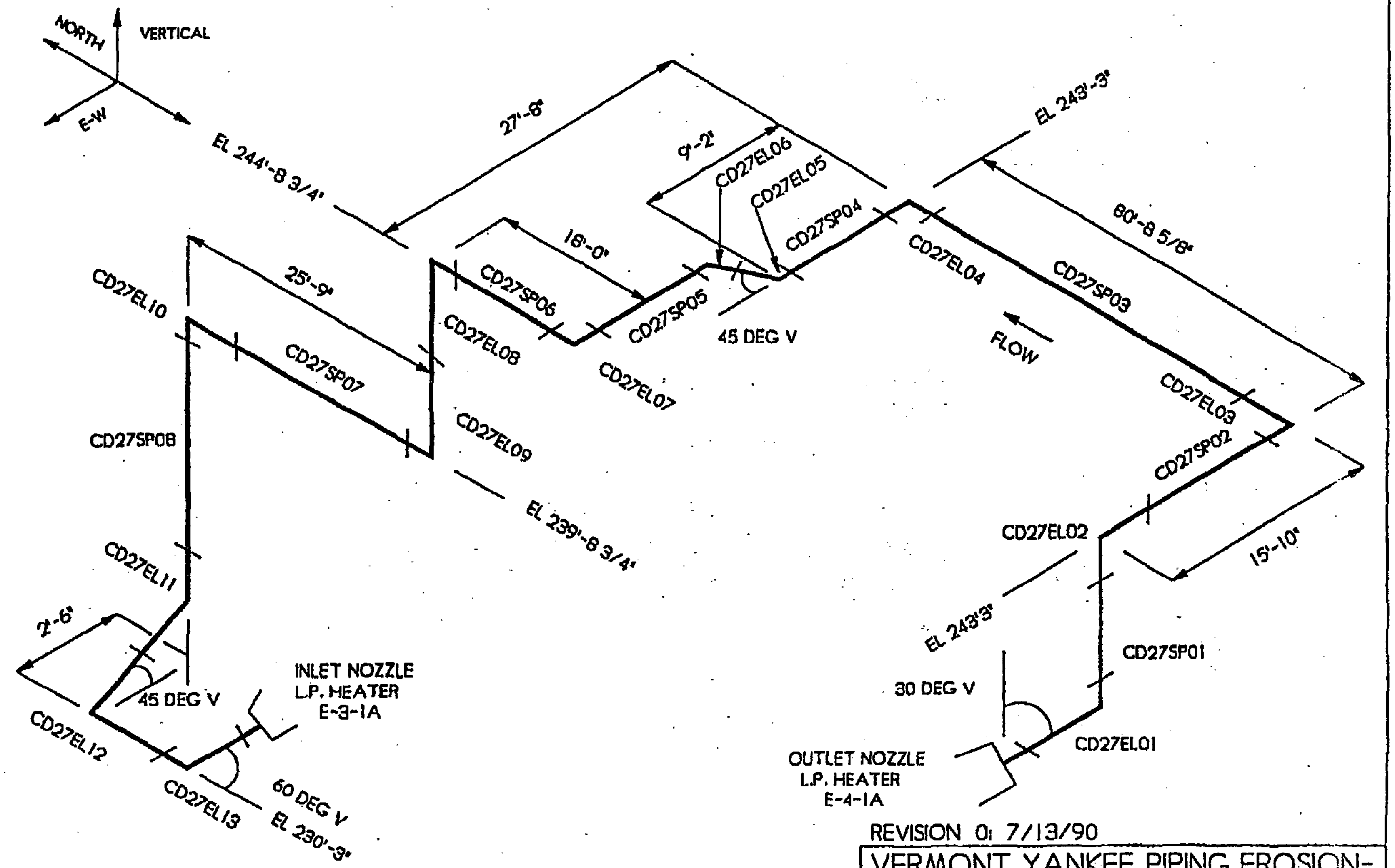
TURBINE BULDING-HEATER BAY
REFERENCES: G191157,G191186,G191187,5920-FS-116,5290-FS-117




REVISION 0: 7/13/90

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| CONDENSATE LINE 20"-C-26 |
| COMPONENT LOCATION SKETCH No.031 |

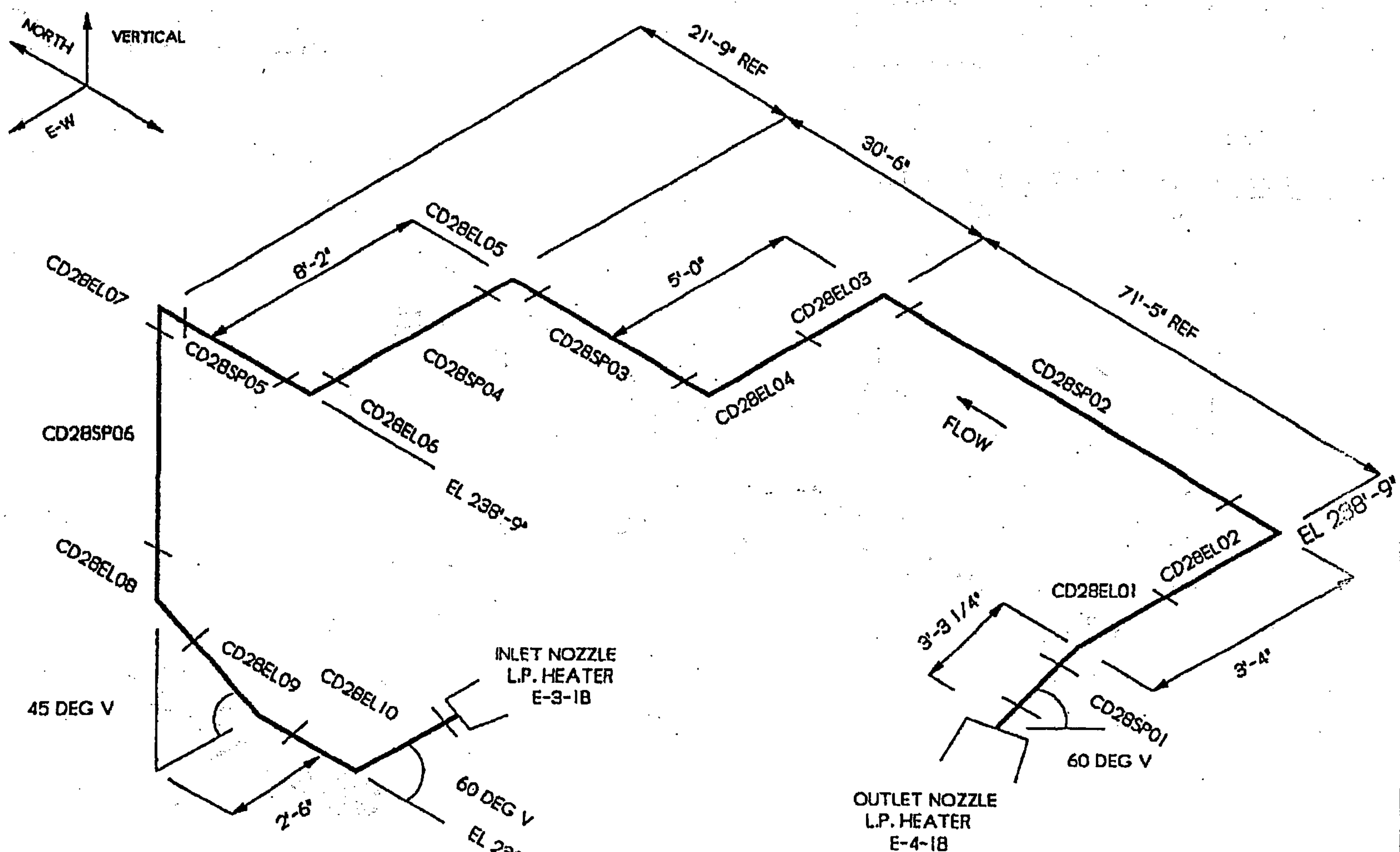
TURBINE BULDING-HEATER BAY
REFERENCES: G191157,G191186,G191187,5920-FS-116,5290-FS-117




REVISION 0: 7/13/90

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINE 20"-C-27 |
| COMPONENT LOCATION SKETCH No.032 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191157,G191186,G191187,5920-FS-116,5920-FS-117

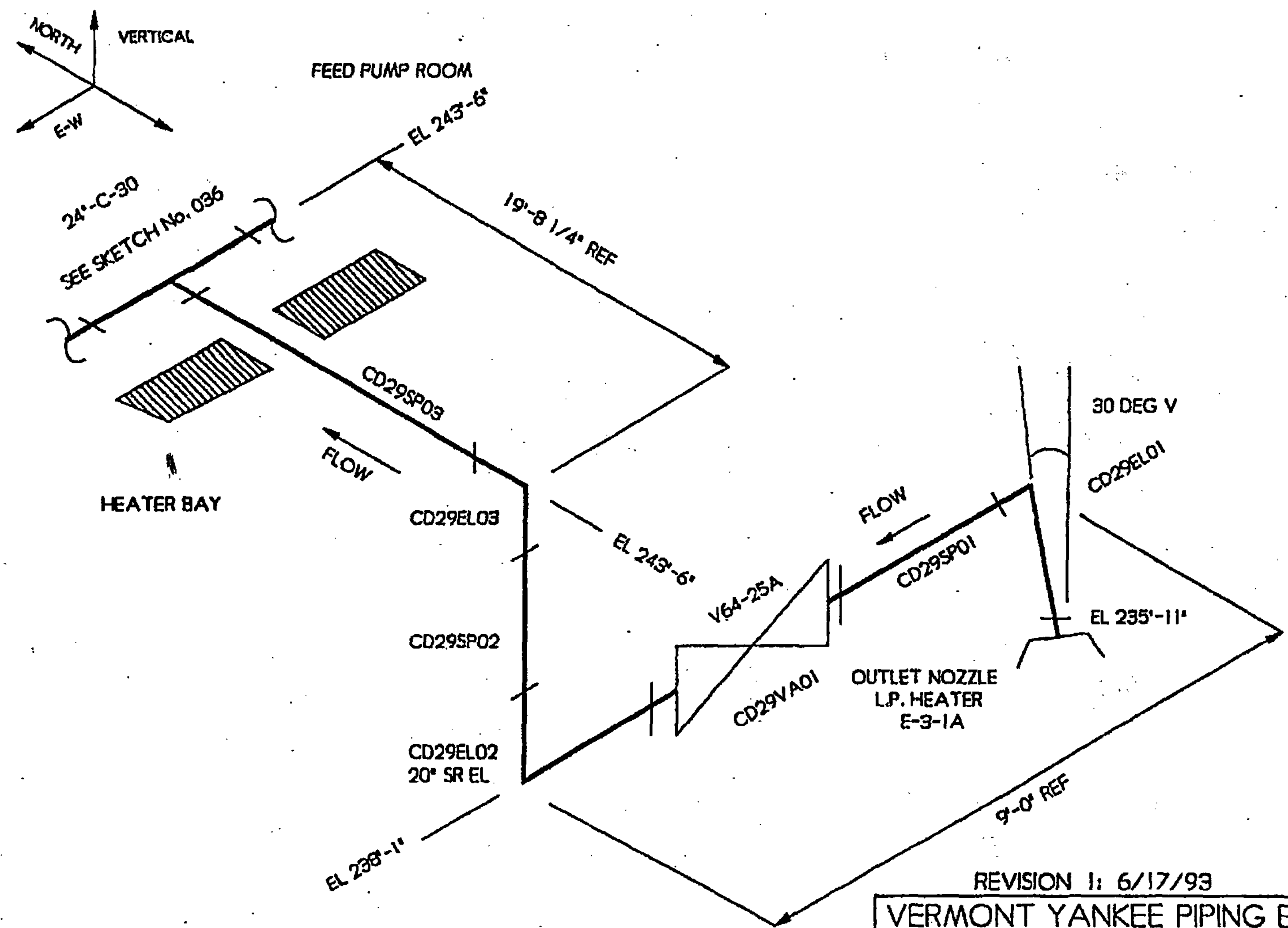



REVISION 0: 7/13/90

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINE 20"-C-28 |
| COMPONENT LOCATION SKETCH No.033 |

TURBINE BULDING-HEATER BAY

REFERENCES: G191157,G191186,G191187,5920-FS-116,5920-FS-117




REVISION 1: 6/17/93

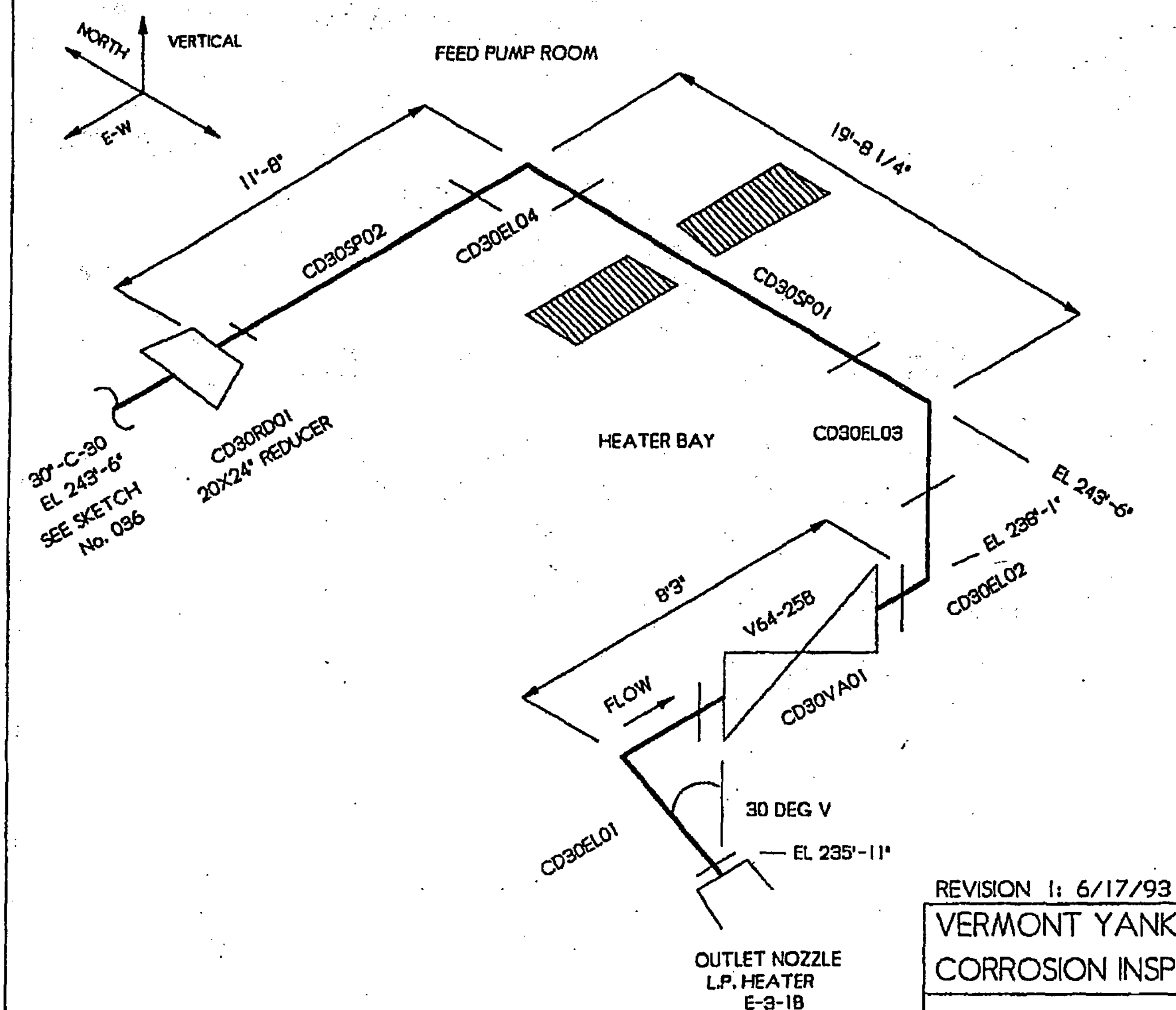
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 20"-C-29

COMPONENT LOCATION SKETCH No.034

TURBINE BULDING-HEATER BAY

REFERENCES: G191157,G191186,G191187,5920-FS-116



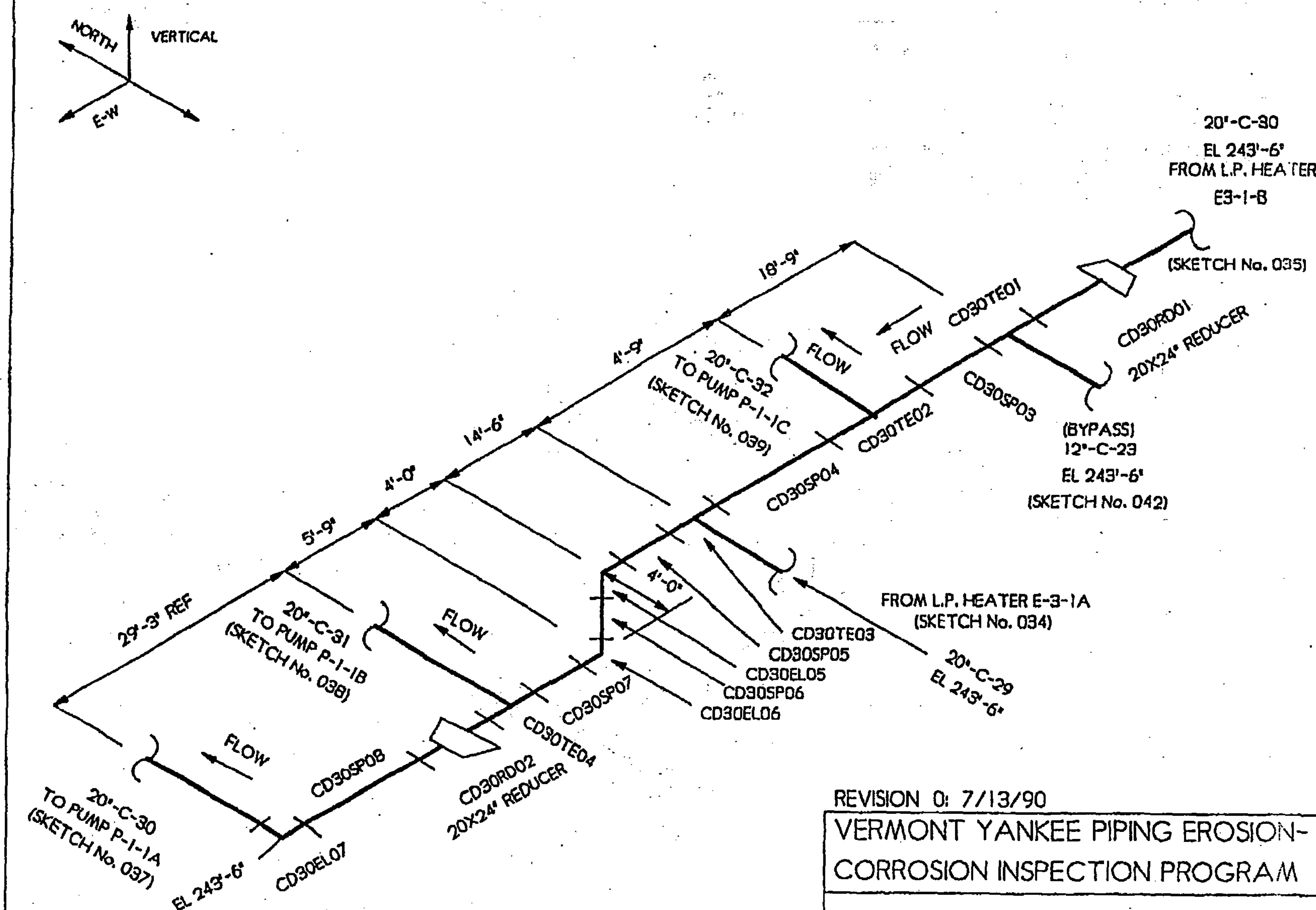

TURBINE BULDING-HEATER BAY
REFERENCES: G191157,G191186,G191187,5920-FS-116

REVISION 1: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 20"-C-30

COMPONENT LOCATION SKETCH No.035




TURBINE BULDING-FEEDWATER PUMP ROOM

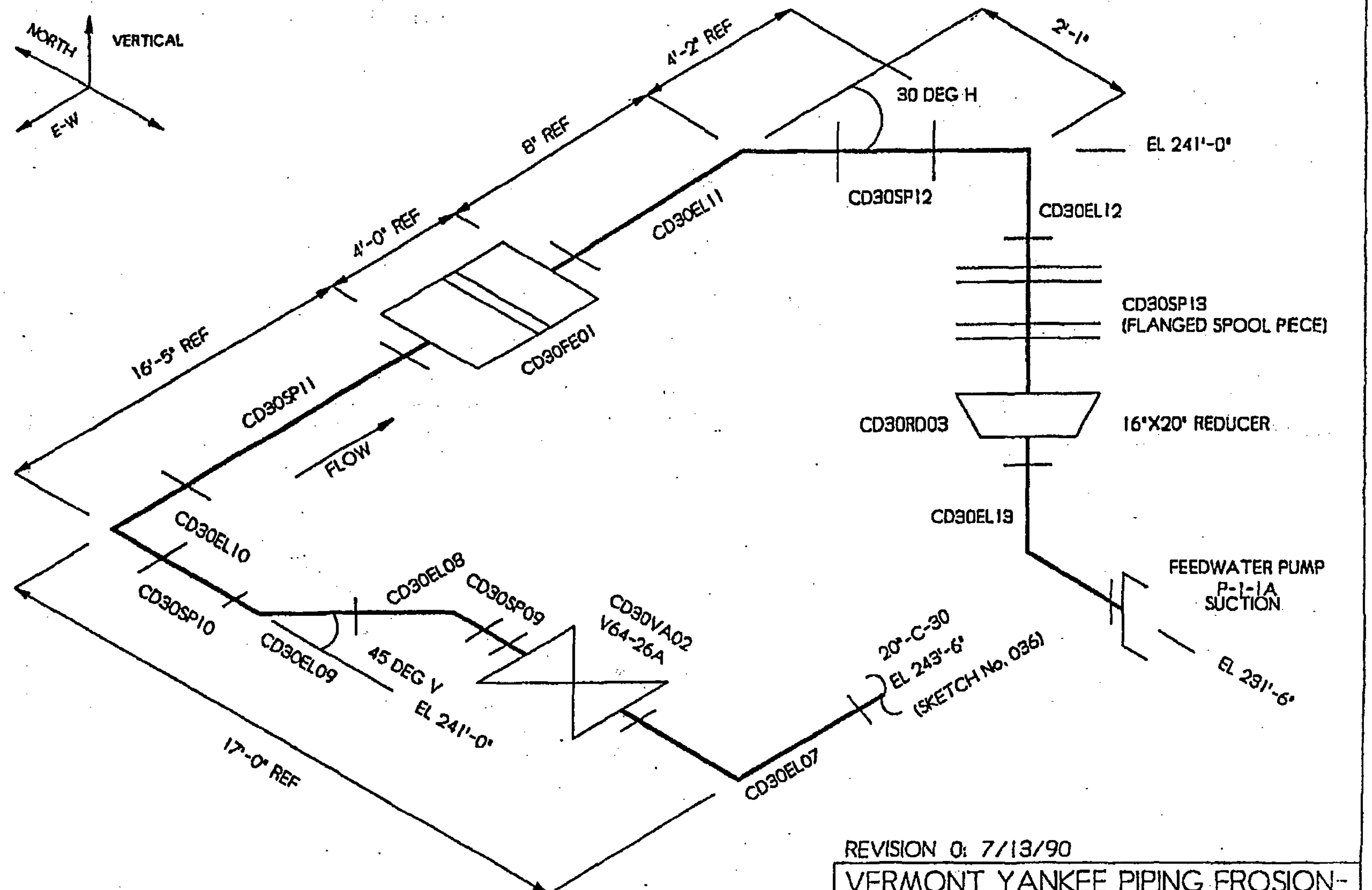
REFERENCES: G191157,G191186,G191187,5920-FS-116

REVISION 0: 7/13/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 24"-C-30

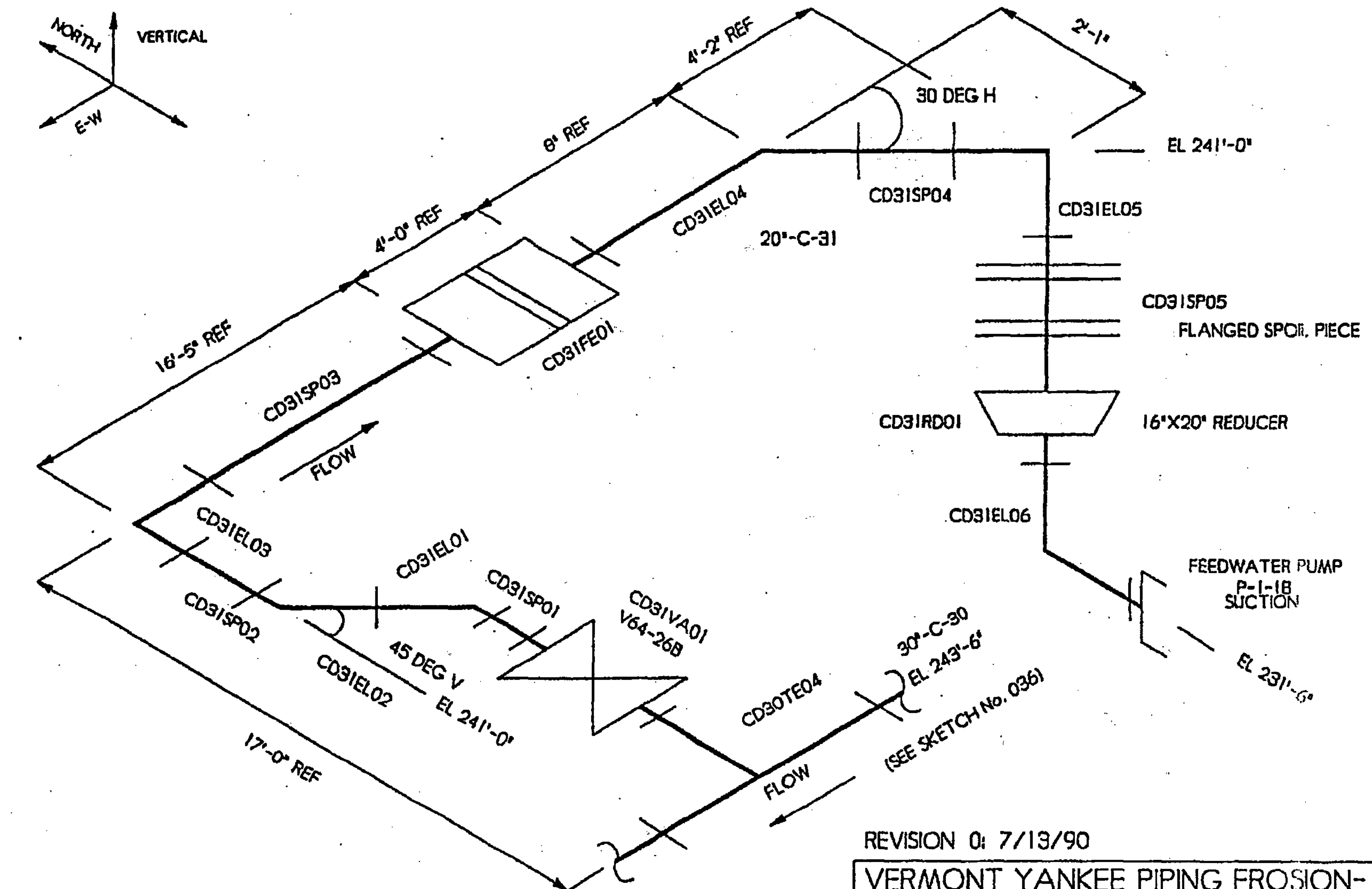
COMPONENT LOCATION SKETCH No. 036




REVISION 0: 7/13/90

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| CONDENSATE LINE 20"-C-30 (CONTINUED) |
| COMPONENT LOCATION SKETCH No. 037 |

TURBINE BULDING-FEEDWATER PUMP ROOM
REFERENCES: G191157,G191186,G191187,5920-FS-116



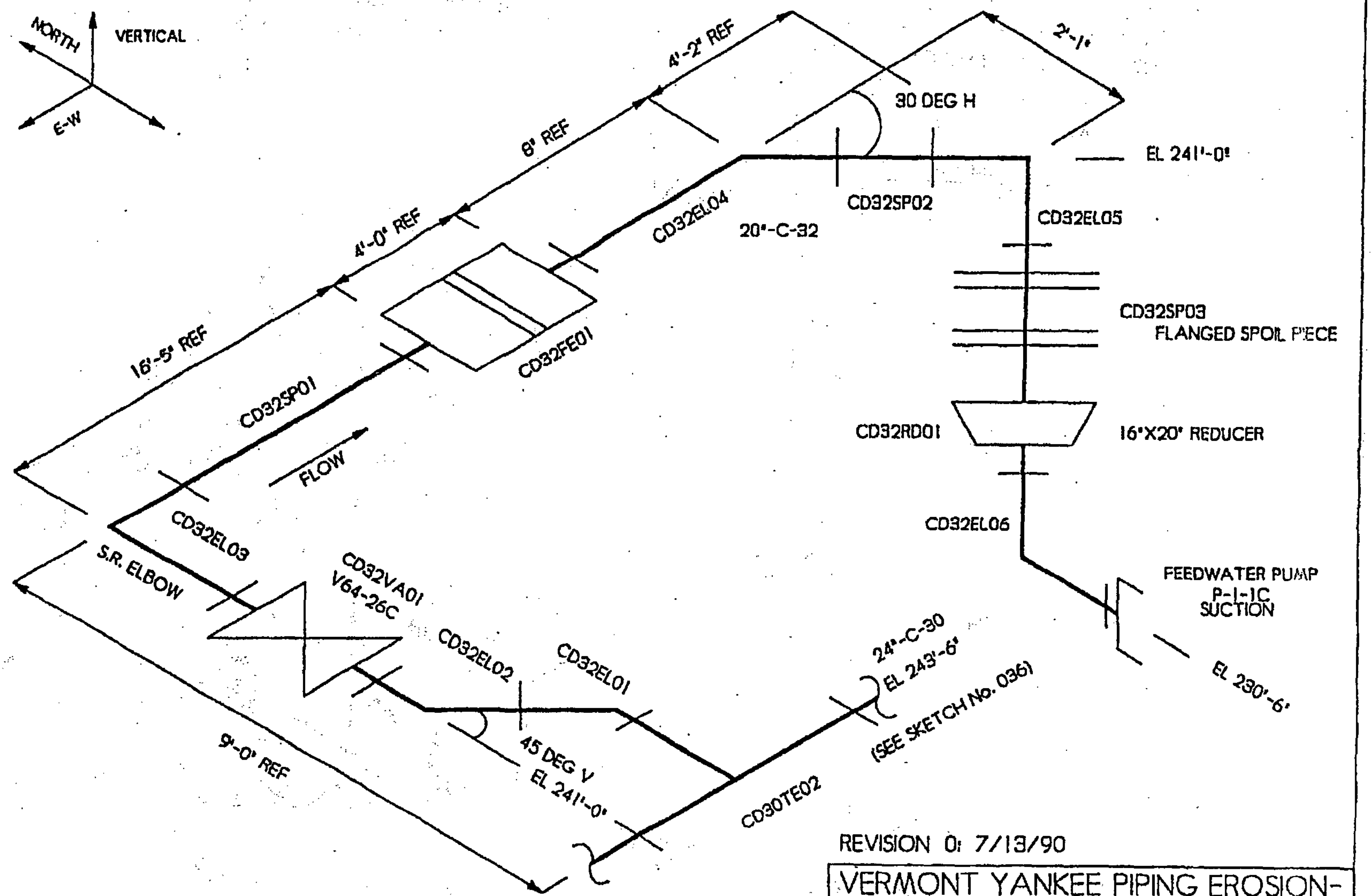

REVISION 0: 7/13/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 20"-C-31

COMPONENT LOCATION SKETCH No. 038

TURBINE BULDING-FEEDWATER PUMP ROOM
REFERENCES: G191157,G191186,G191187,5920-FS-116



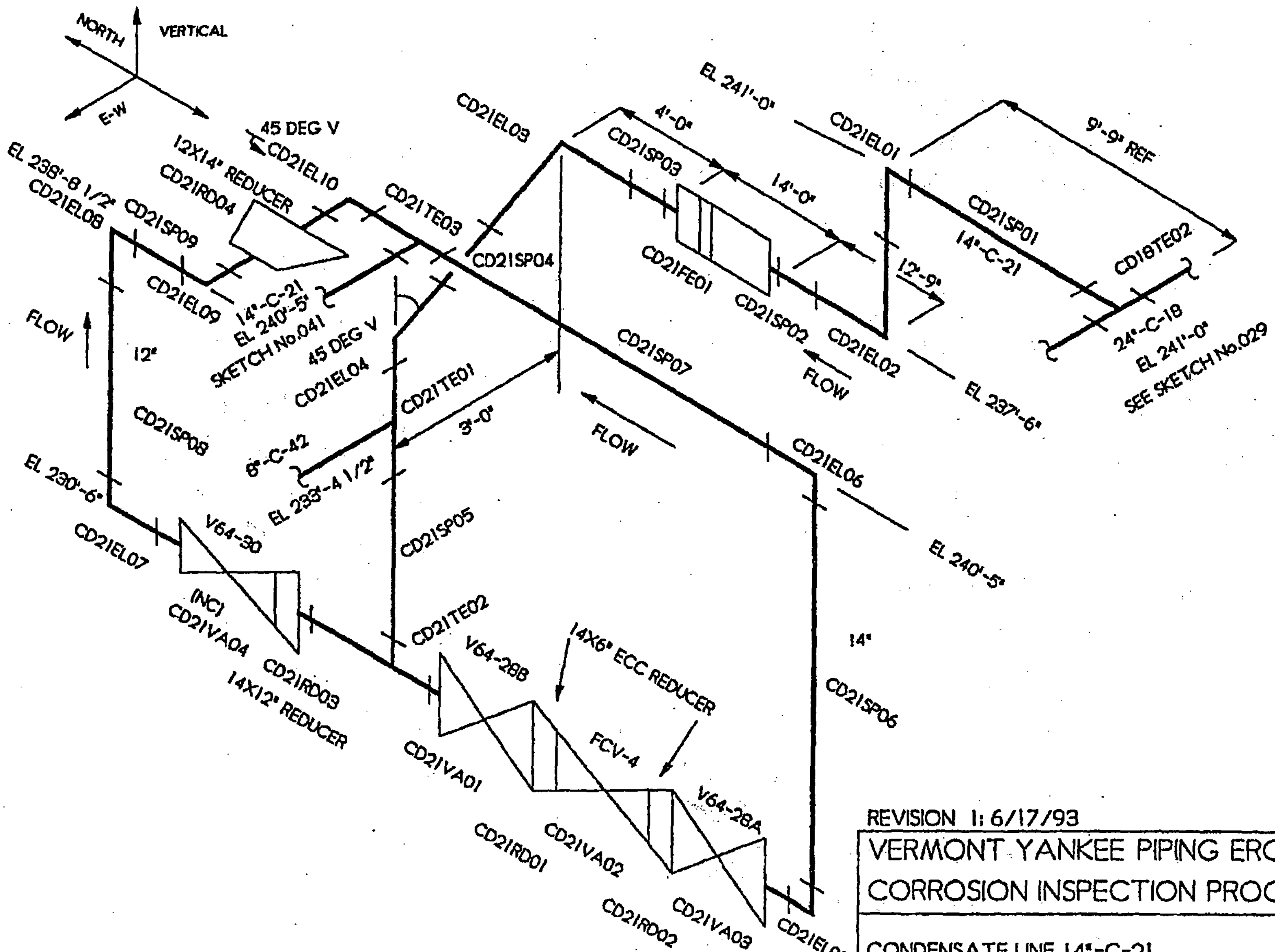

REVISION 0: 7/13/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 20"-C-32

COMPONENT LOCATION SKETCH No. 039

TURBINE BULDING-FEEDWATER PUMP ROOM
REFERENCES: G191157,G191186,G191187,5920-FS-116



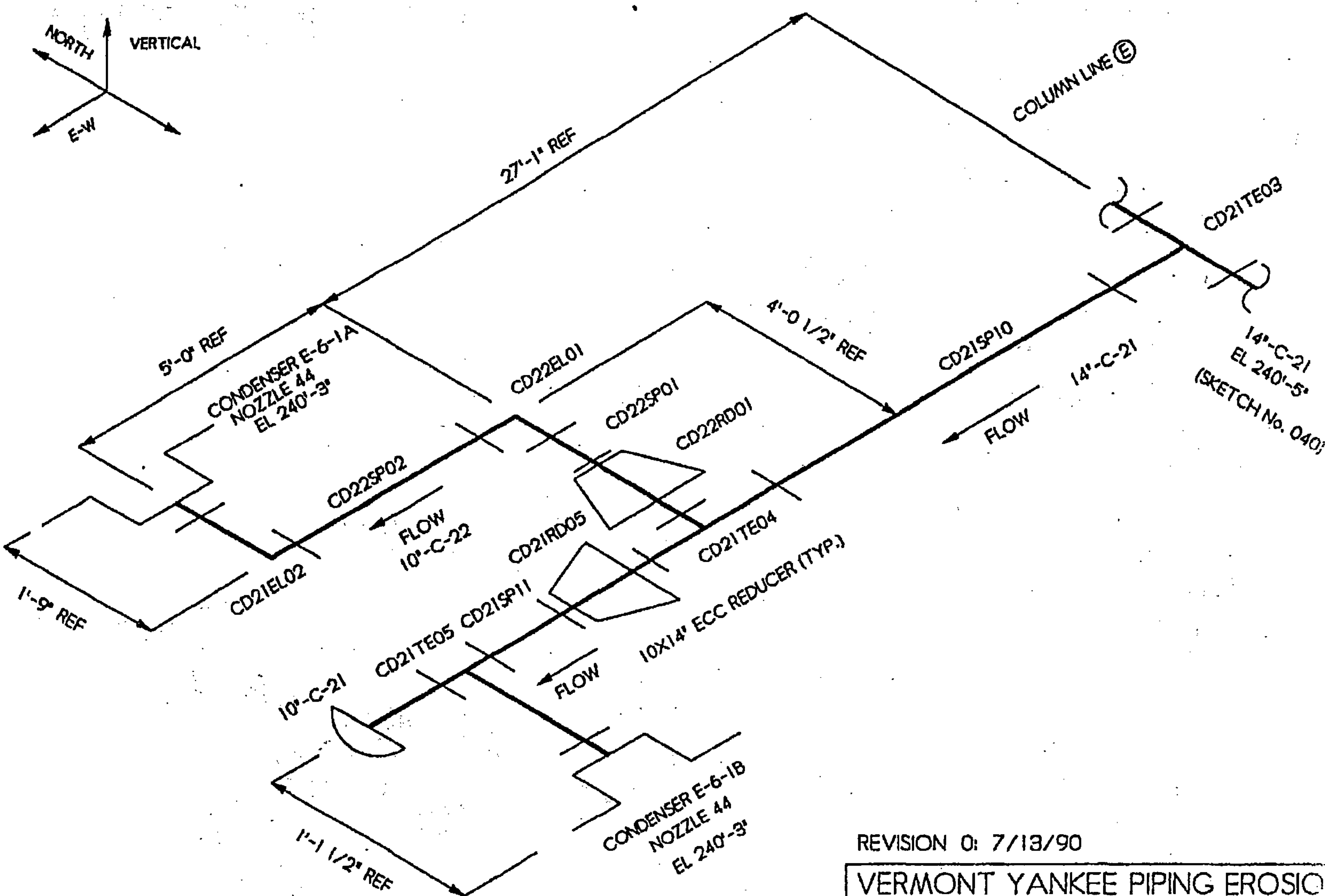

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-135

REVISION 1: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 14"-C-21

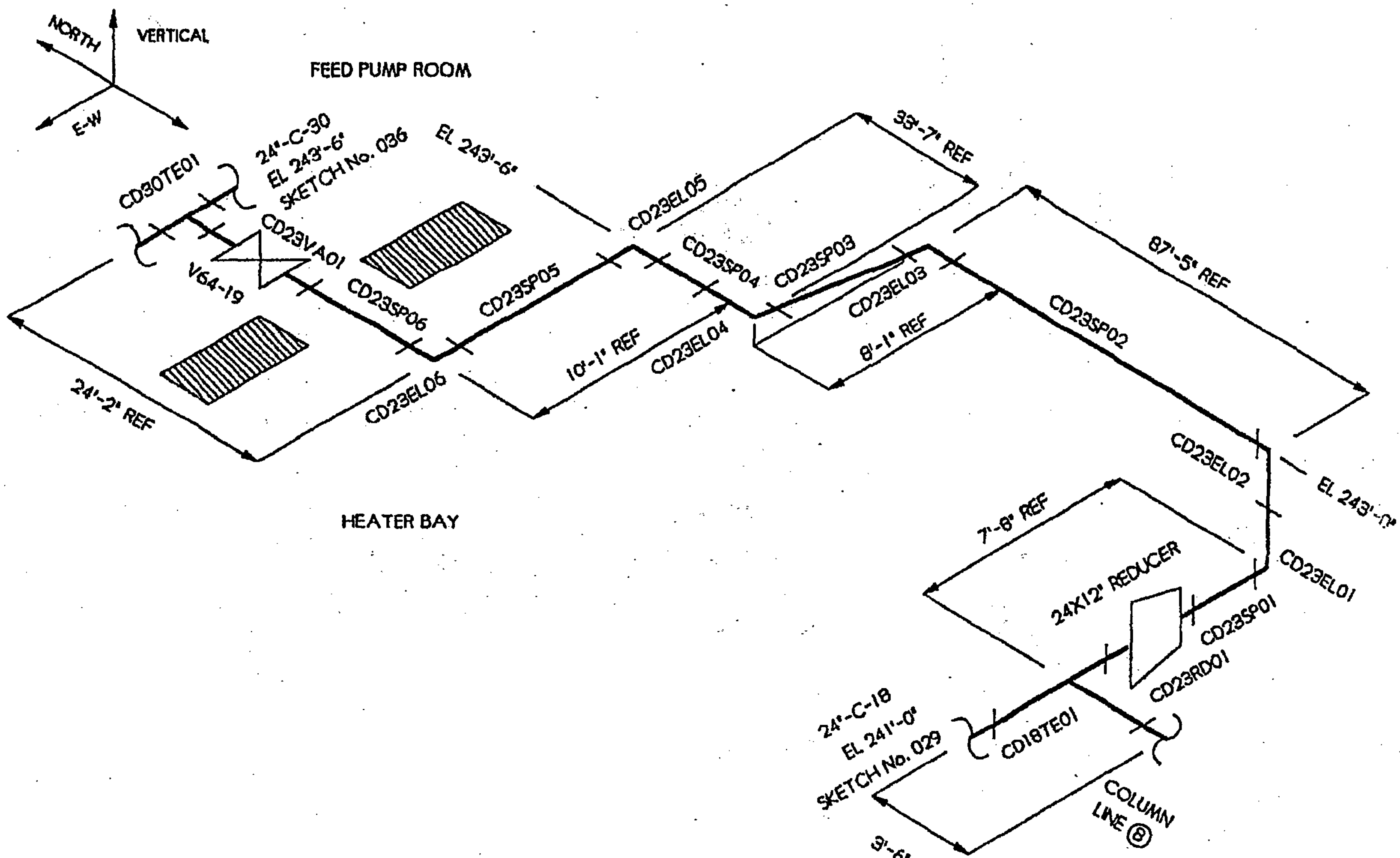
COMPONENT LOCATION SKETCH No.040




REVISION 0: 7/13/90

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| CONDENSATE LINES 14"-C-21, 10"-C-21 AND 10"-C-22 |
| COMPONENT LOCATION SKETCH No.041 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-135



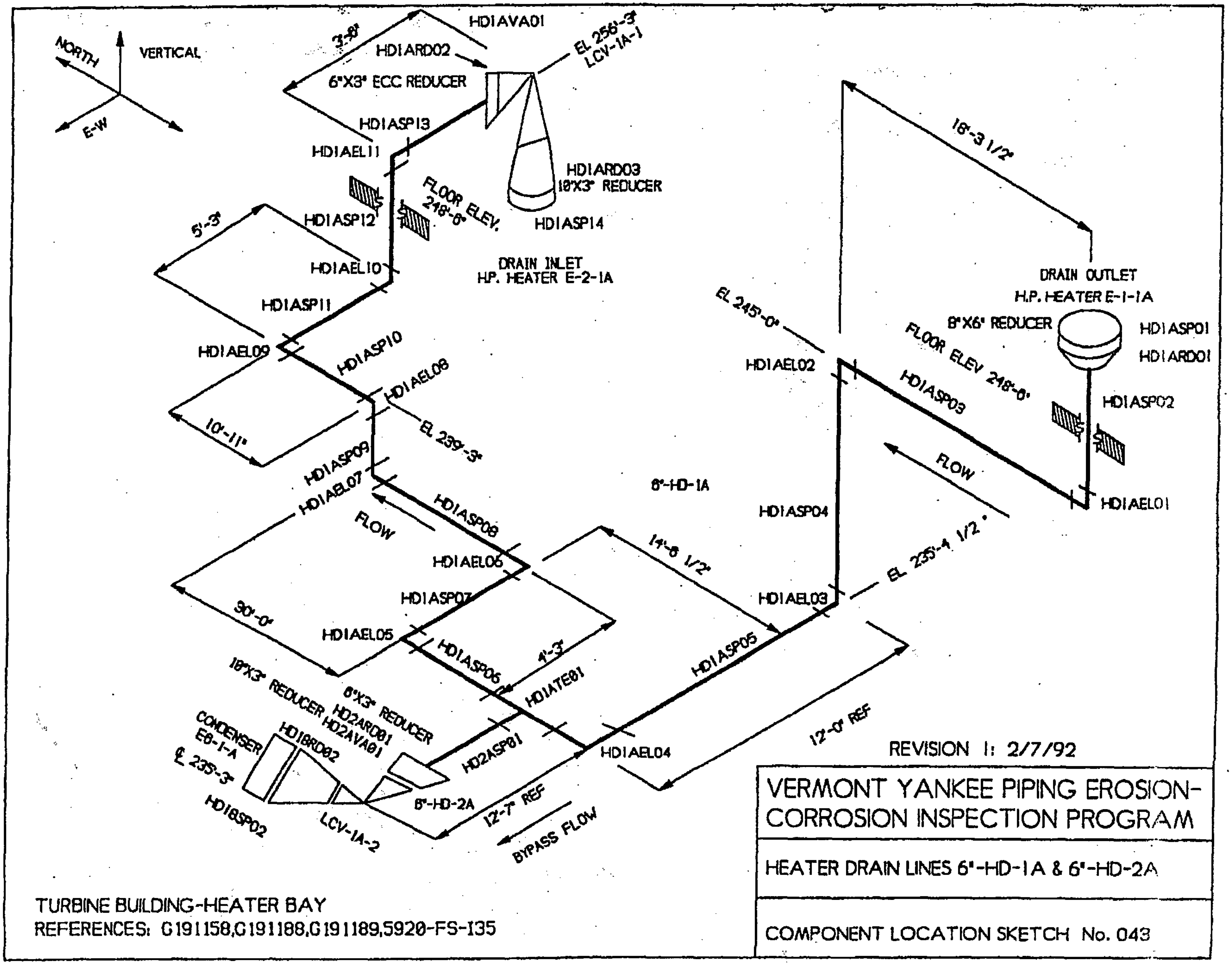

REVISION 0: 7/13/90

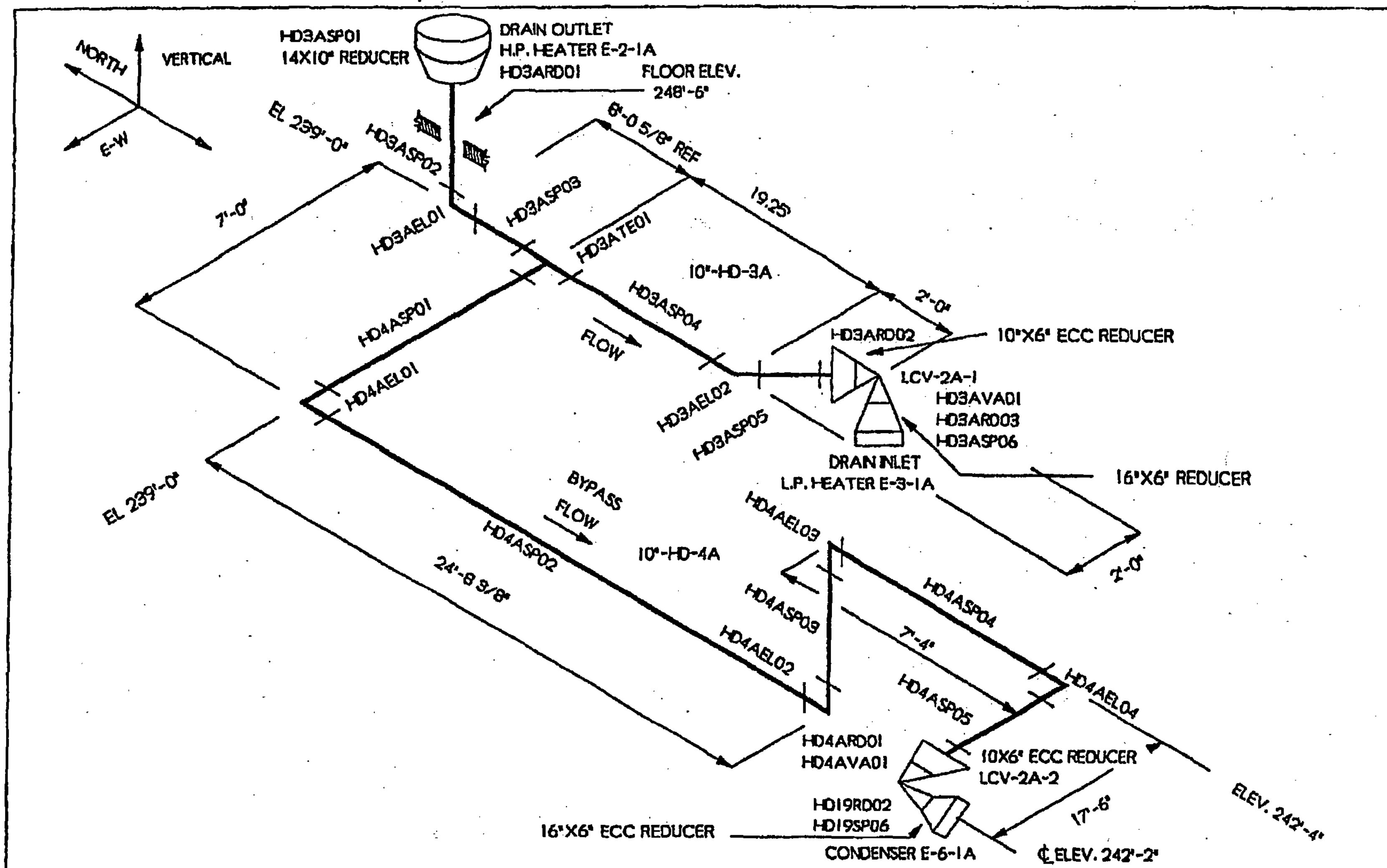
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 12"-C-23

COMPONENT LOCATION SKETCH No.042

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-135


NORTH
VERTICAL
E-W
3'-8"
HD1AVA01
HD1ARD02
EL 256'-3"
LCV-1A-1
6"X3" ECC REDUCER
HD1ASP13
HD1AEL11
HD1ARD03
10"X3" REDUCER
FLOOR ELEV. 248'-6"
HD1ASP12
HD1ASP14
5'-3"
HD1AEL10
DRAIN INLET
H.P. HEATER E-2-1A
HD1ASP11
HD1AEL09
HD1ASP10
HD1AEL08
10'-11"
EL 239'-3"
HD1ASP09
HD1AEL07
FLOW
HD1ASP08
HD1AEL06
30'-0"
HD1ASP07
HD1AEL05
HD1ASP06
4'-3"
HD1ATE01
10"X3" REDUCER
6"X3" REDUCER
HD2ARD01
HD2AVA01
CONDENSER
E8-1-A
℄ 235'-3"
HD1BRD02
HD1BSP02
LCV-1A-2
HD2ASP01
6"-HD-2A
12'-7" REF
BYPASS FLOW
6"-HD-1A
14'-6 1/2"
HD1ASP05
HD1AEL04
12'-0" REF
HD1AEL03
EL 235'-4 1/2"
HD1ASP04
EL 245'-0"
HD1AEL02
HD1ASP03
FLOOR ELEV 248'-6"
FLOW
18'-3 1/2"
DRAIN OUTLET
H.P. HEATER E-1-1A
8"X6" REDUCER
HD1ASP01
HD1ARD01
HD1ASP02
HD1AEL01
REVISION 1: 2/7/92
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
HEATER DRAIN LINES 6"-HD-1A & 6"-HD-2A
COMPONENT LOCATION SKETCH No. 043
TURBINE BUILDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-135



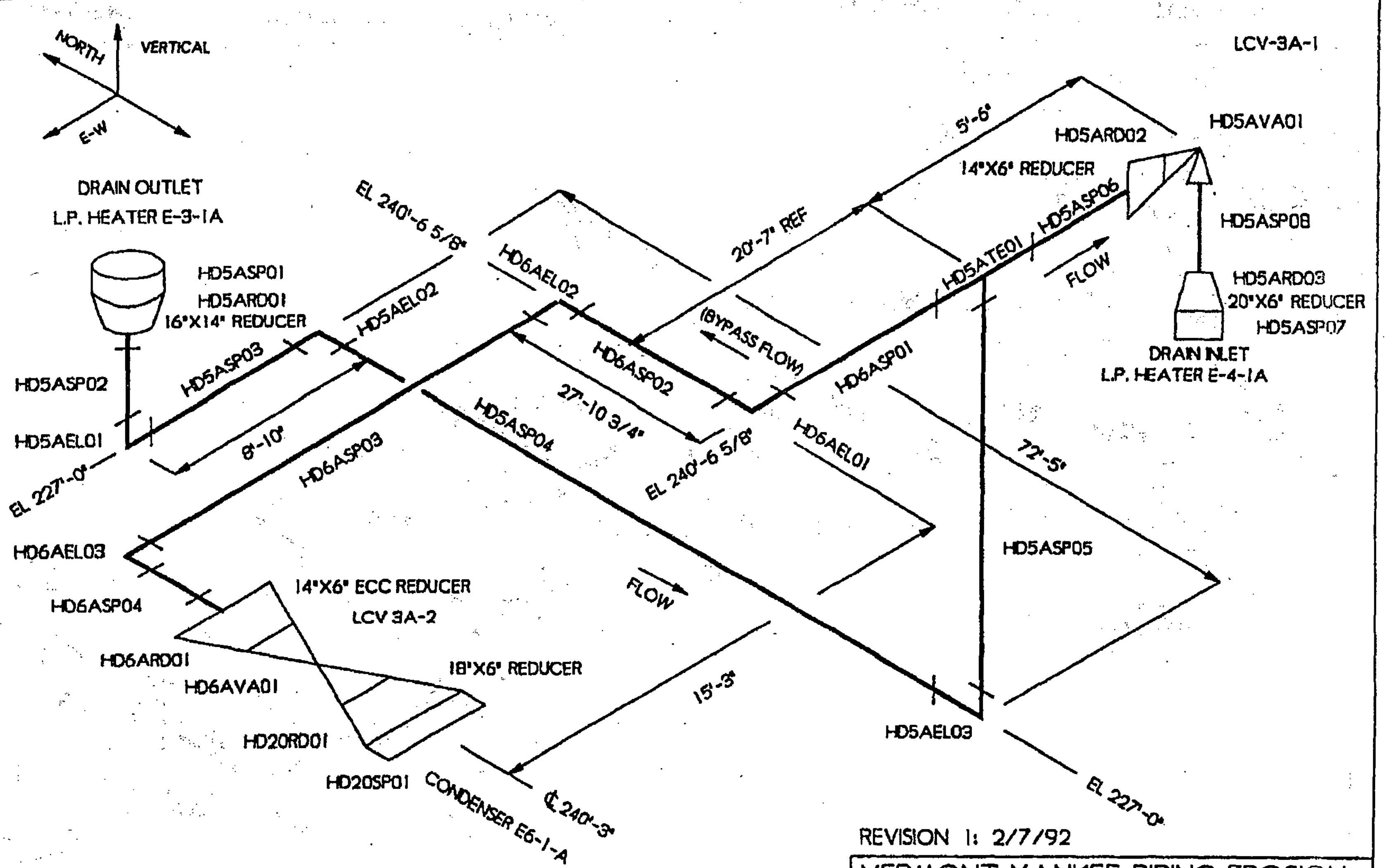

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-15

REVISION 2: 6/17/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 10"-HD-3A & 10"-HD-4A

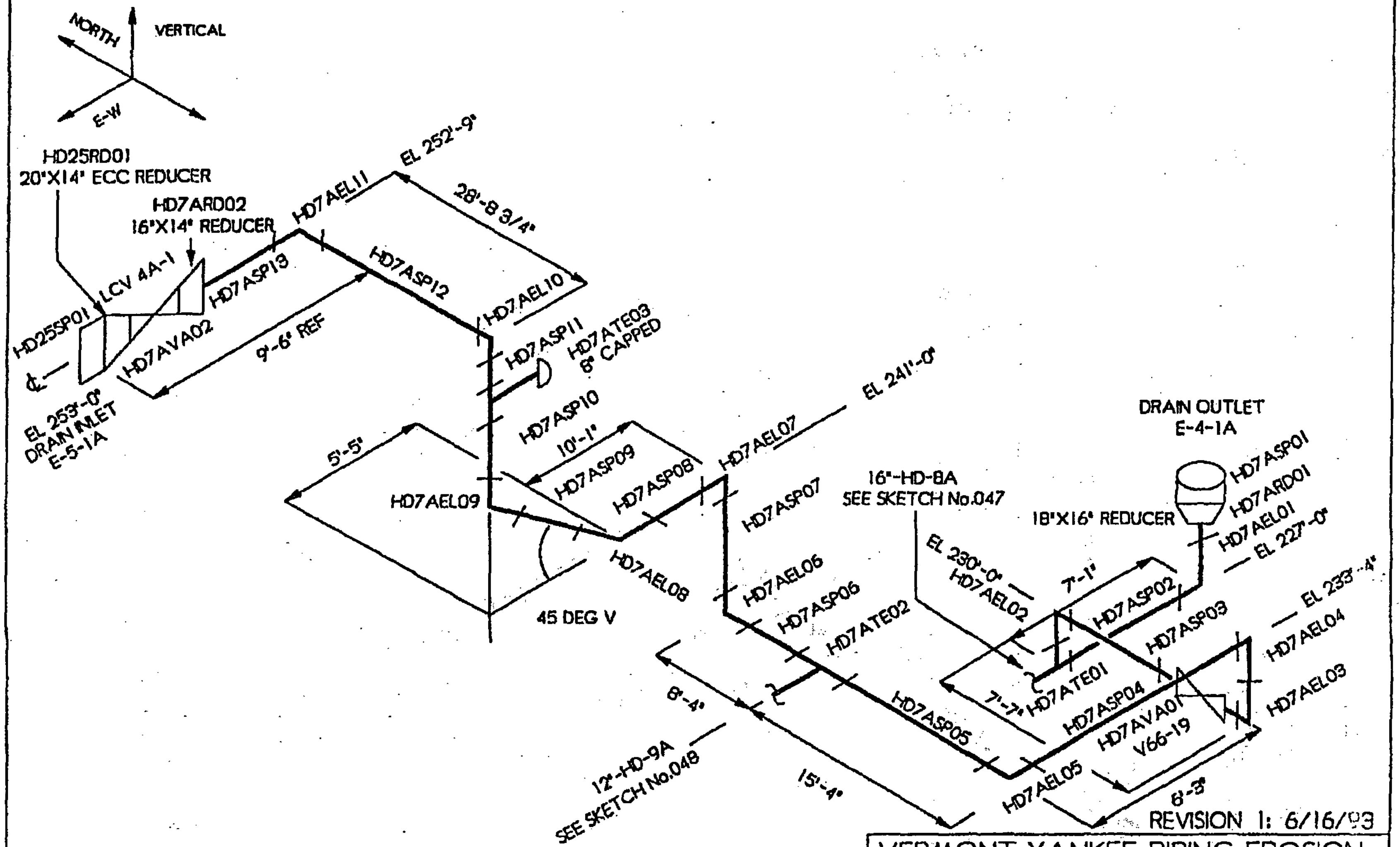
COMPONENT LOCATION SKETCH No. 044




REVISION 1: 2/7/92

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINES 14"-HD-5A & 14"-HD-6A |
| COMPONENT LOCATION SKETCH No. 045 |

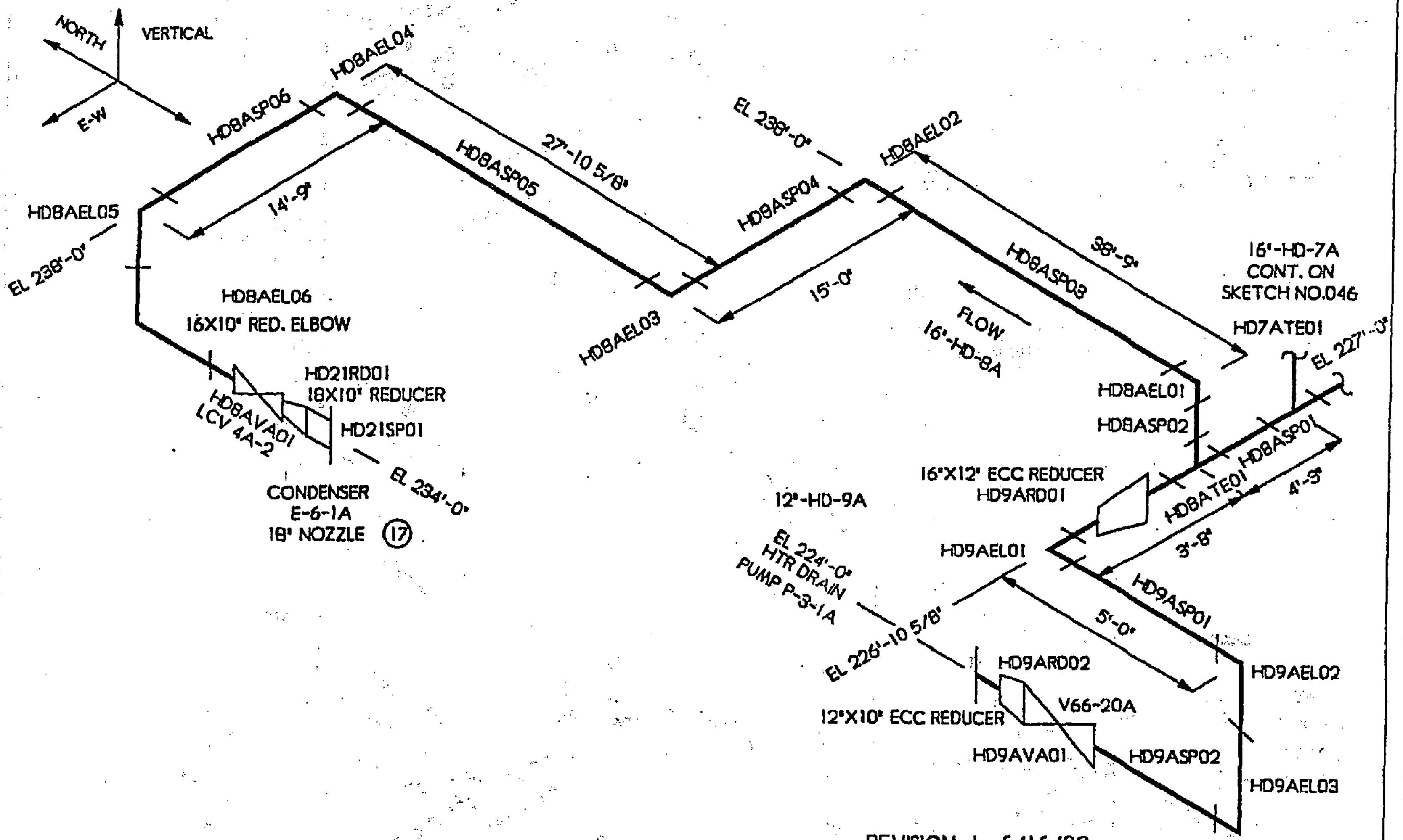
TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-I35




REVISION 1: 6/16/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| HEATER DRAIN LINES 16"-HD-7A & 20"-HD-25A |
| COMPONENT LOCATION SKETCH No.046 |

TURBINE BUILDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-I35



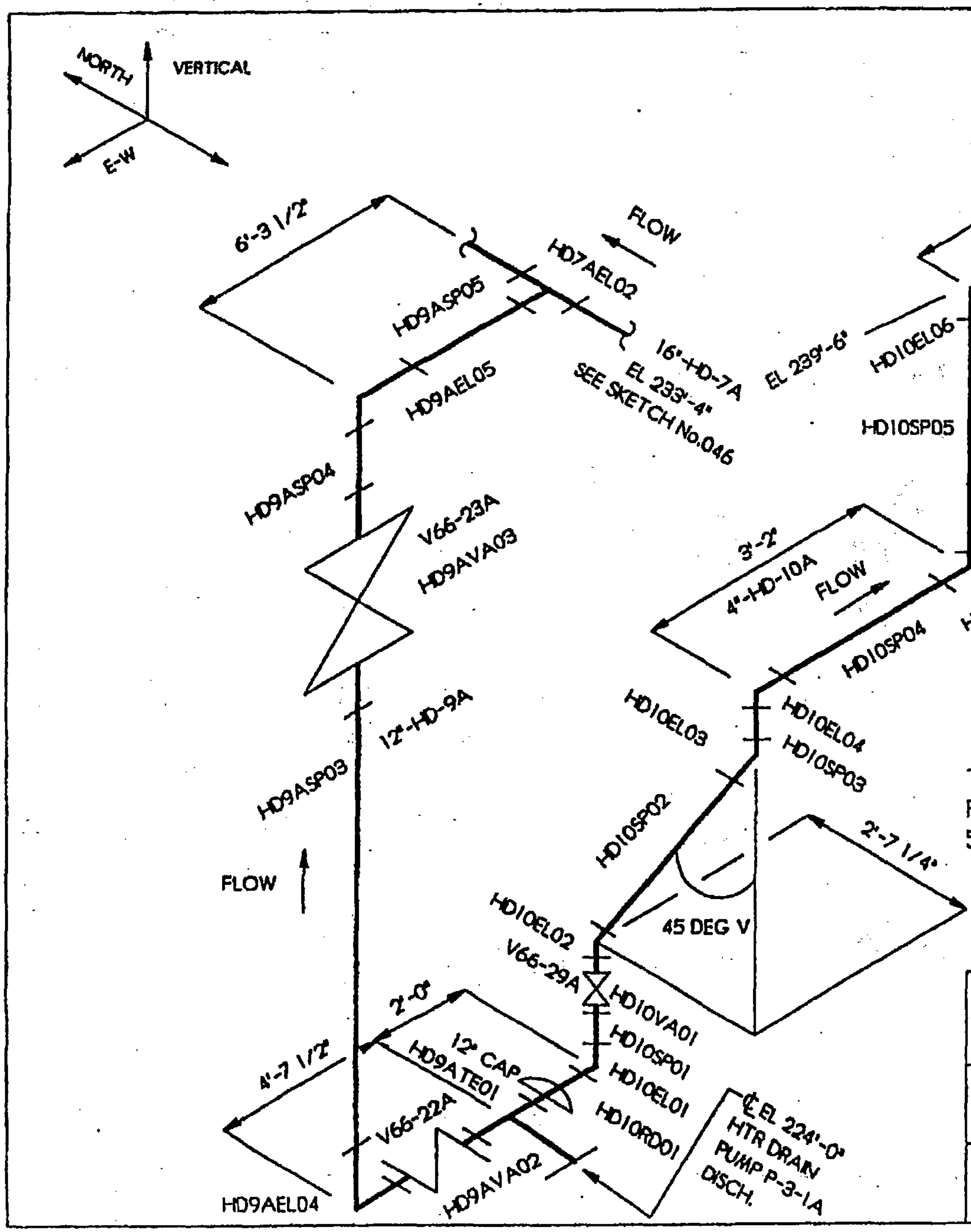

REVISION 1: 6/16/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 16"-HD-8A, 12"-HD-9A
18"-HD-21A

COMPONENT LOCATION SKETCH No.047

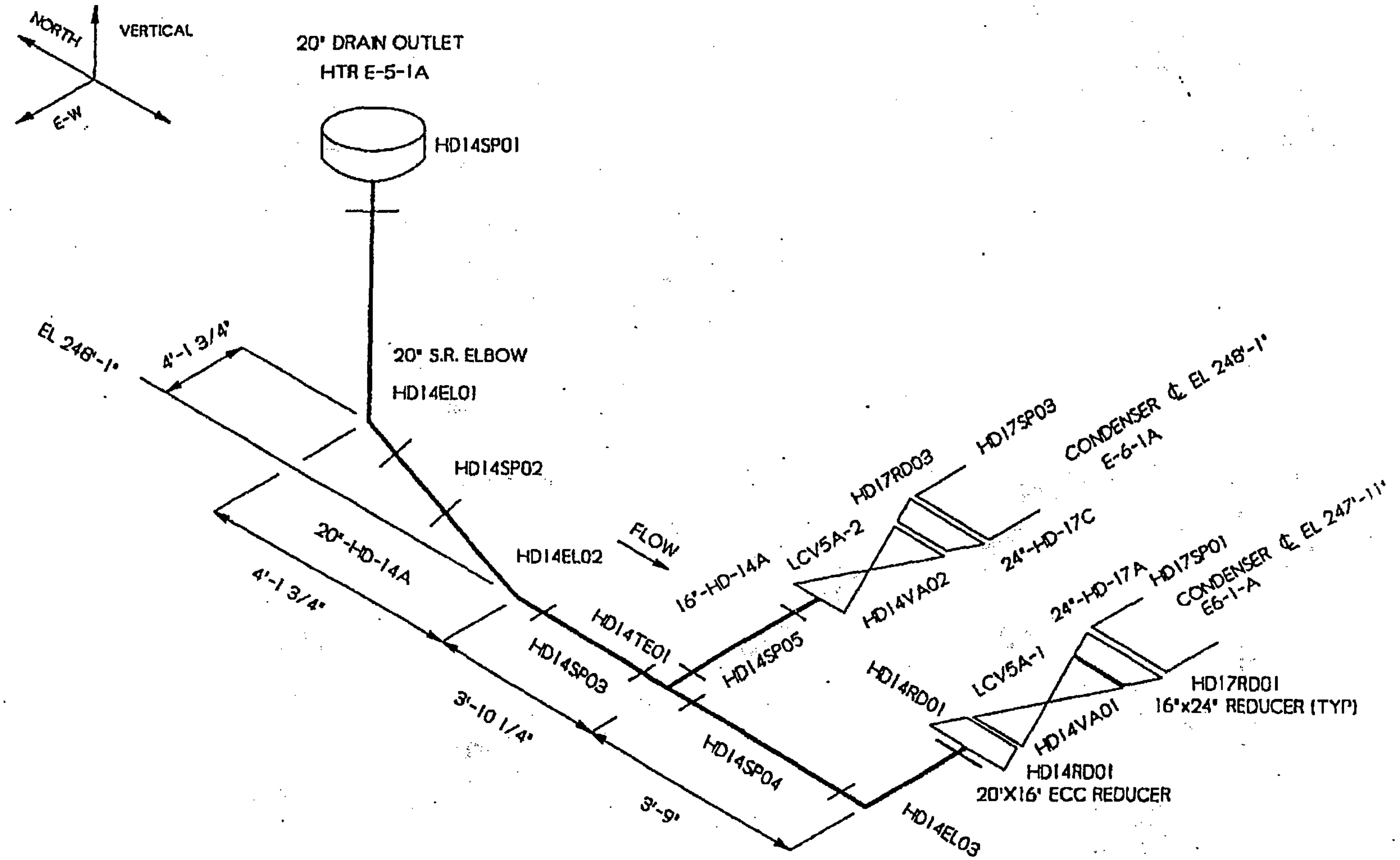
TURBINE BUILDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-135




TURBINE BUILDING-HEATER BAY
REFERENCES: G191158, G191188, G191189
5920-FS-135

REVISION 1: 2/7/92

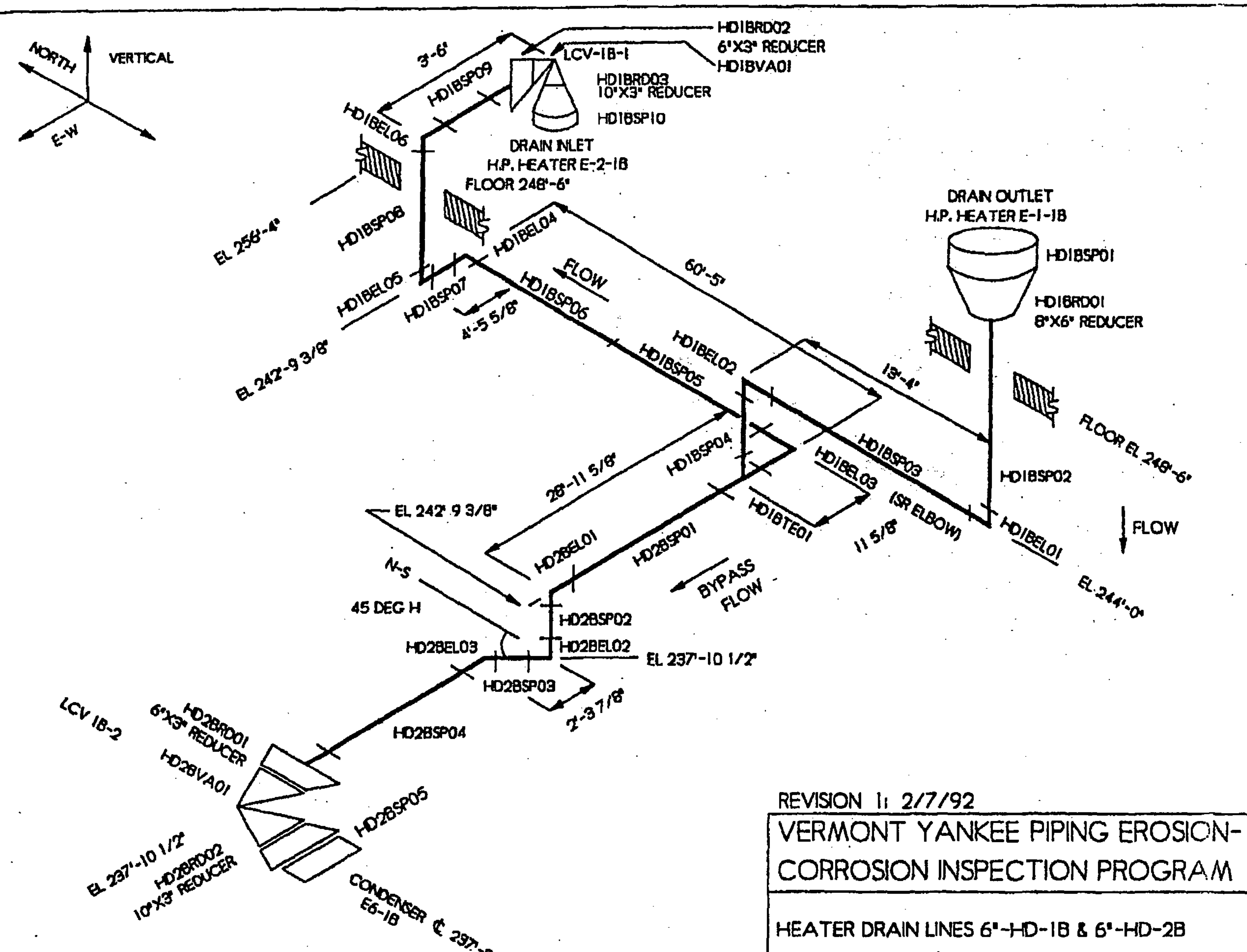
| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINES 12"-HD-9A & 4"-HD-10A |
| COMPONENT LOCATION SKETCH No.048 |




REVISION 0: 7/18/90

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| HEATER DRAIN LINES 20"-HD-14A, 16"-HD-14A AND 24"-HD-17A & C |
| COMPONENT LOCATION SKETCH No.049 |

REFERENCES: G191158,G191188,G191189,5920-FI-15

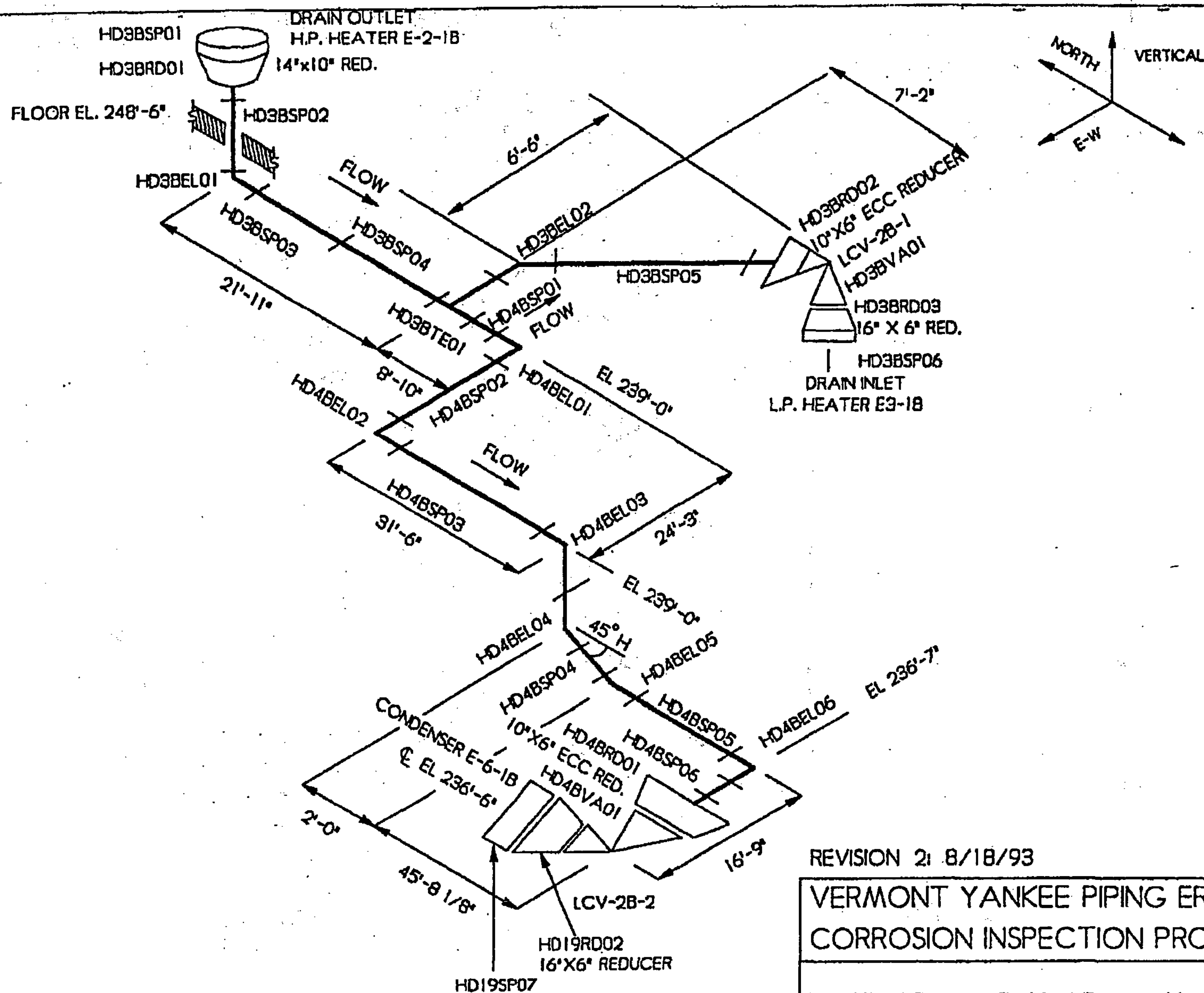



TURBINE BUILDING-HEATER BAY

REFERENCES: G191158, G191188, G191189, 5920-FS-I35

REVISION 1: 2/7/92

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| HEATER DRAIN LINES 6"-HD-1B & 6"-HD-2B |
| COMPONENT LOCATION SKETCH No.050 |



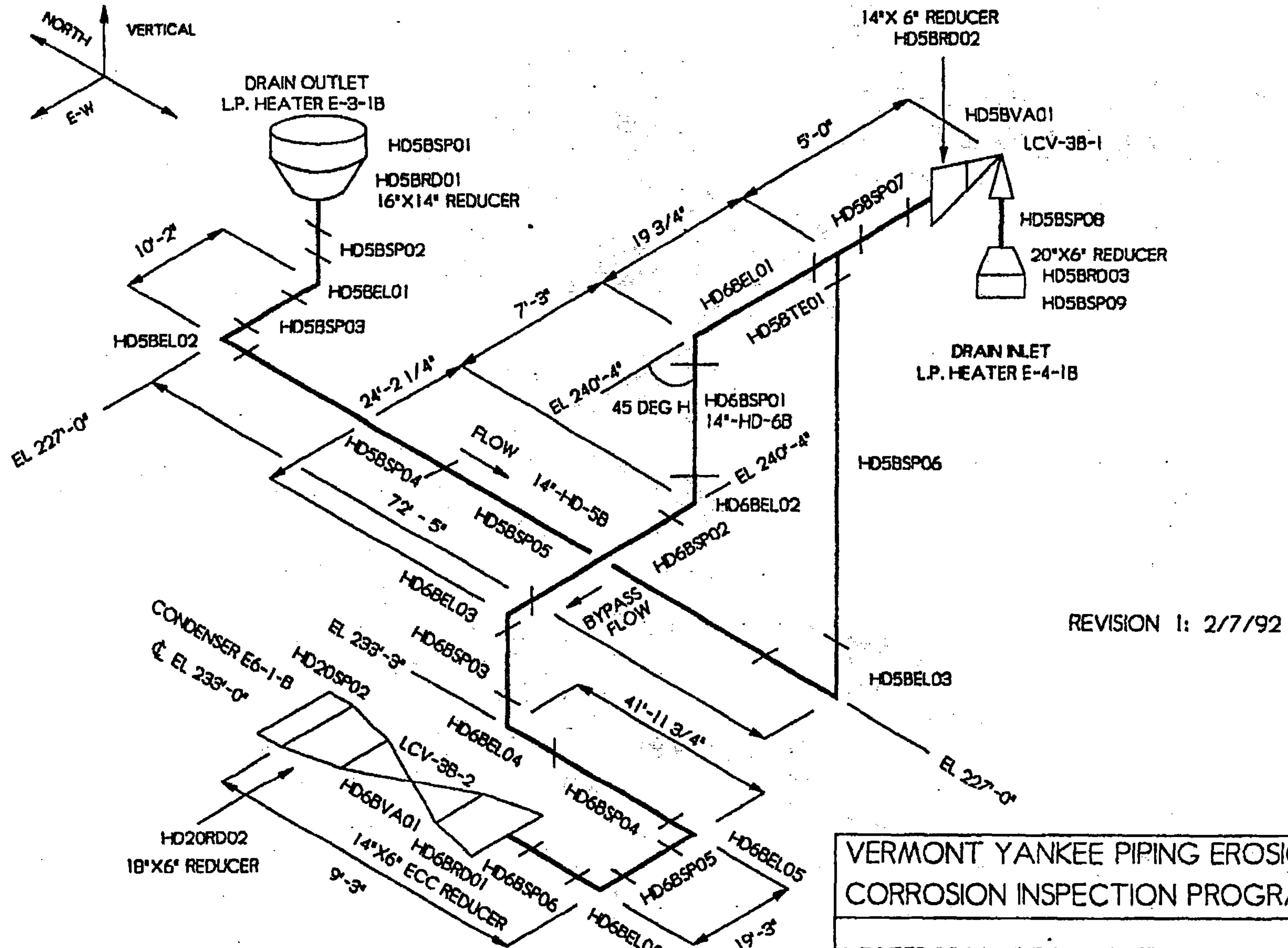

TURBINE BUILDING-HEATER BAY
REFERENCES: G191158, G191188, G191189, 5920-FS-135

REVISION 2: 8/18/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 10"-HD-3B & 10"-HD-4B

COMPONENT LOCATION SKETCH No. 051

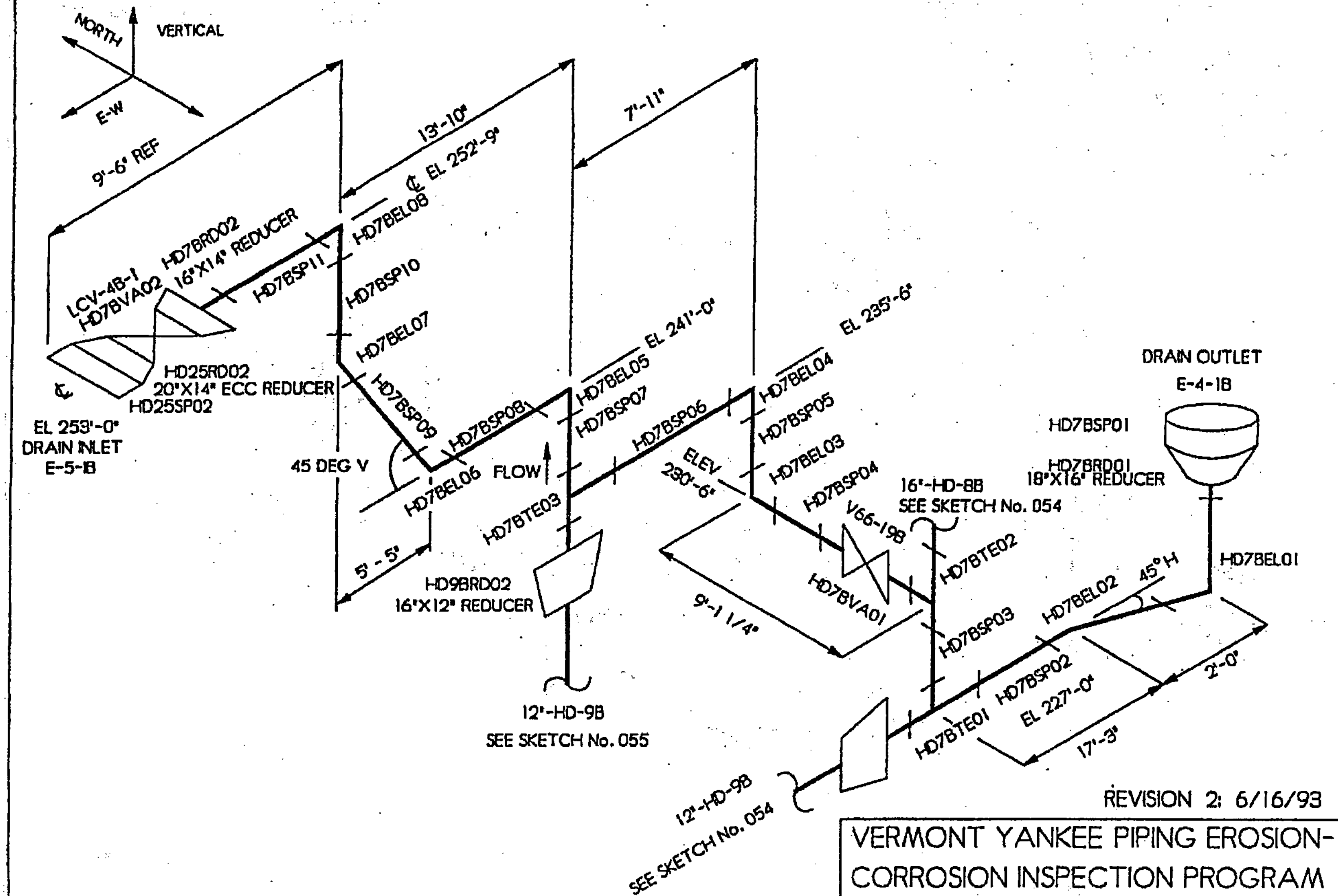



REVISION 1: 2/7/92

TURBINE BULDING-HEATER BAY

REFERENCES: G191158,G191188,G191189,5920-FS-1 35

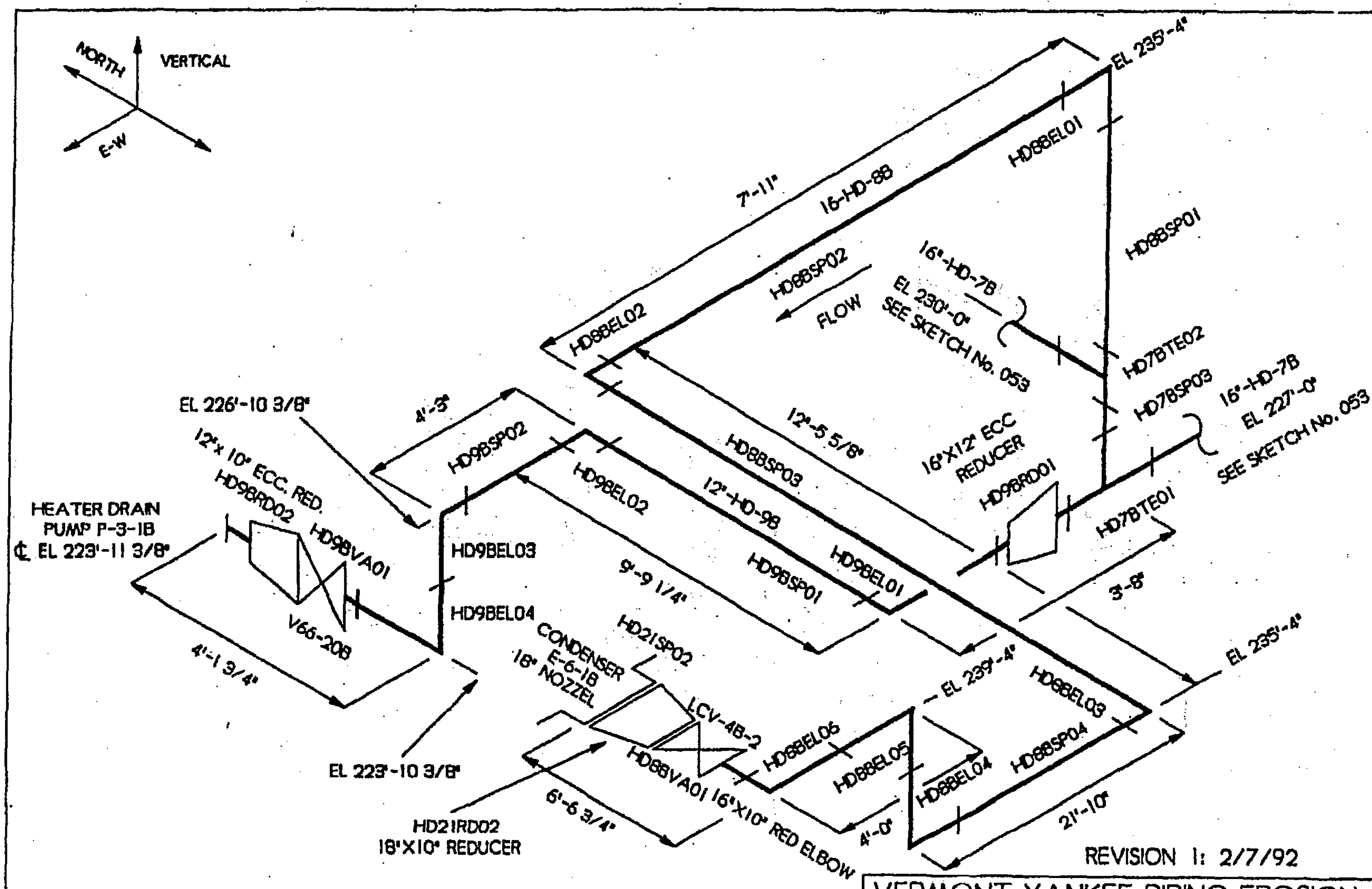
| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINE 14"-HD-5B & 14"-HD-6B |
| COMPONENT LOCATION SKETCH No.052 |




REVISION 2: 6/16/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| HEATER DRAIN LINES 16"-HD-7B & 20"-HD-25B |
| COMPONENT LOCATION SKETCH No.053 |

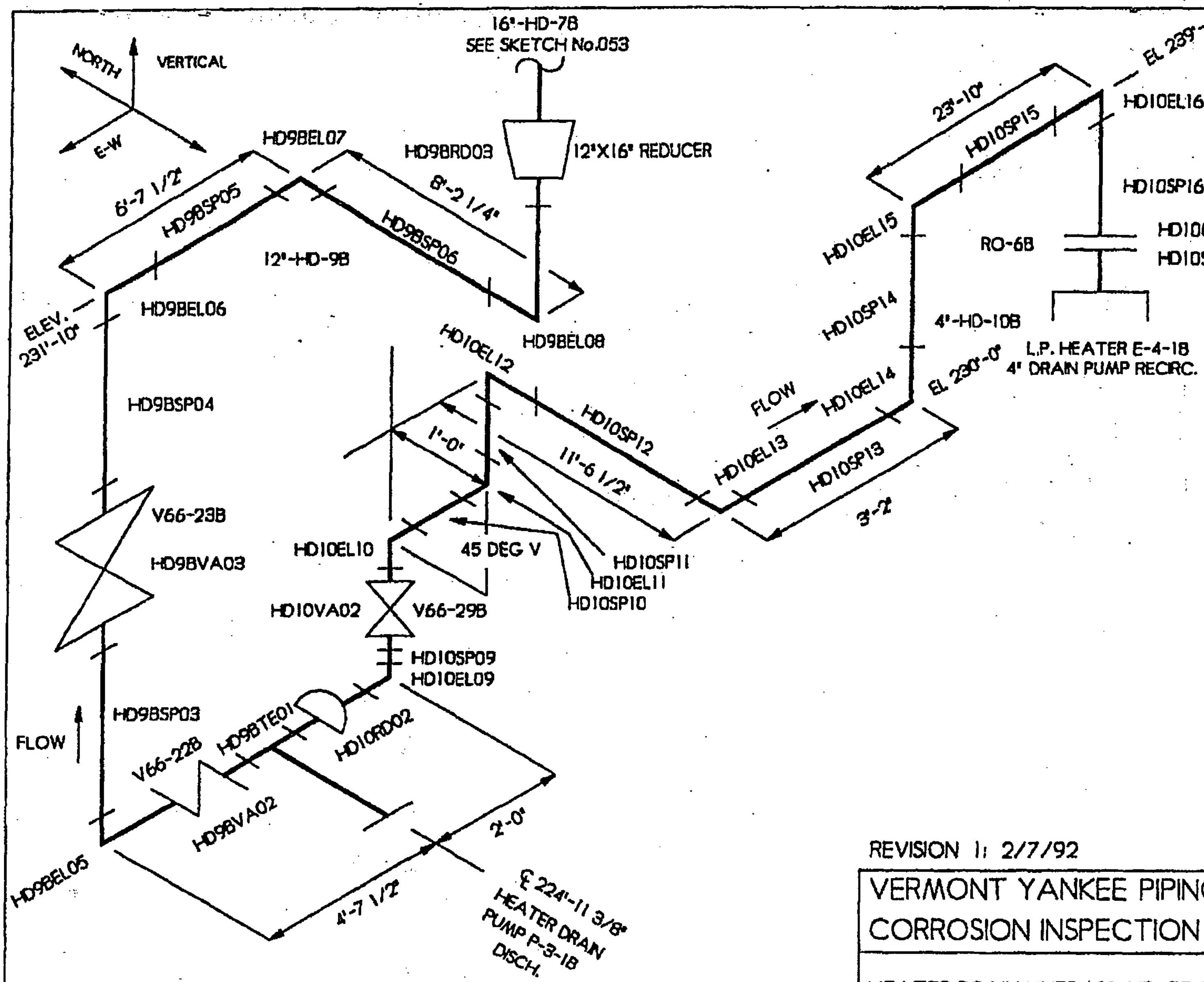
TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-15




REVISION 1: 2/7/92

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-I35

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINES 16"-HD-8B, 12"-HD-9B AND 18"-HD-21B |
| COMPONENT LOCATION SKETCH No. 054 |



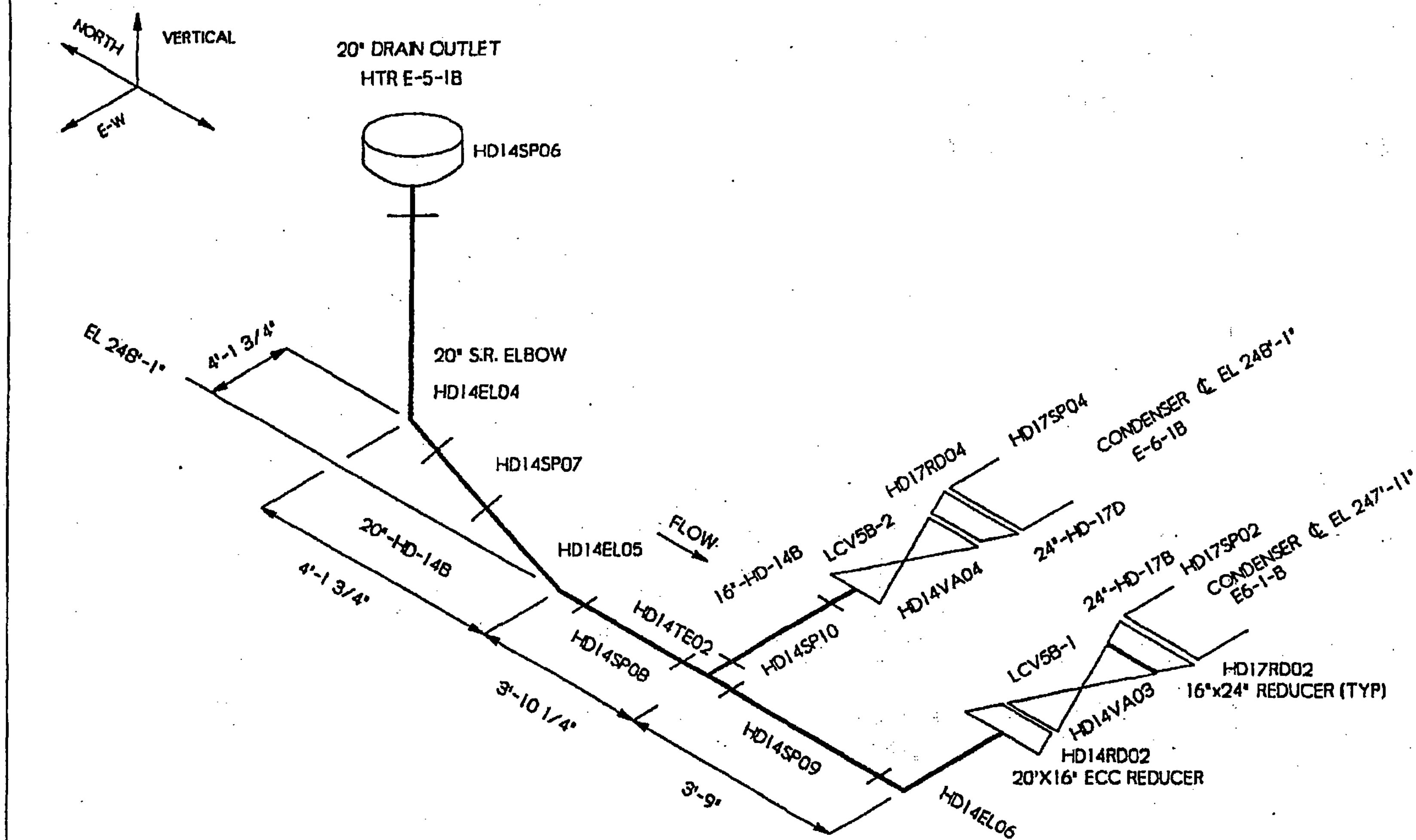

REVISION 1: 2/7/92

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 12"-HD-9B & 4"-HD-10B

COMPONENT LOCATION SKETCH No. 055

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-15



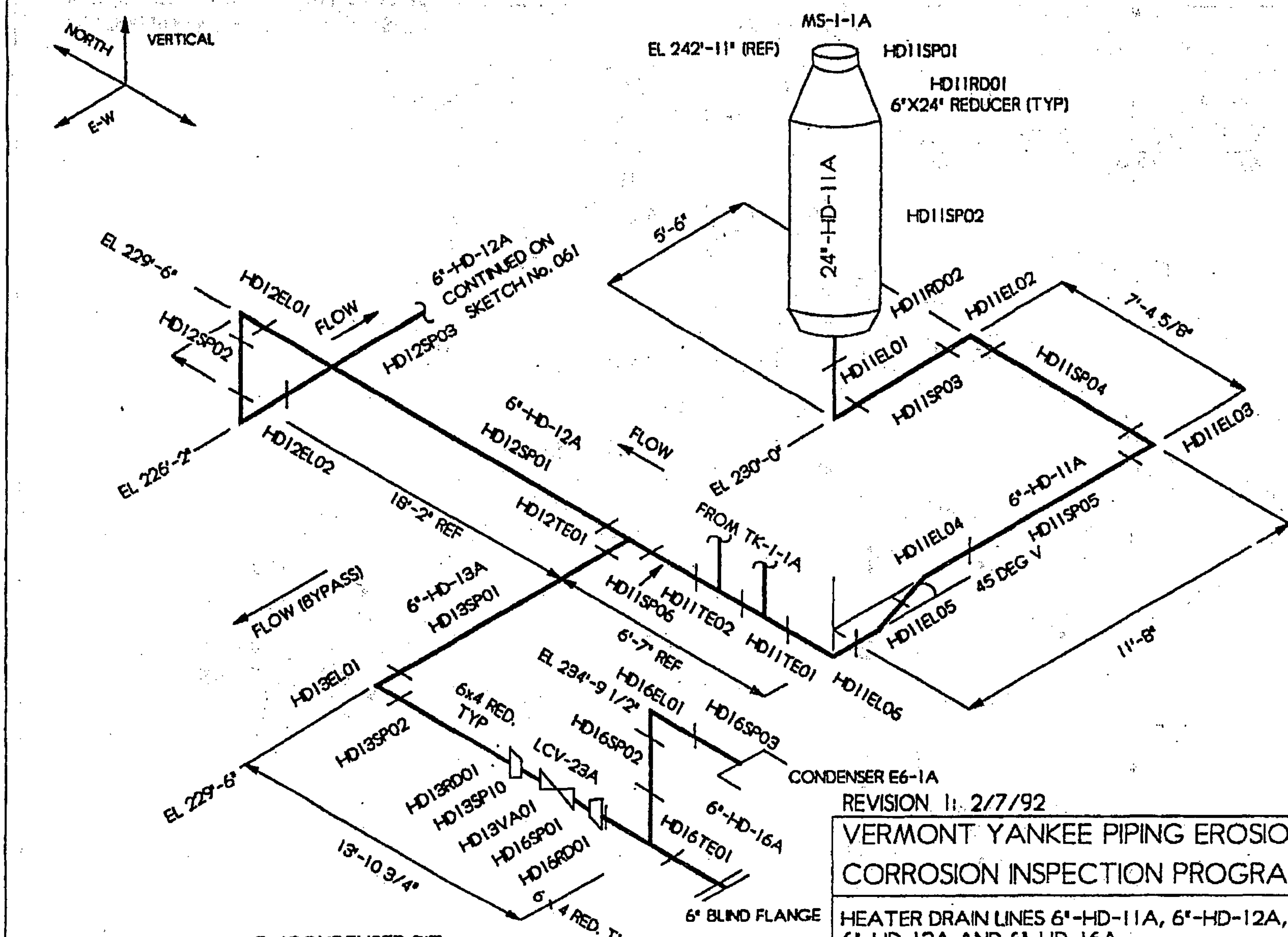

REVISION 0: 7/19/90

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 20"-HD-14B, 16"-HD-14B AND 24"-HD-17B & D

COMPONENT LOCATION SKETCH No. 056

REFERENCES: G191158,G191188,G191189,5920-FI-15



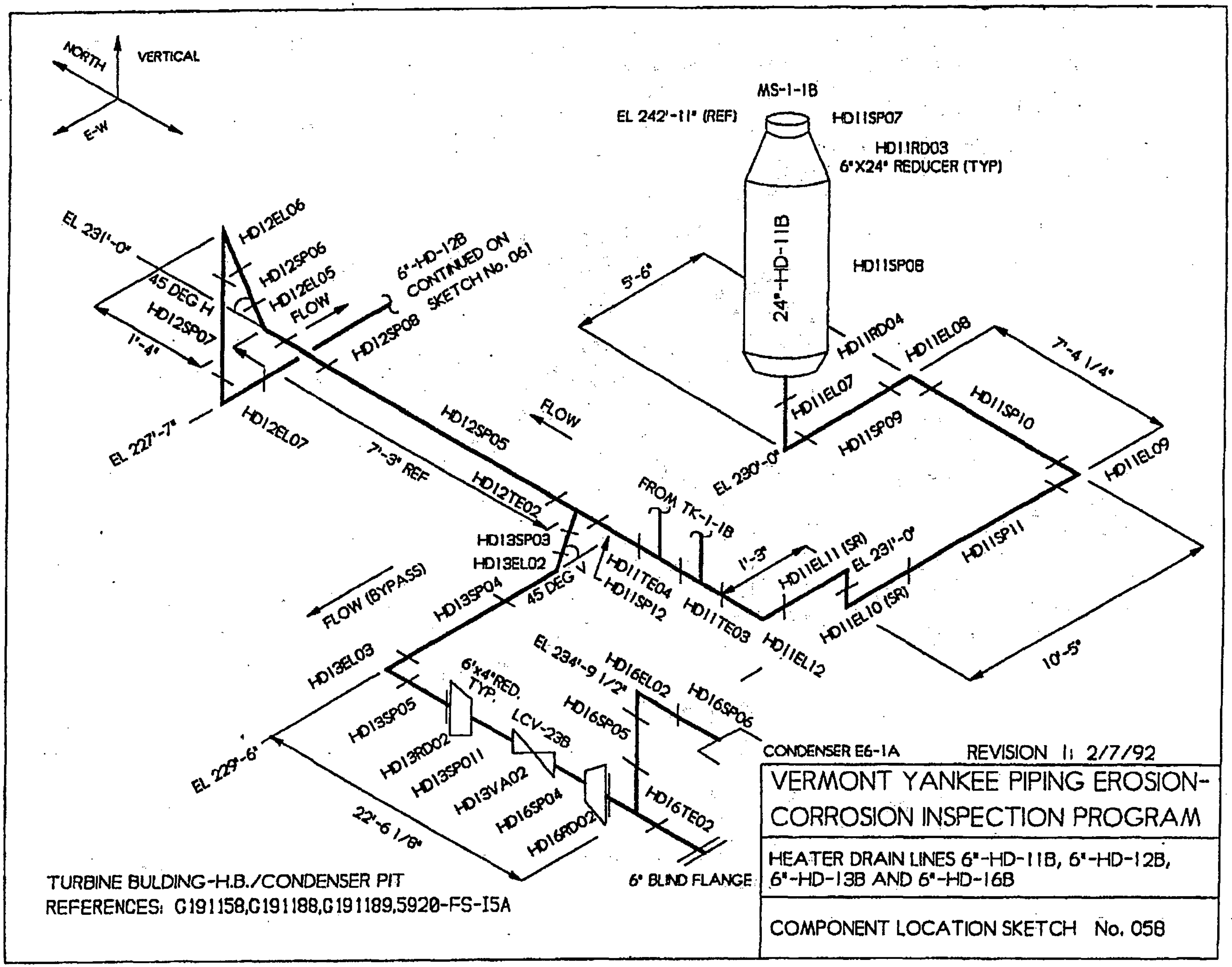

REVISION 1: 2/7/92

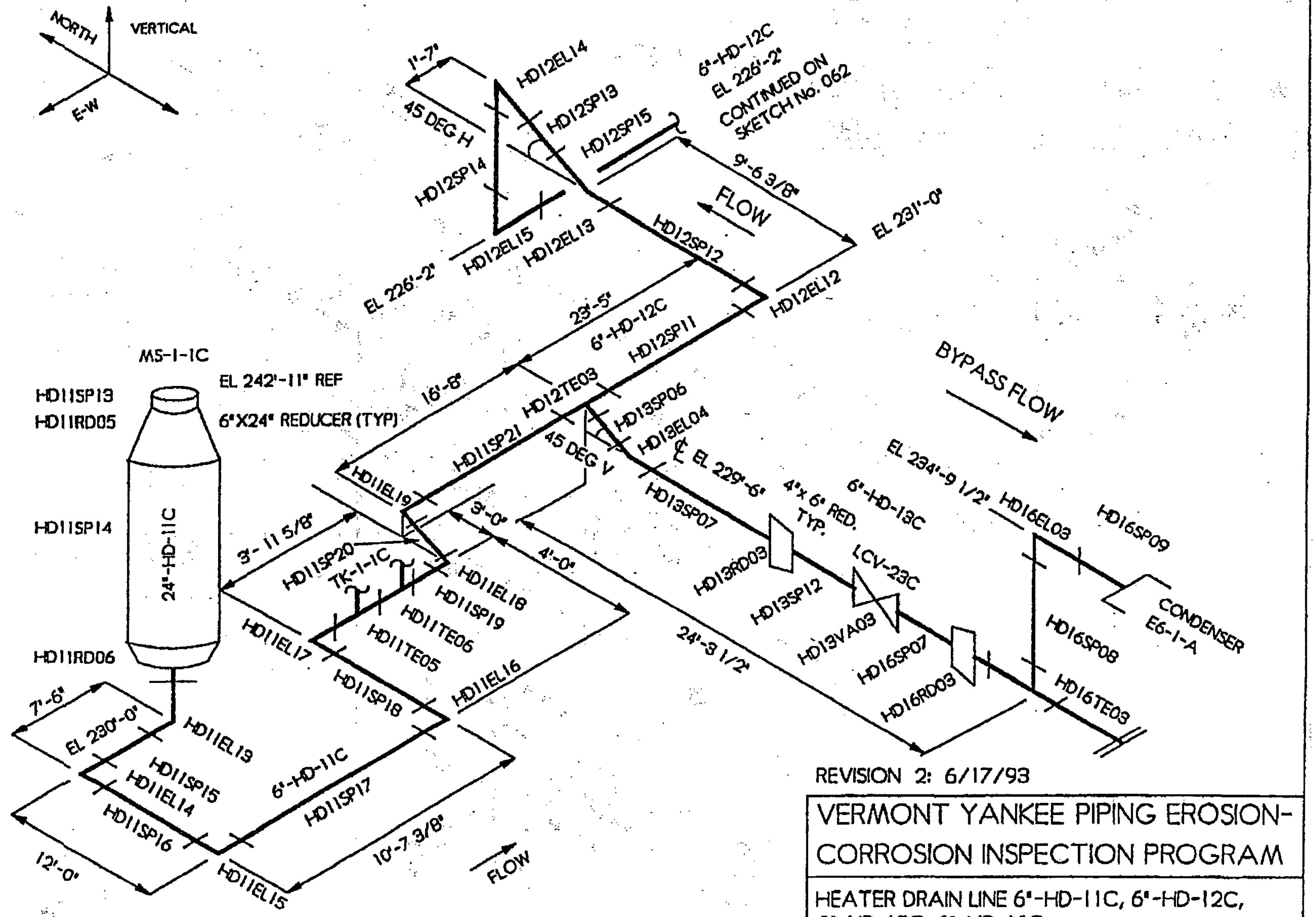
**VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM**

HEATER DRAIN LINES 6"-HD-11A, 6"-HD-12A, 6"-HD-13A AND 6"-HD-16A

COMPONENT LOCATION SKETCH No. 057

TURBINE BULDING-H.B./CONDENSER PIT
REFERENCES: G191158,G191188,G191189,5920-FS-15A


NORTH
VERTICAL
E-W
MS-1-1B
EL 242'-11" (REF)
HD11SP07
HD11RD03
6"X24" REDUCER (TYP)
24"-HD-11B
HD11SP08
5'-6"
HD11RD04
HD11EL08
7'-4 1/4"
HD11EL07
HD11SP10
HD11SP09
EL 230'-0"
HD11EL09
EL 231'-0"
HD12EL06
HD12SP06
HD12EL05
6"-HD-12B
CONTINUED ON
SKETCH No. 061
45 DEG H
FLOW
HD12SP07
1'-4"
HD12SP08
EL 227'-7"
HD12EL07
HD12SP05
FLOW
7'-3" REF
HD12TE02
FROM TK-1-1B
HD13SP03
HD13EL02
45 DEG V
HD11TE04
HD11SP12
1'-3"
HD11EL11 (SR)
EL 231'-0"
HD11SP11
FLOW (BYPASS)
HD13SP04
HD11TE03
HD11EL10 (SR)
HD11EL12
10'-5"
HD13EL03
EL 234'-9 1/2"
HD16EL02
HD16SP06
6"x4"RED.
TYP.
HD13SP05
HD16SP05
LCV-23B
HD13RD02
HD13SP011
HD13VA02
HD16SP04
HD16RD02
HD16TE02
EL 229'-6"
22'-6 1/8"
6" BLIND FLANGE
CONDENSER E6-1A
REVISION 1: 2/7/92
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
HEATER DRAIN LINES 6"-HD-11B, 6"-HD-12B, 6"-HD-13B AND 6"-HD-16B
COMPONENT LOCATION SKETCH No. 058
TURBINE BULDING-H.B./CONDENSER PIT
REFERENCES: G191158,G191188,G191189,5920-FS-15A

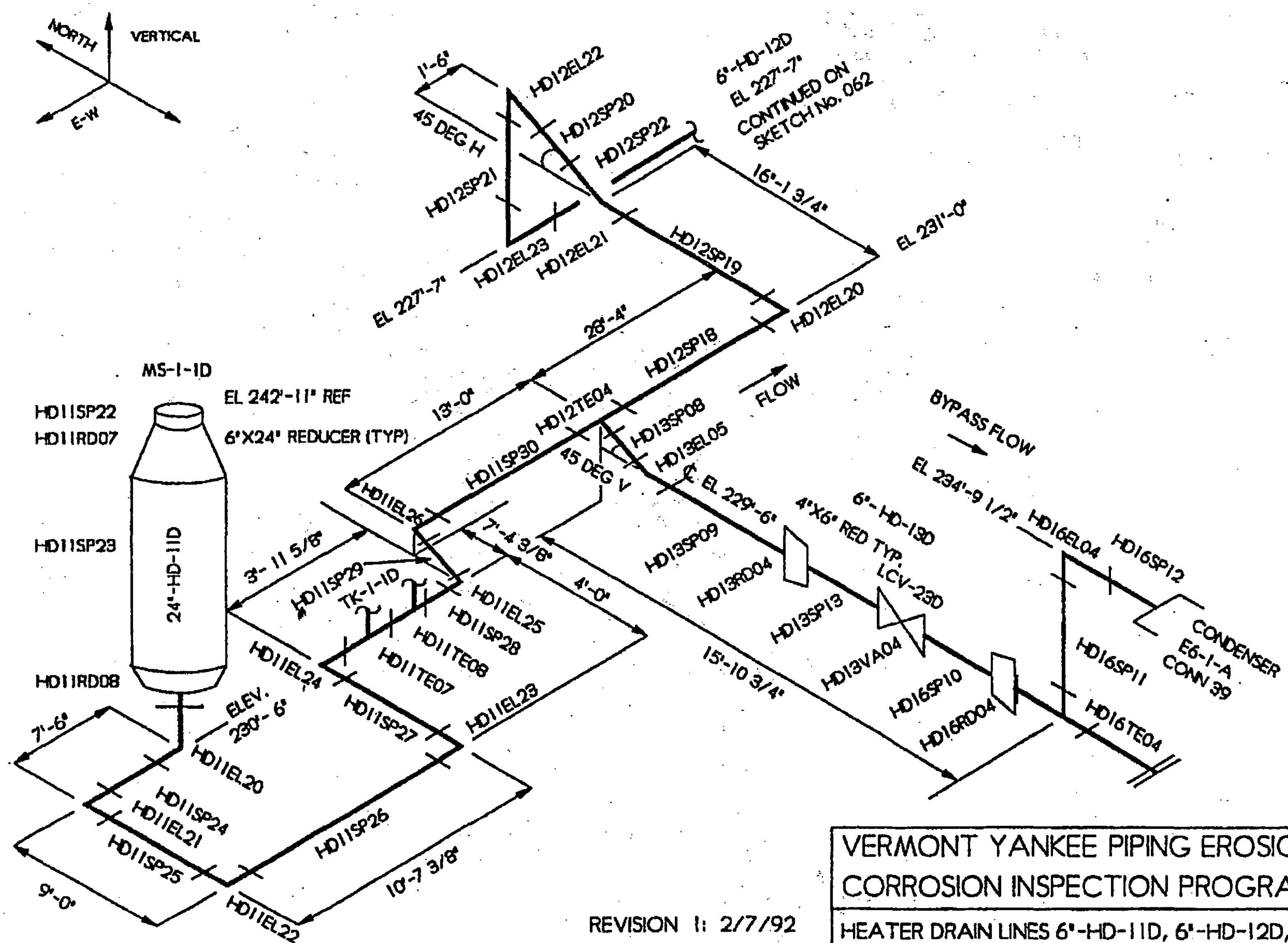



TURBINE BULDING-CONDENSER PIT

REFERENCES: G191158,G191188,G191189,5920-FS-I5A

REVISION 2: 6/17/93

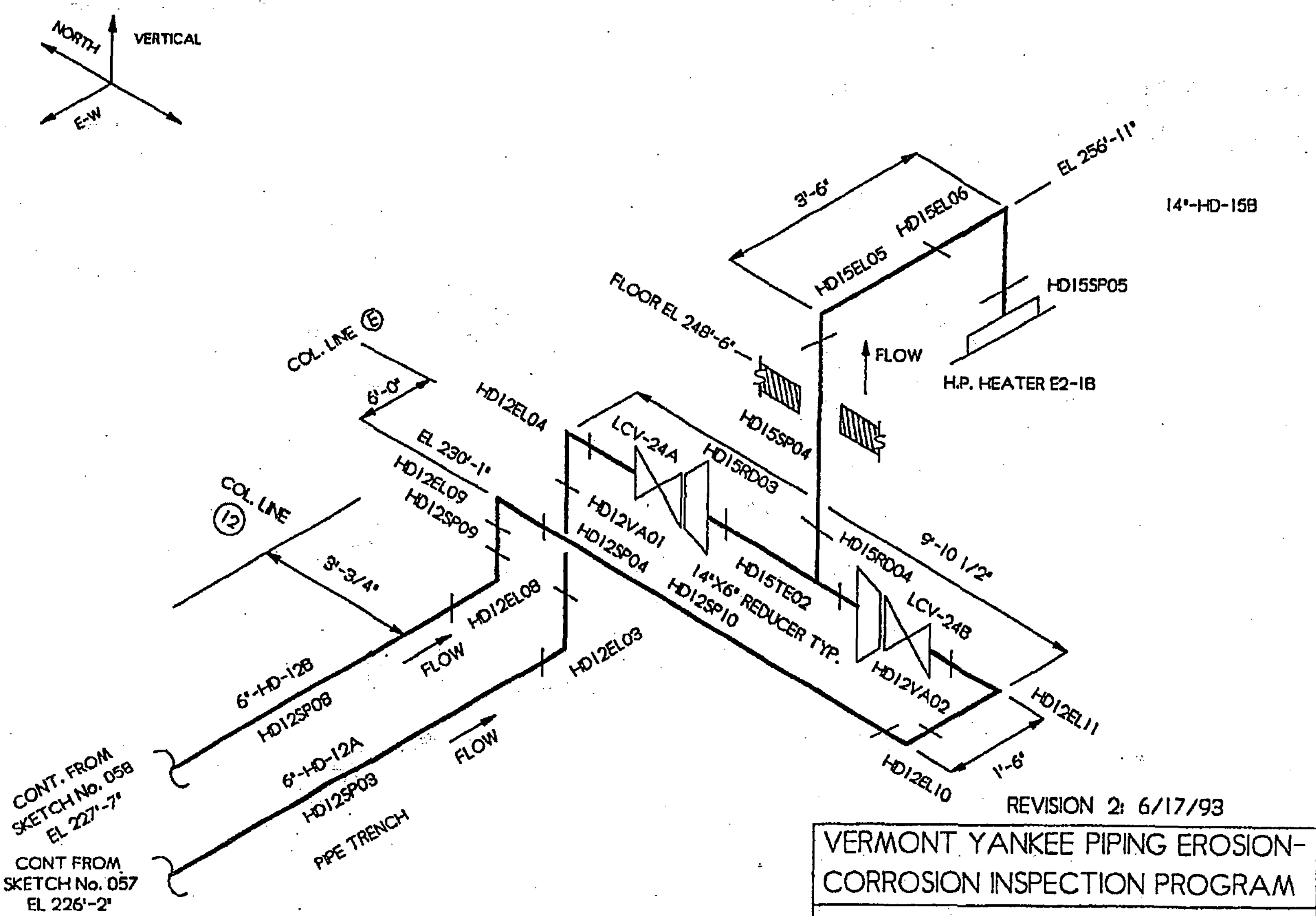
| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINE 6"-HD-11C, 6"-HD-12C, 6"-HD-13C, 6"-HD-16C |
| COMPONENT LOCATION SKETCH No. 059 |




REVISION 1: 2/7/92

TURBINE BULDING-CONDENSER PIT
REFERENCES: G191158,G191188,G191189,5920-FS-15A

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| HEATER DRAIN LINES 6"-HD-11D, 6"-HD-12D, 6"-HD-13D, 6"-HD-16D |
| COMPONENT LOCATION SKETCH No. 060 |

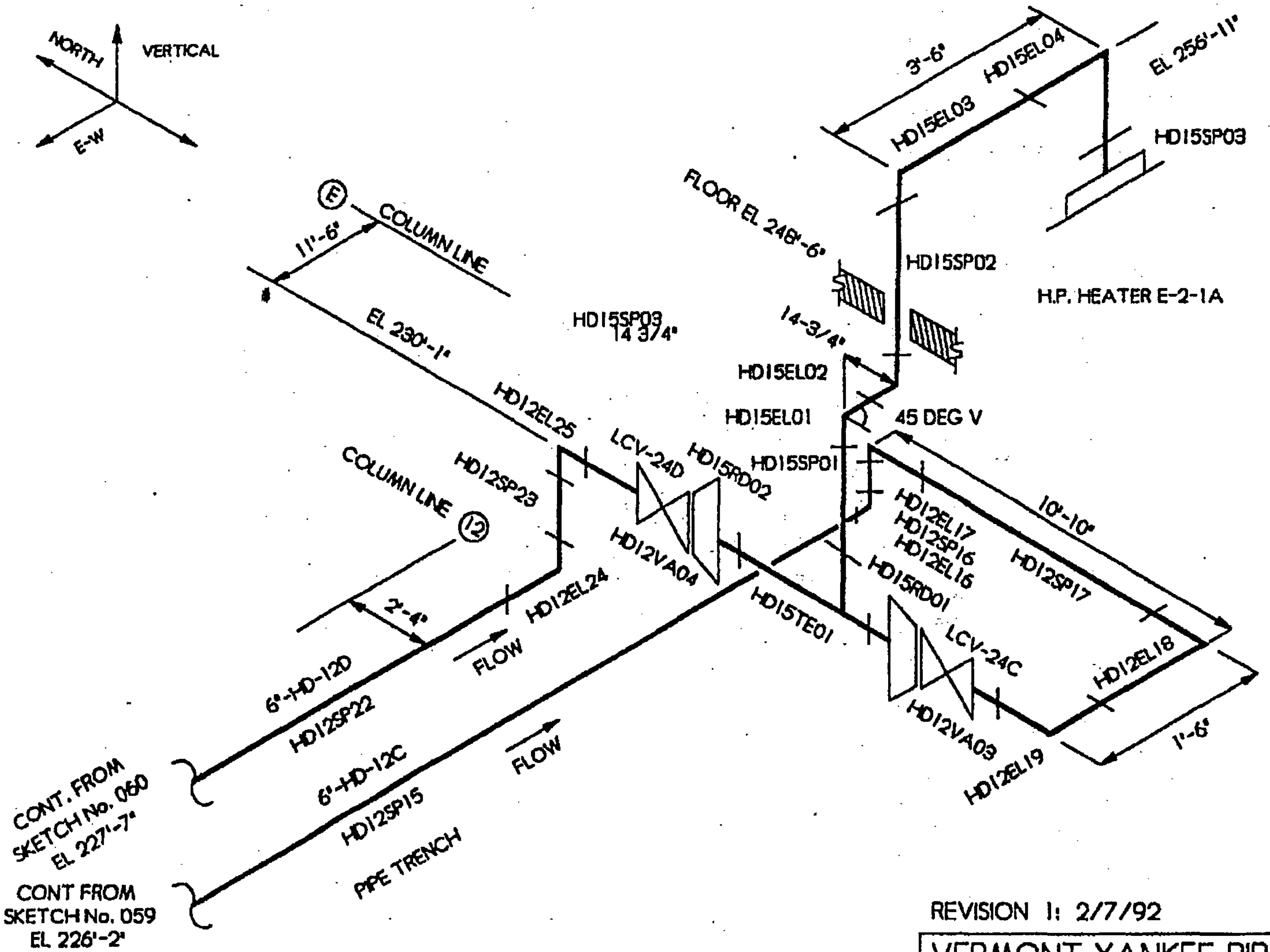



TURBINE BULDING-HEATER BAY

REFERENCES: G191158,G191188,G191189,5920-FS-I5

REVISION 2: 6/17/93

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| HEATER DRAIN LINES 6"-HD-12A, 6"-HD-12B, AND 14"-HD-15B |
| COMPONENT LOCATION SKETCH No. 061 |



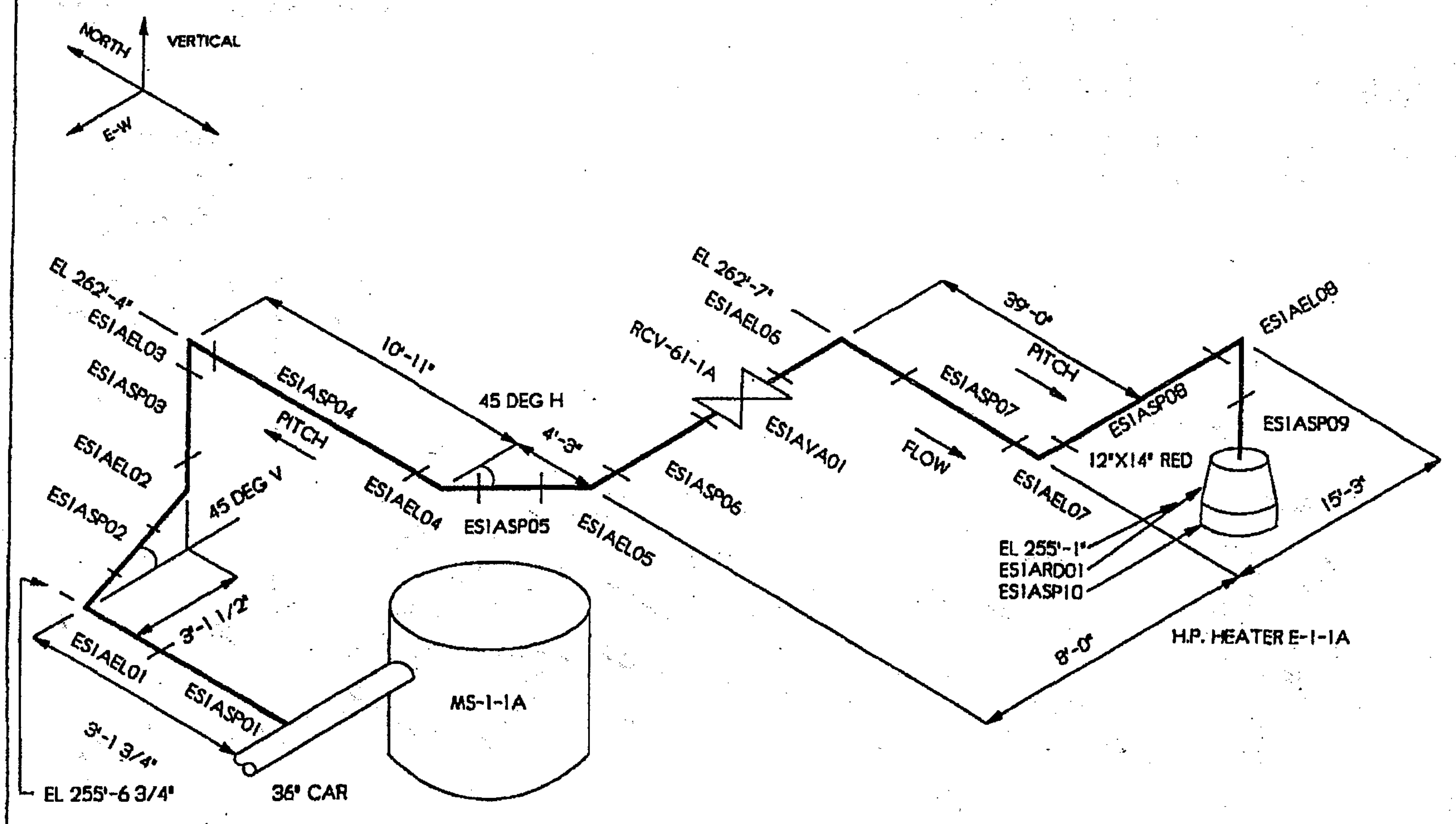

TURBINE BULDING-HEATER BAY
REFERENCES: G191158,G191188,G191189,5920-FS-15

REVISION 1: 2/7/92

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

HEATER DRAIN LINES 6"-HD-12C, 6"-HD-12D, AND 14"-HD-15A

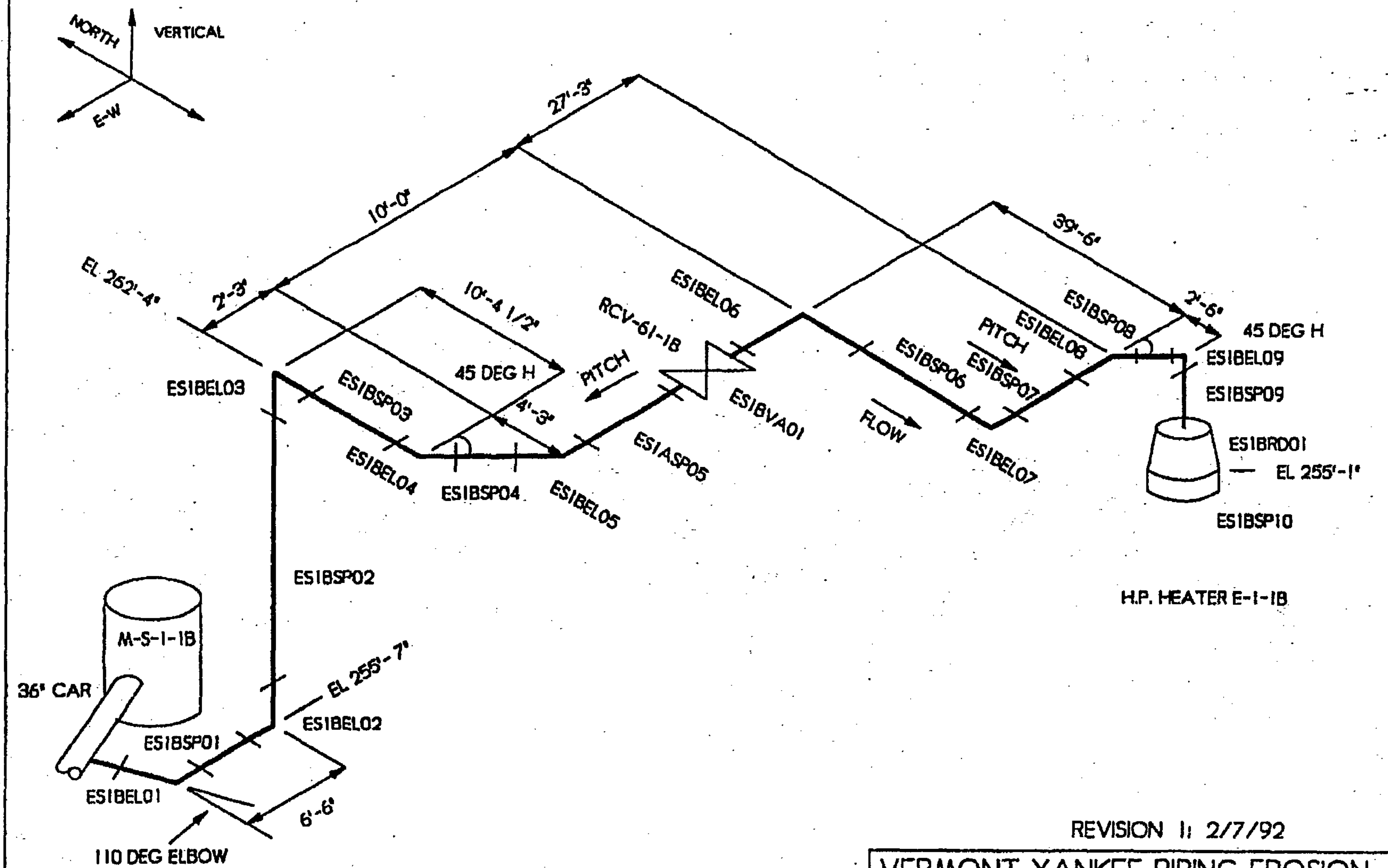
COMPONENT LOCATION SKETCH No. 062




REVISION 1: 2/7/92

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| EXTRACTION STEAM LINE 12"-ES-1A |
| COMPONENT LOCATION SKETCH No. 063 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191184,G191185,5920-FS-1-8



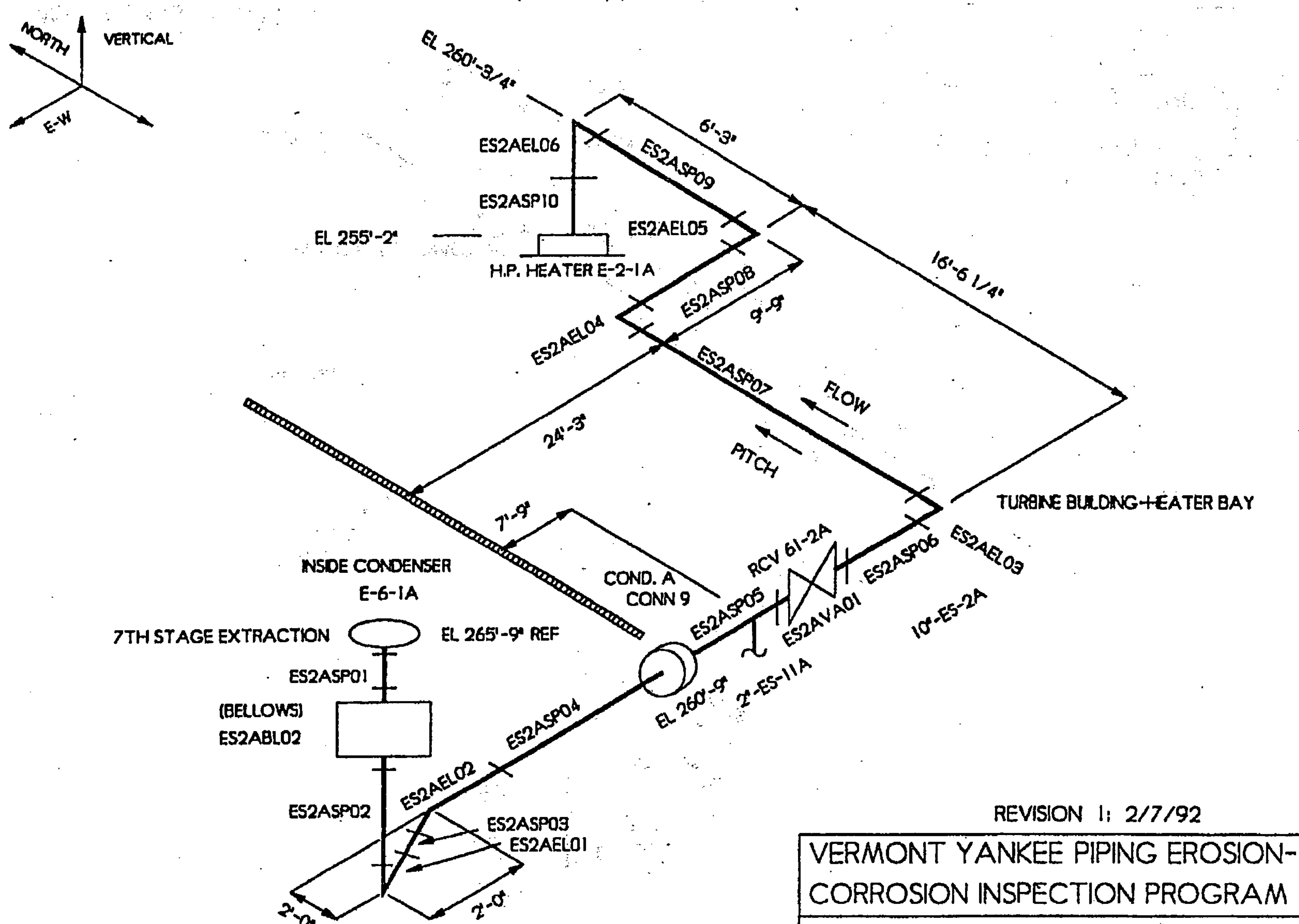

REVISION 1: 2/7/92

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

EXTRACTION STEAM LINE 12"-ES-1B

COMPONENT LOCATION SKETCH No. 064

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191184,G191185, 5920-FS-I-8

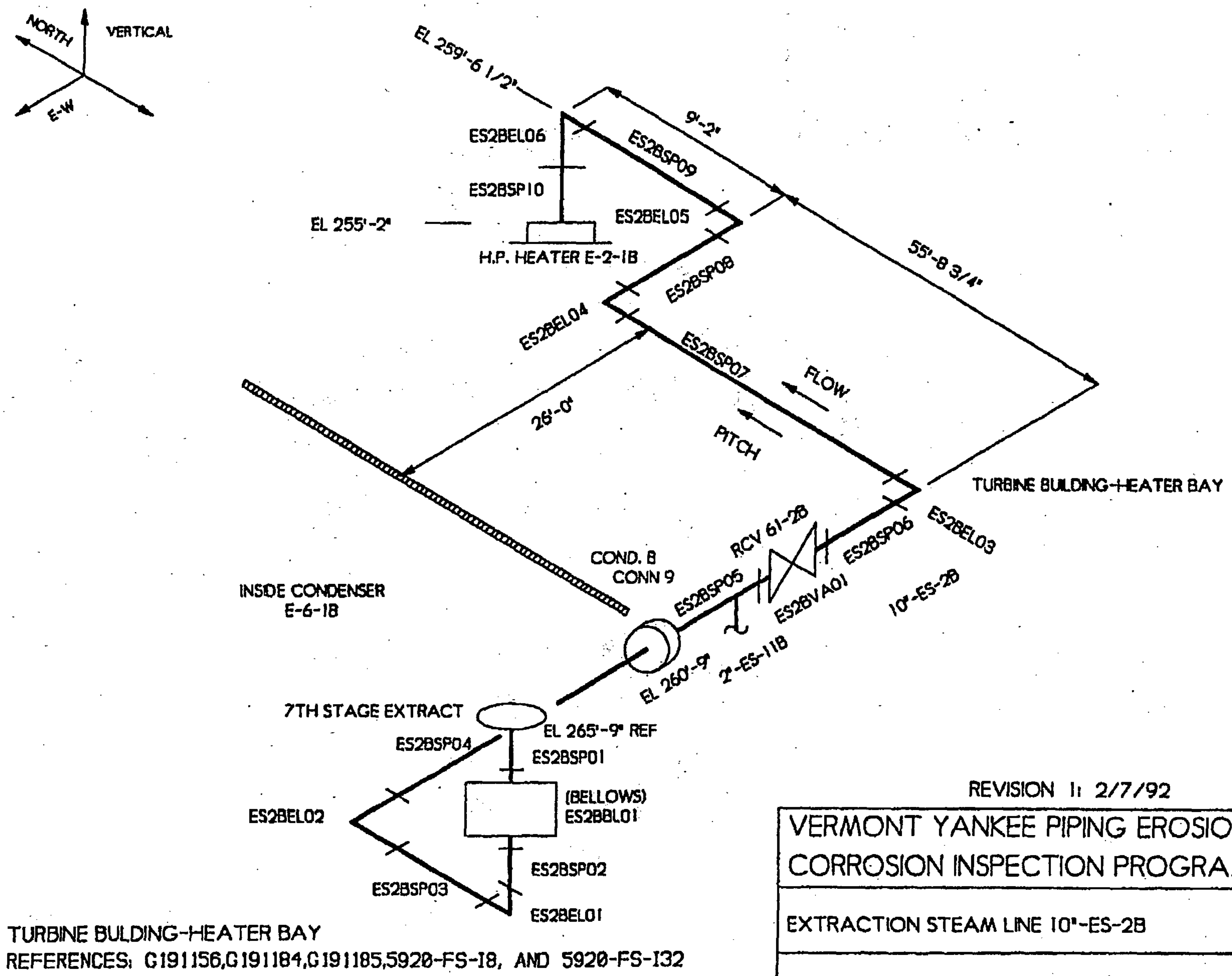



REVISION 1: 2/7/92

TURBINE BULDING-HEATER BAY

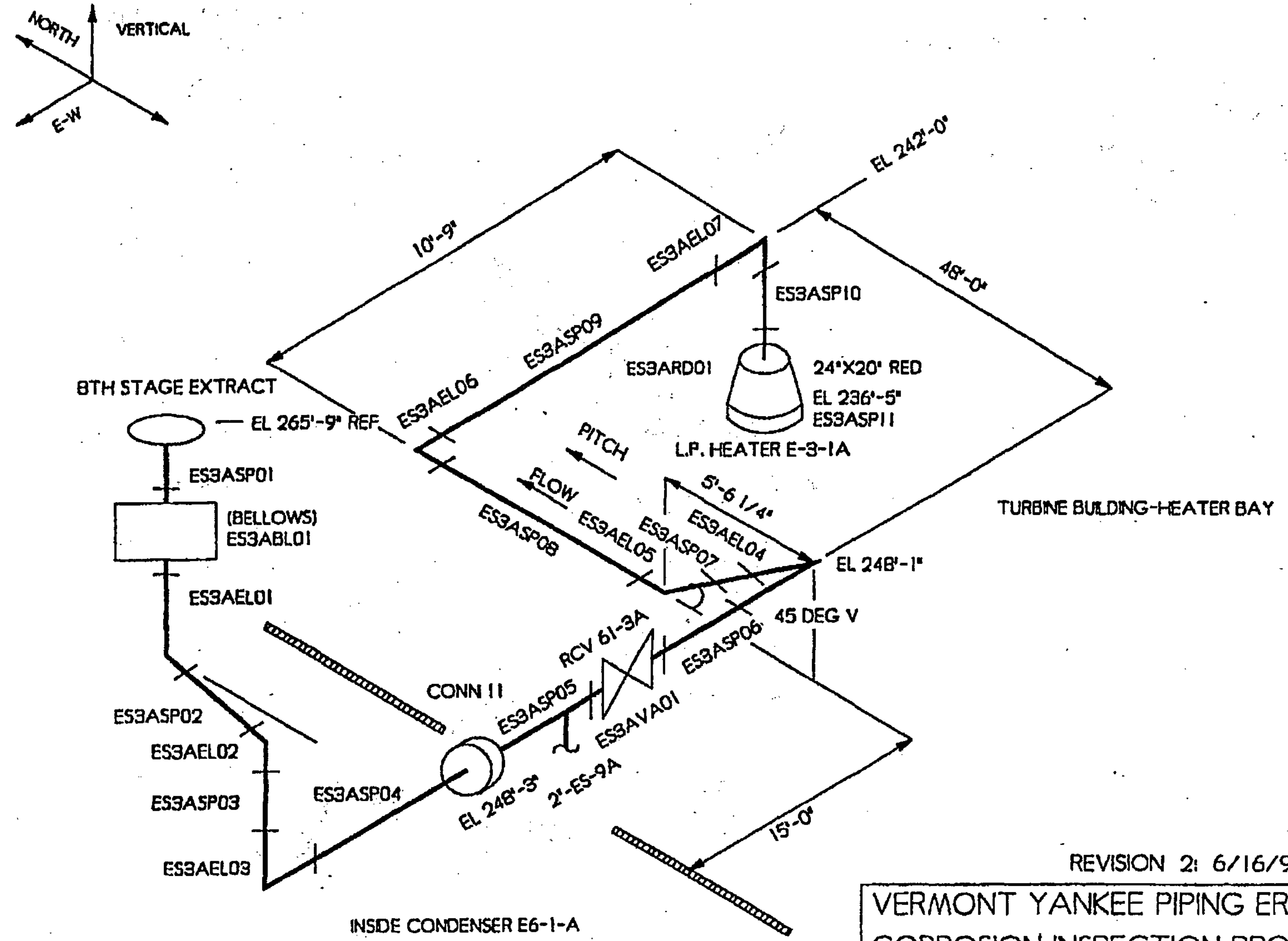
REFERENCES: G191156,G191184,G191185,5920-FS-18, AND 5920-FS-132

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| EXTRACTION STEAM LINE 10"-ES-2A |
| COMPONENT LOCATION SKETCH No. 065 |




REVISION 1: 2/7/92

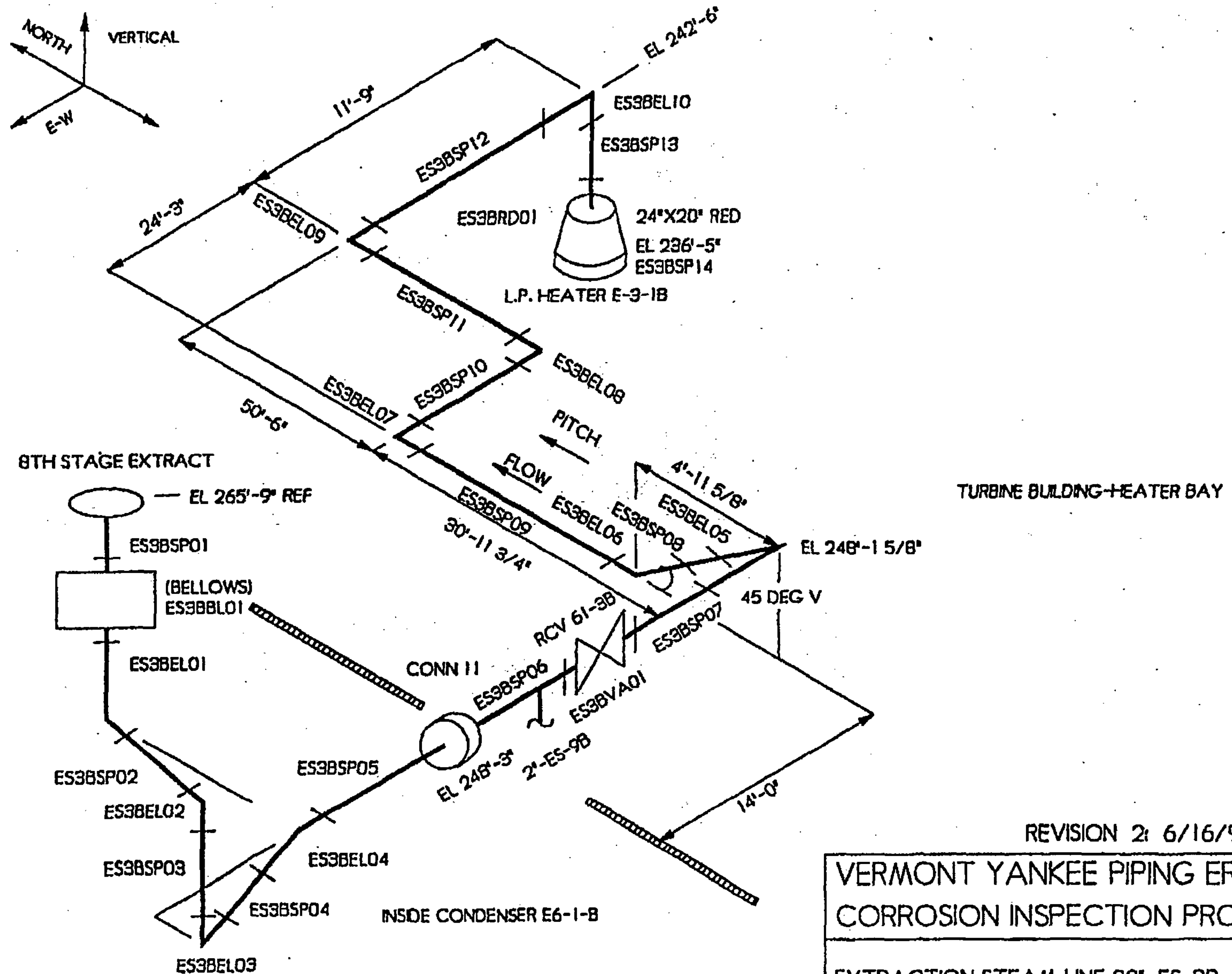
| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| EXTRACTION STEAM LINE 10"-ES-2B |
| COMPONENT LOCATION SKETCH No. 066 |




REVISION 2: 6/16/93

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| EXTRACTION STEAM LINE 20"-ES-3A |
| COMPONENT LOCATION SKETCH No. 067 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191184,G191185,5920-FS-132

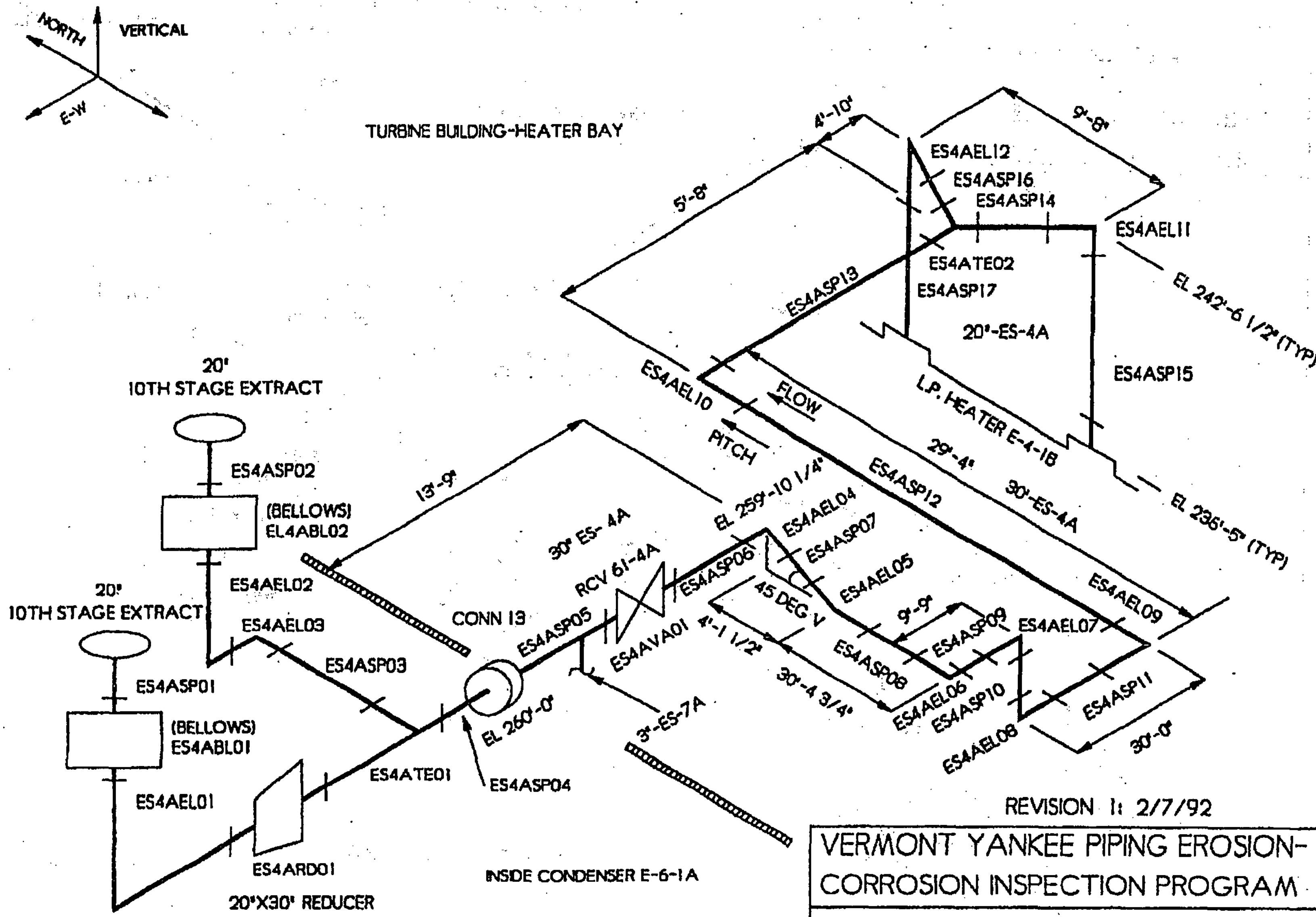



TURBINE BULDING-HEATER BAY

REFERENCES: G191156,G191184,G191185,5920-FS-132,5920-FS-18

REVISION 2: 6/16/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| --- |
| EXTRACTION STEAM LINE 20"-ES-3B |
| COMPONENT LOCATION SKETCH No. 068 |

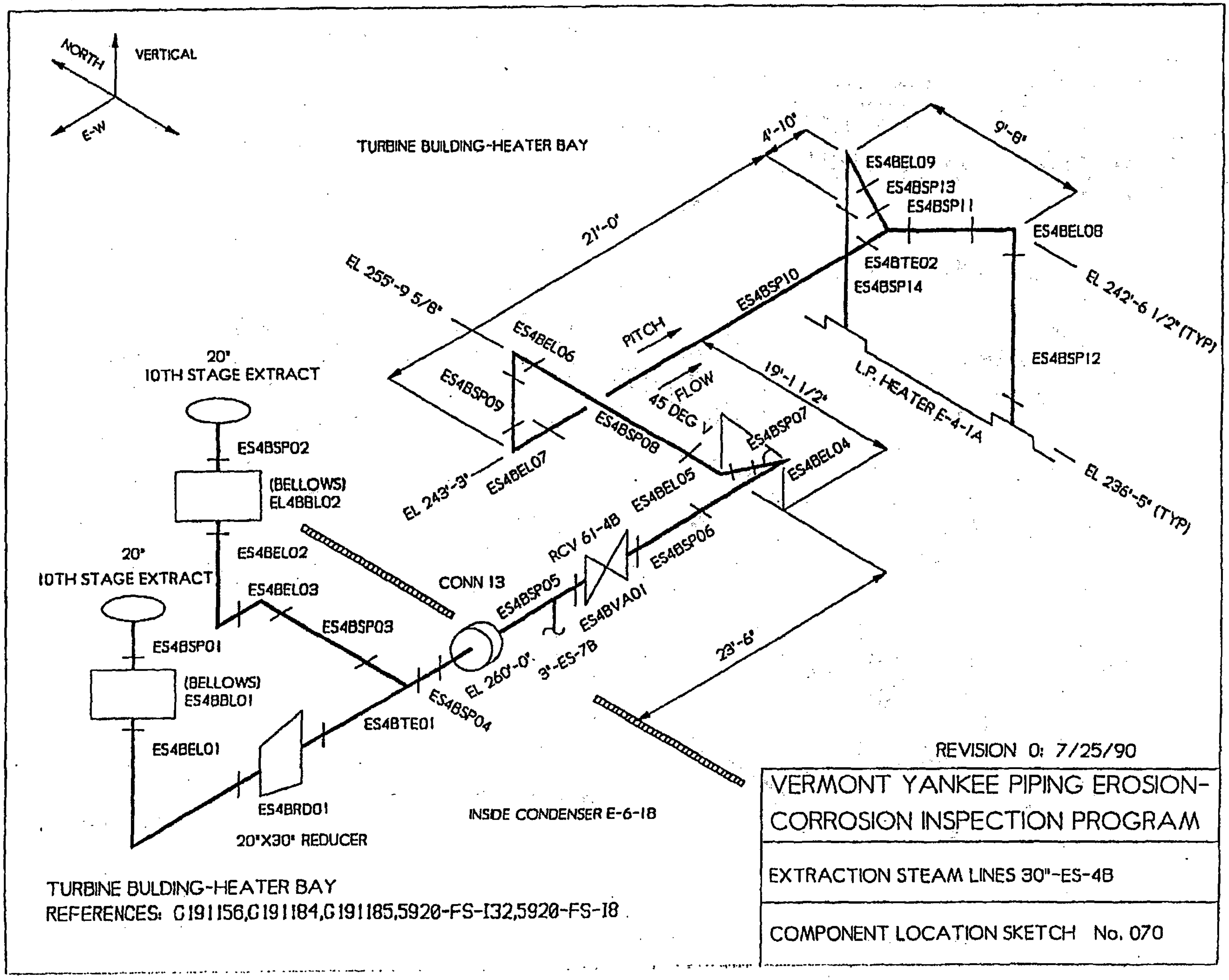


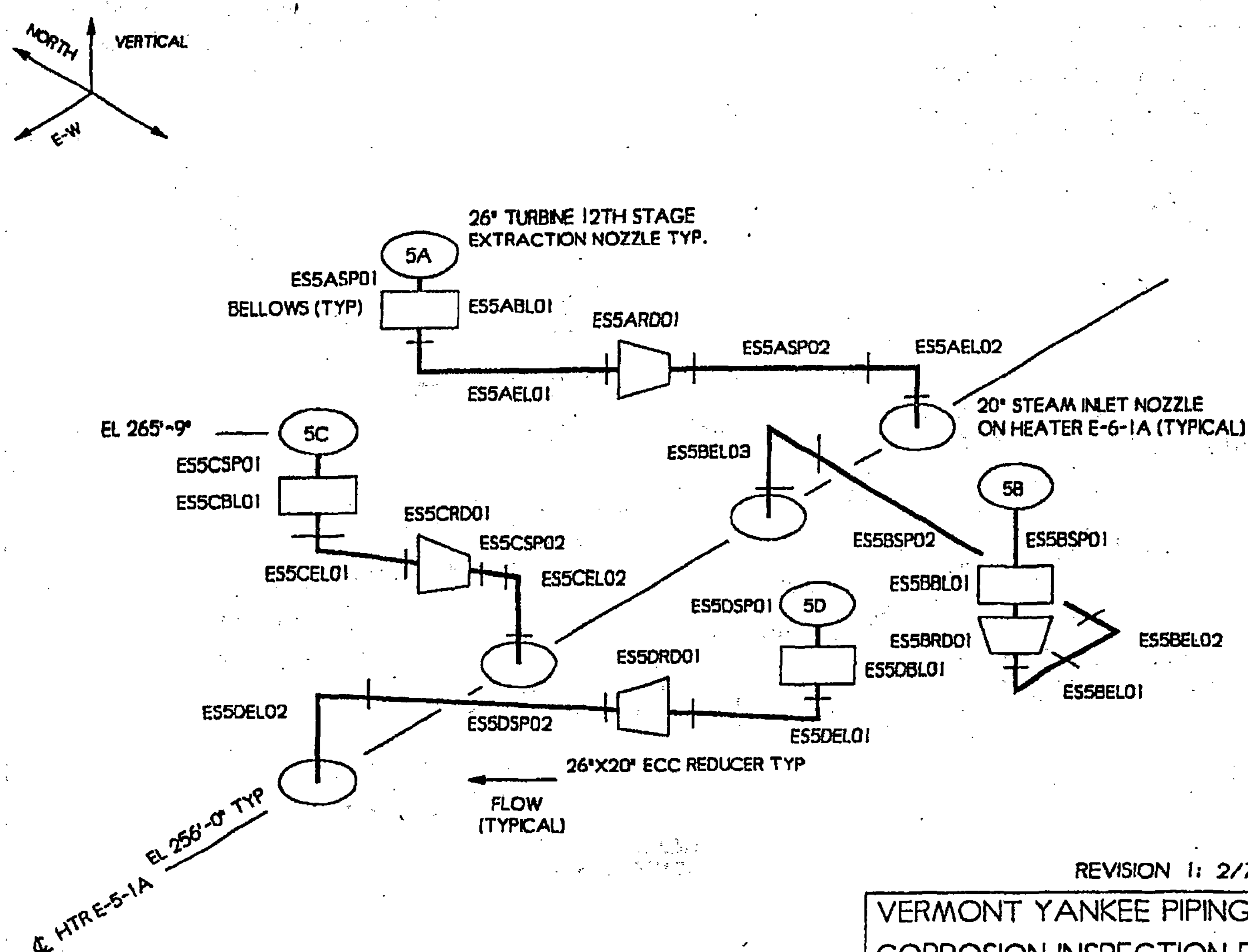

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191184,G191185,5920-FS-I32,5920-FS-I8

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

EXTRACTION STEAM LINES 20"-ES-4A & 30"-ES-4A

COMPONENT LOCATION SKETCH No. 069

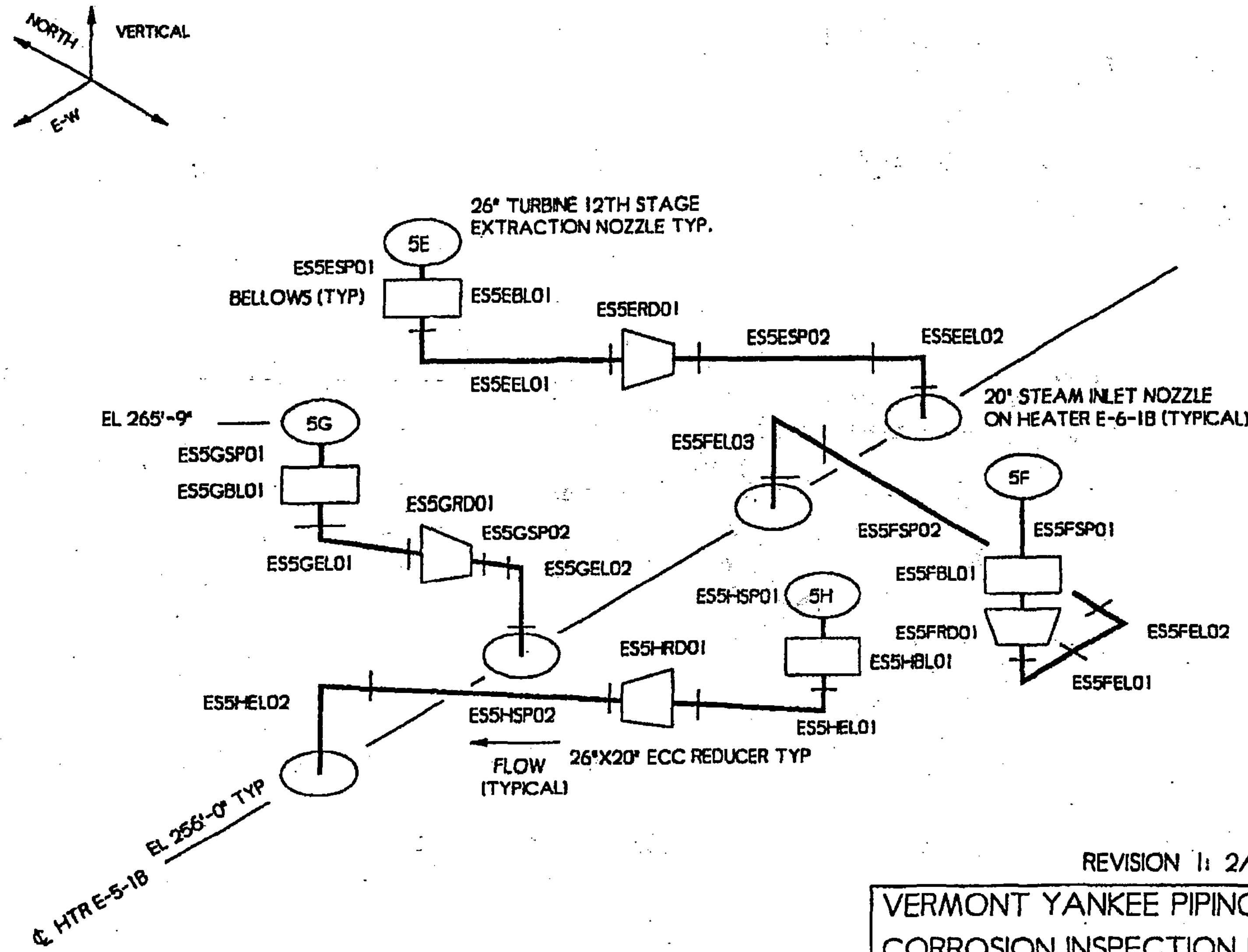

NORTH
VERTICAL
E-W
TURBINE BUILDING-HEATER BAY
4'-10"
9'-8"
ES4BEL09
ES4BSP13
ES4BSP11
ES4BEL08
21'-0"
ES4BTE02
ES4BSP14
EL 255'-9 5/8"
ES4BSP10
EL 242'-6 1/2" (TYP)
ES4BEL06
PITCH
ES4BSP12
20"
10TH STAGE EXTRACT
ES4BSP09
FLOW
45 DEG V
19'-1 1/2"
L.P. HEATER E-4-1A
ES4BSP08
ES4BSP07
ES4BSP02
ES4BEL04
EL 243'-3"
ES4BEL07
ES4BEL05
EL 236'-5" (TYP)
(BELLOWS)
EL4BBL02
RCV 61-4B
ES4BSP06
ES4BEL02
20"
10TH STAGE EXTRACT
CONN 13
ES4BEL03
ES4BSP05
ES4BVA01
ES4BSP03
ES4BSP01
3"-ES-7B
EL 260'-0"
23'-6"
(BELLOWS)
ES4BBL01
ES4BSP04
ES4BTE01
ES4BEL01
REVISION 0: 7/25/90
ES4BRD01
INSIDE CONDENSER E-6-1B
20"X30" REDUCER
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191184,G191185,5920-FS-132,5920-FS-18
EXTRACTION STEAM LINES 30"-ES-4B
COMPONENT LOCATION SKETCH No. 070




INSIDE CONDENSER E-6-1A
REFERENCES: G191156,5920-FS-I32

REVISION 1: 2/7/92

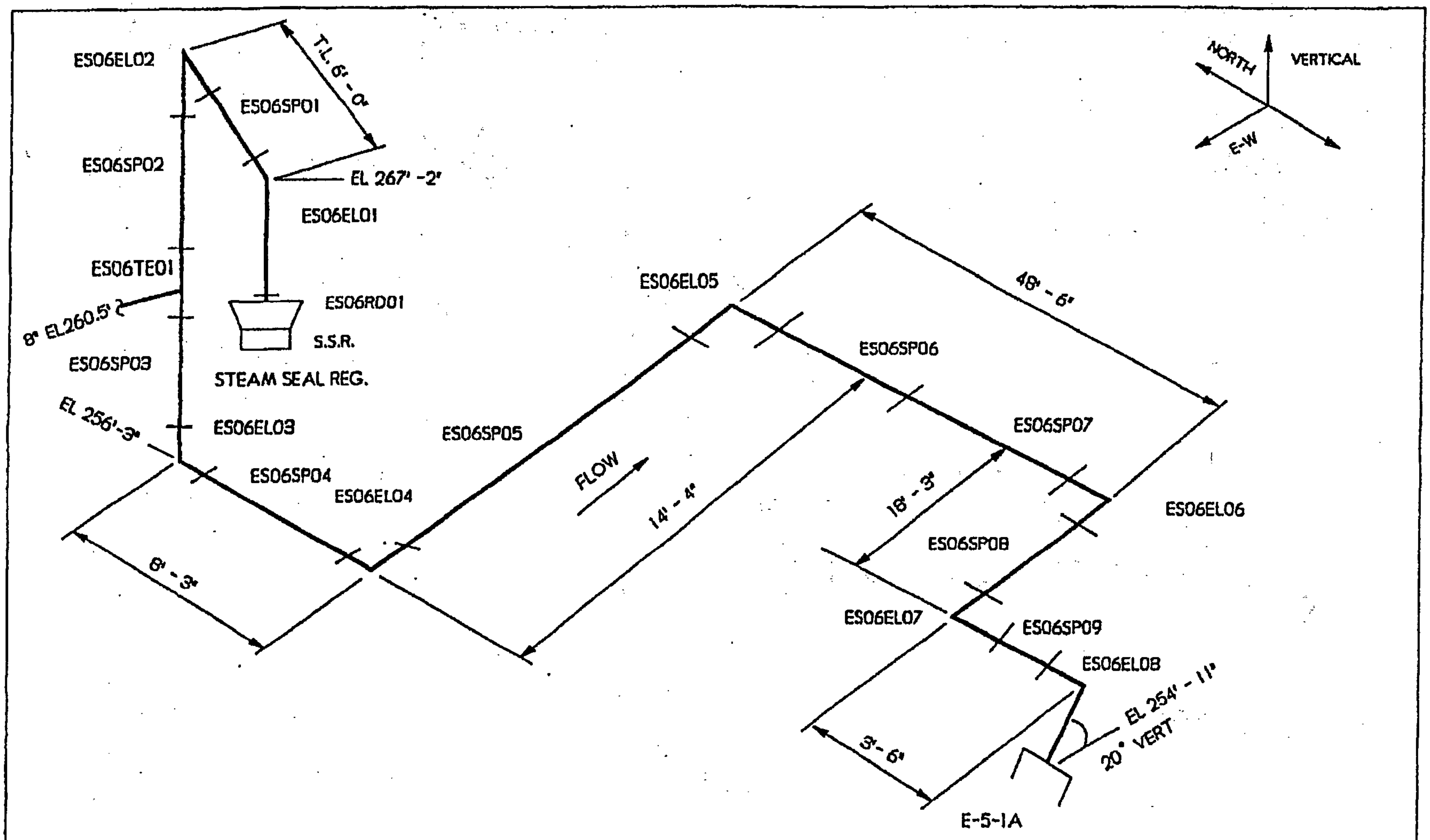
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| EXTRACTION STEAM LINES 20" & 26"-ES-5A 5B,5C,5D |
| COMPONENT LOCATION SKETCH No. 071 |




REVISION 1: 2/7/92

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| EXTRACTION STEAM LINES 20" & 26"-ES-5E 5F,5G,5H |
| COMPONENT LOCATION SKETCH No. 072 |

INSIDE CONDENSER E-6-1B
REFERENCES: G191156,5920-FS-132




REVISION 1; 6/16/93

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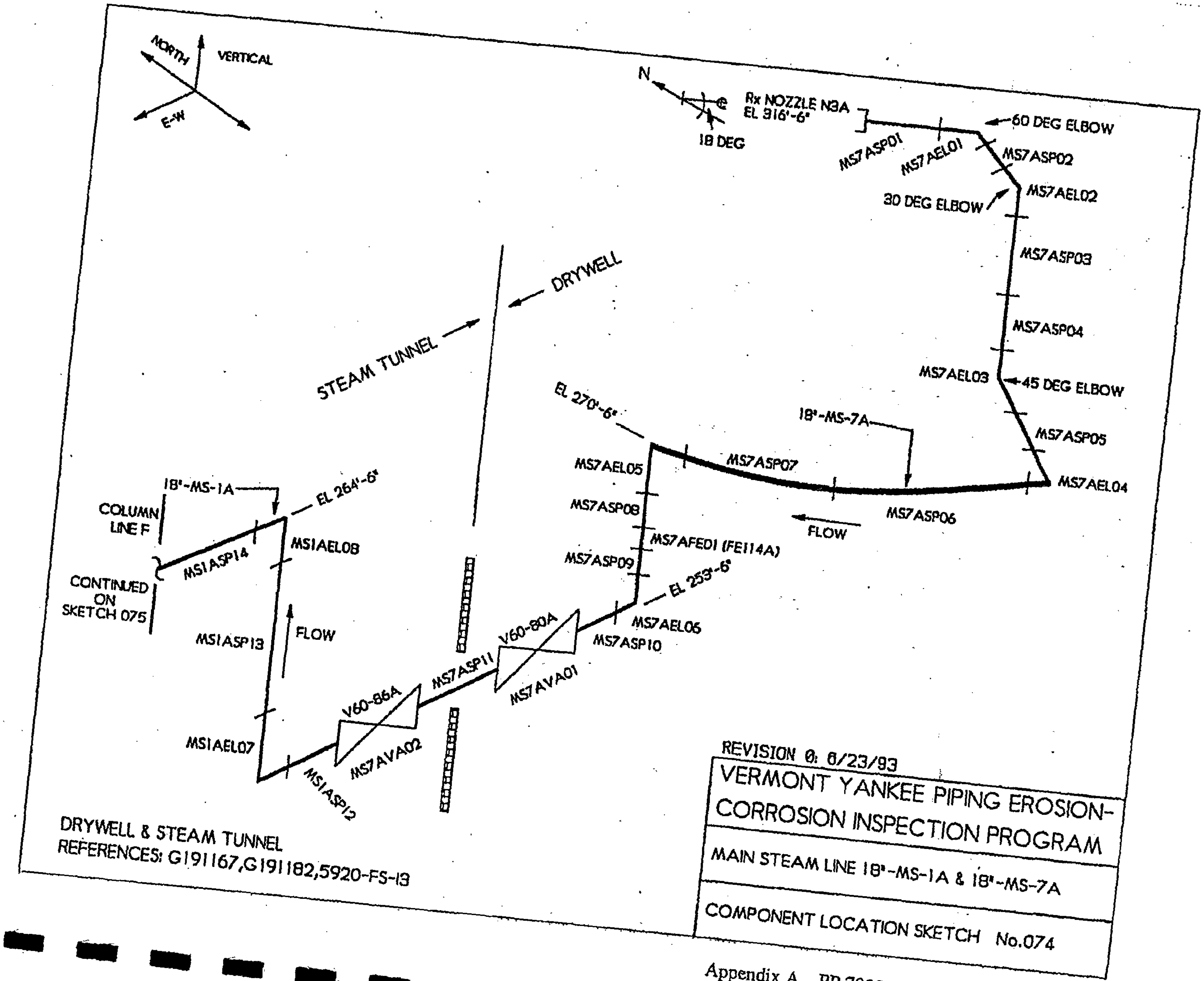
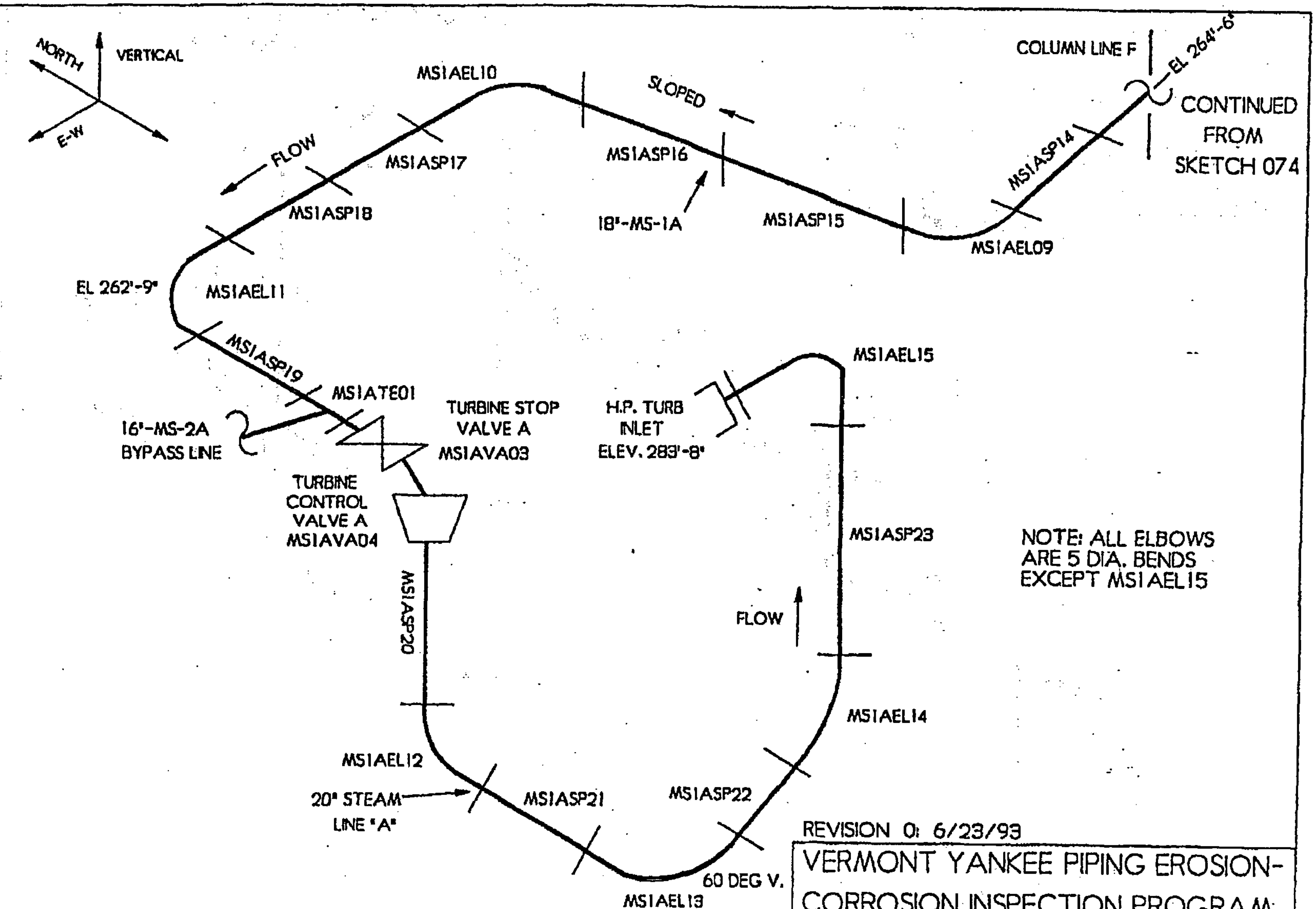
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| EXTRACTION STEAM LINE 12"-ES-6 |
| COMPONENT LOCATION SKETCH No. 073 |

TURBINE BULDING-H.P. HEATER BAY
REFERENCES: G191156, G191184, G191185


NORTH
VERTICAL
E-W
N
℄
18 DEG
Rx NOZZLE N3A
EL 916'-6"
60 DEG ELBOW
MS7ASP01
MS7AEL01
MS7ASP02
MS7AEL02
30 DEG ELBOW
MS7ASP03
MS7ASP04
MS7AEL03
45 DEG ELBOW
MS7ASP05
MS7AEL04
18"-MS-7A
MS7ASP06
FLOW
EL 270'-6"
MS7ASP07
MS7AEL05
MS7ASP08
MS7AFE01 (FE114A)
MS7ASP09
EL 253'-6"
MS7AEL06
MS7ASP10
V60-80A
MS7AVA01
MS7ASP11
V60-86A
MS7AVA02
DRYWELL
STEAM TUNNEL
18"-MS-1A
EL 264'-6"
COLUMN LINE F
MS1ASP14
MS1AEL08
CONTINUED ON SKETCH 075
MS1ASP13
FLOW
MS1AEL07
MS1ASP12
DRYWELL & STEAM TUNNEL
REFERENCES: G191167,G191182,5920-FS-13
REVISION 0: 6/23/93
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM
MAIN STEAM LINE 18"-MS-1A & 18"-MS-7A
COMPONENT LOCATION SKETCH No.074



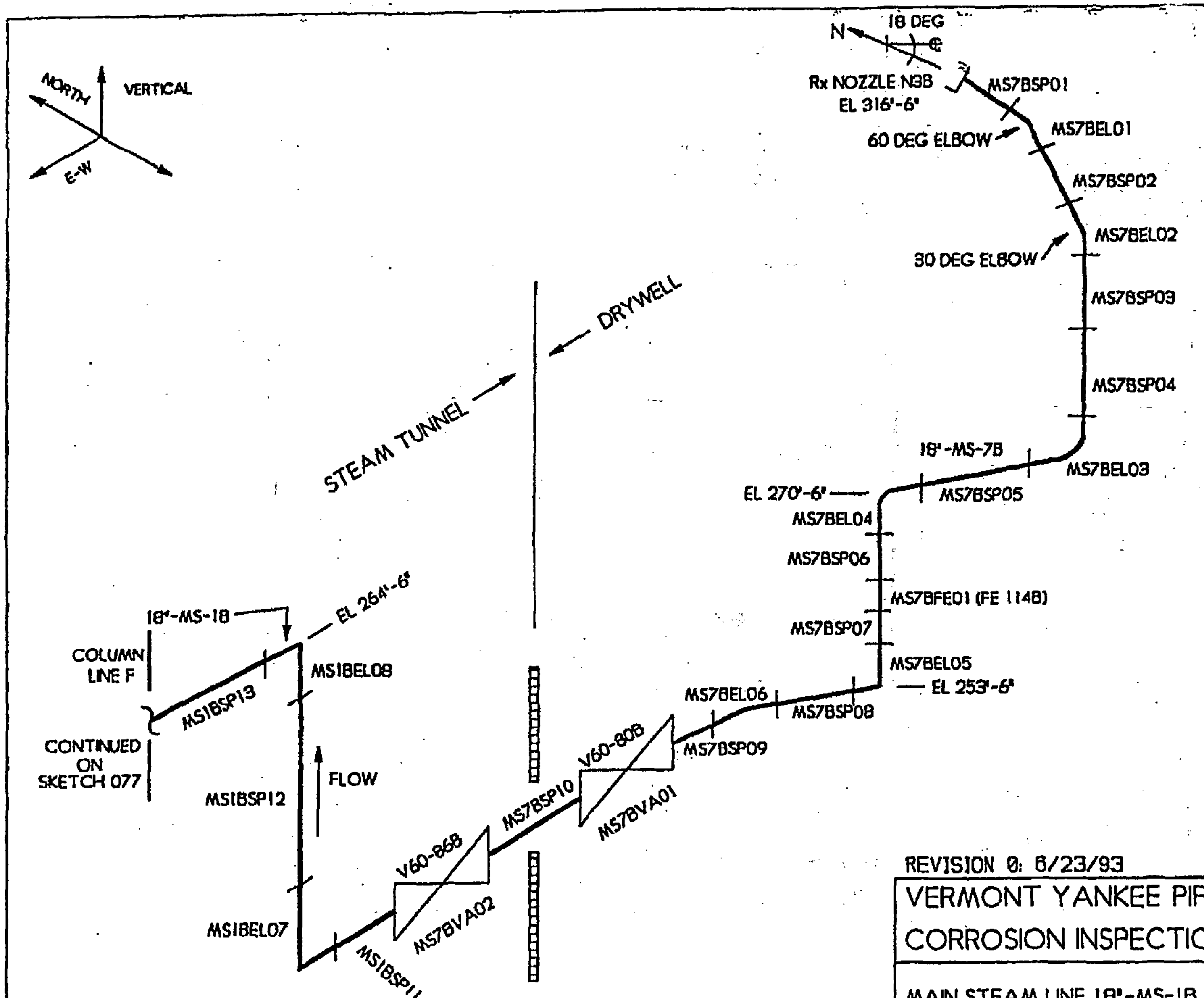

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I1&I2

REVISION 0: 6/23/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

MAIN STEAM LINE 18"-MS-1A (CONTINUED)

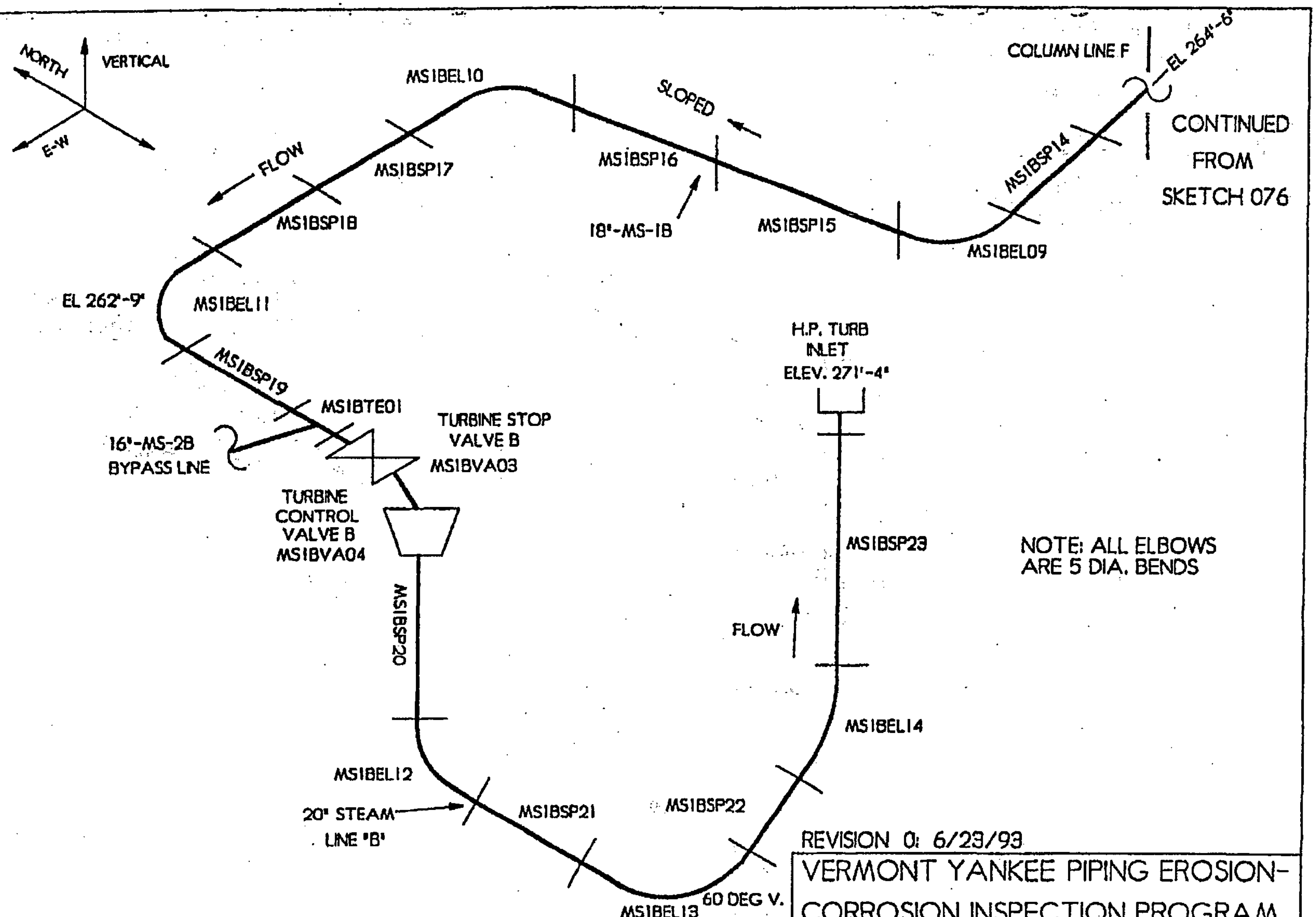
COMPONENT LOCATION SKETCH No. 075




DRYWELL & STEAM TUNNEL
REFERENCES: G191167,G191182,5920-FS-13

REVISION 0: 6/23/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| MAIN STEAM LINE 18"-MS-1B & 18"-MS-7B |
| COMPONENT LOCATION SKETCH No.076 |



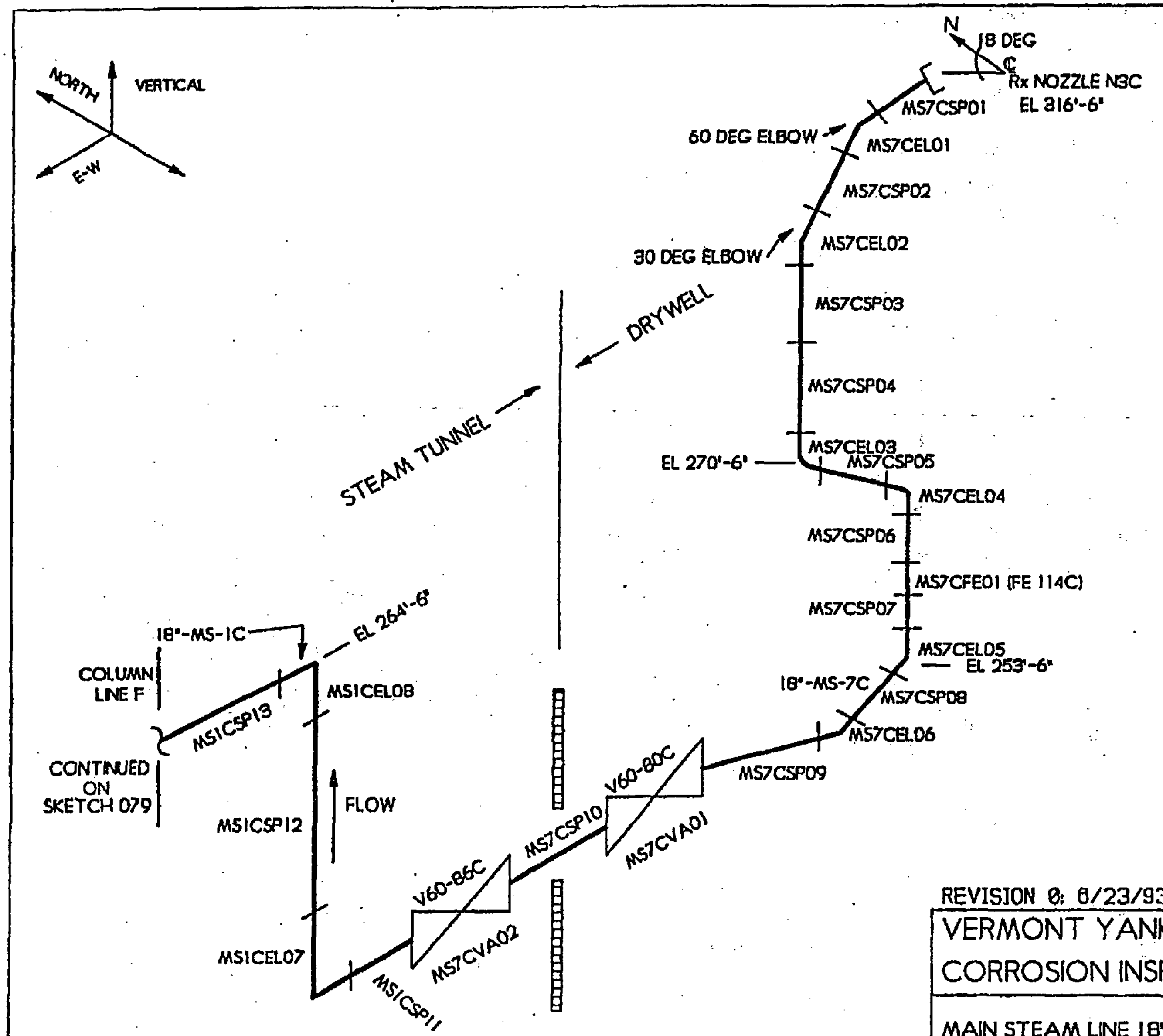

REVISION 0: 6/23/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

MAIN STEAM LINE 18"-MS-1B (CONTINUED)

COMPONENT LOCATION SKETCH No. 077

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I1&I2



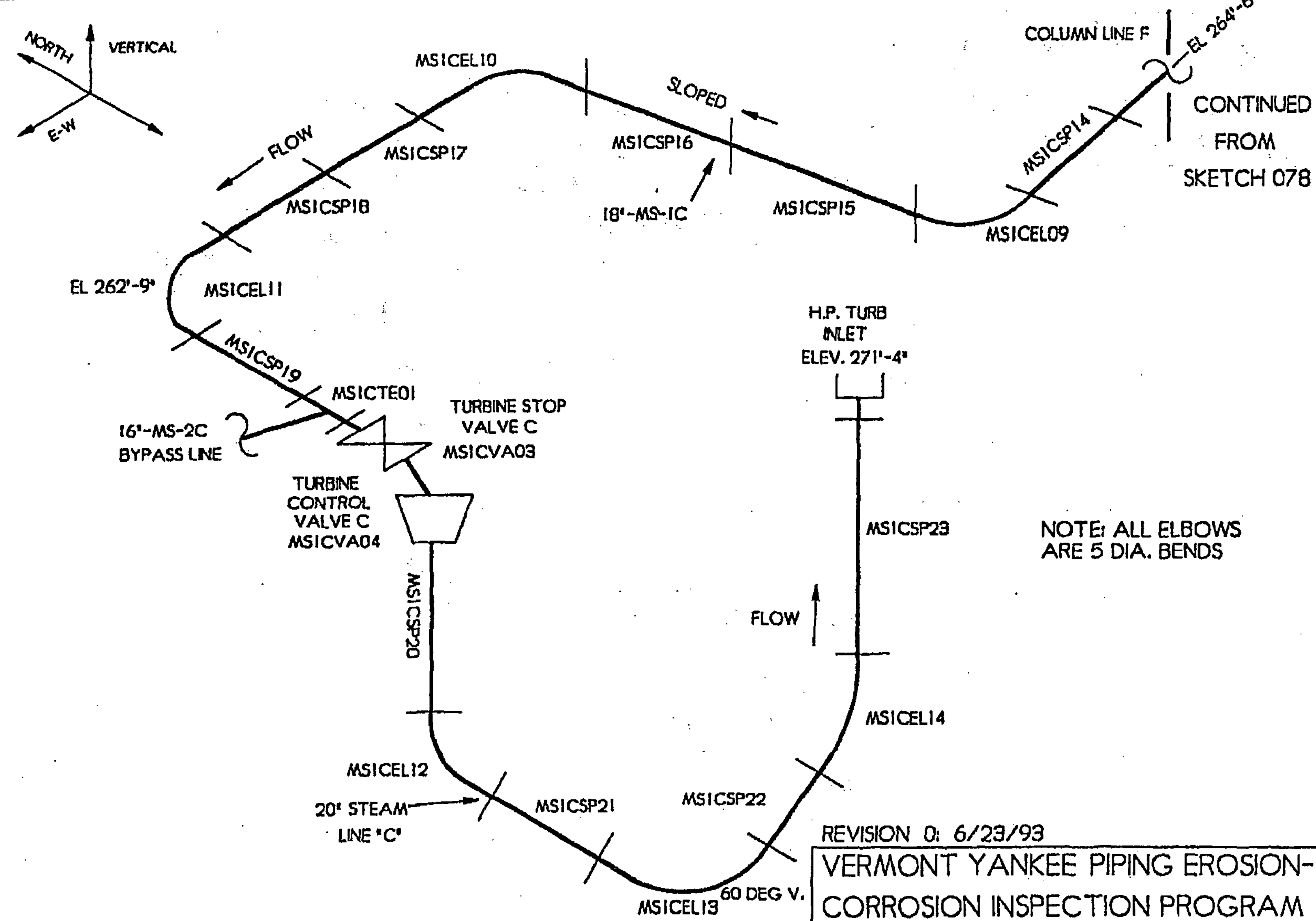

REVISION 0: 6/23/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

MAIN STEAM LINE 18"-MS-1C & 18"-MS-7C

COMPONENT LOCATION SKETCH No.078

DRYWELL & STEAM TUNNEL
REFERENCES: G191167,G191182,5920-FS-13




REVISION 0: 6/23/93

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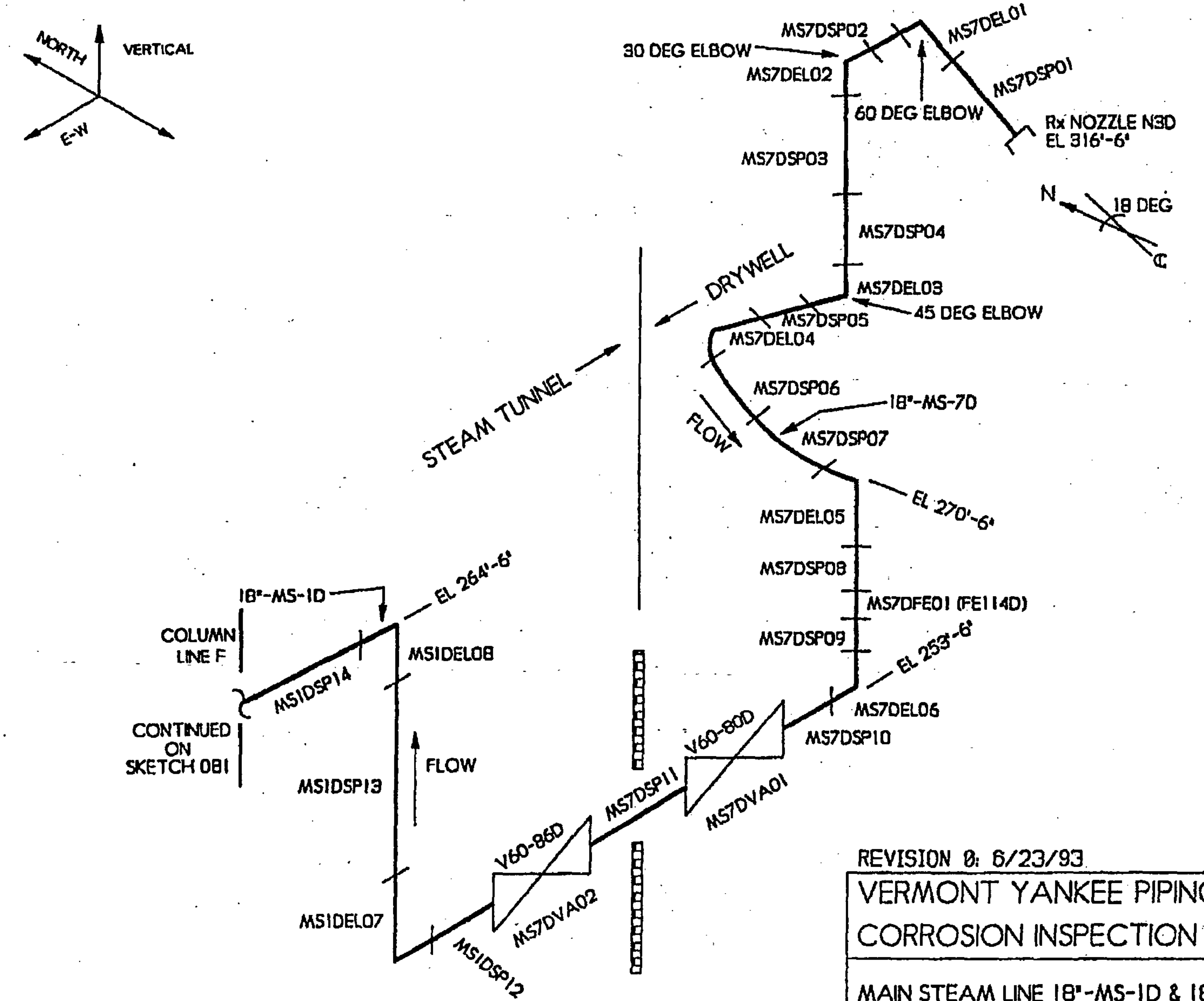
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| MAIN STEAM LINE 18"-MS-1C (CONTINUED) |
| COMPONENT LOCATION SKETCH No. 079 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-11&12



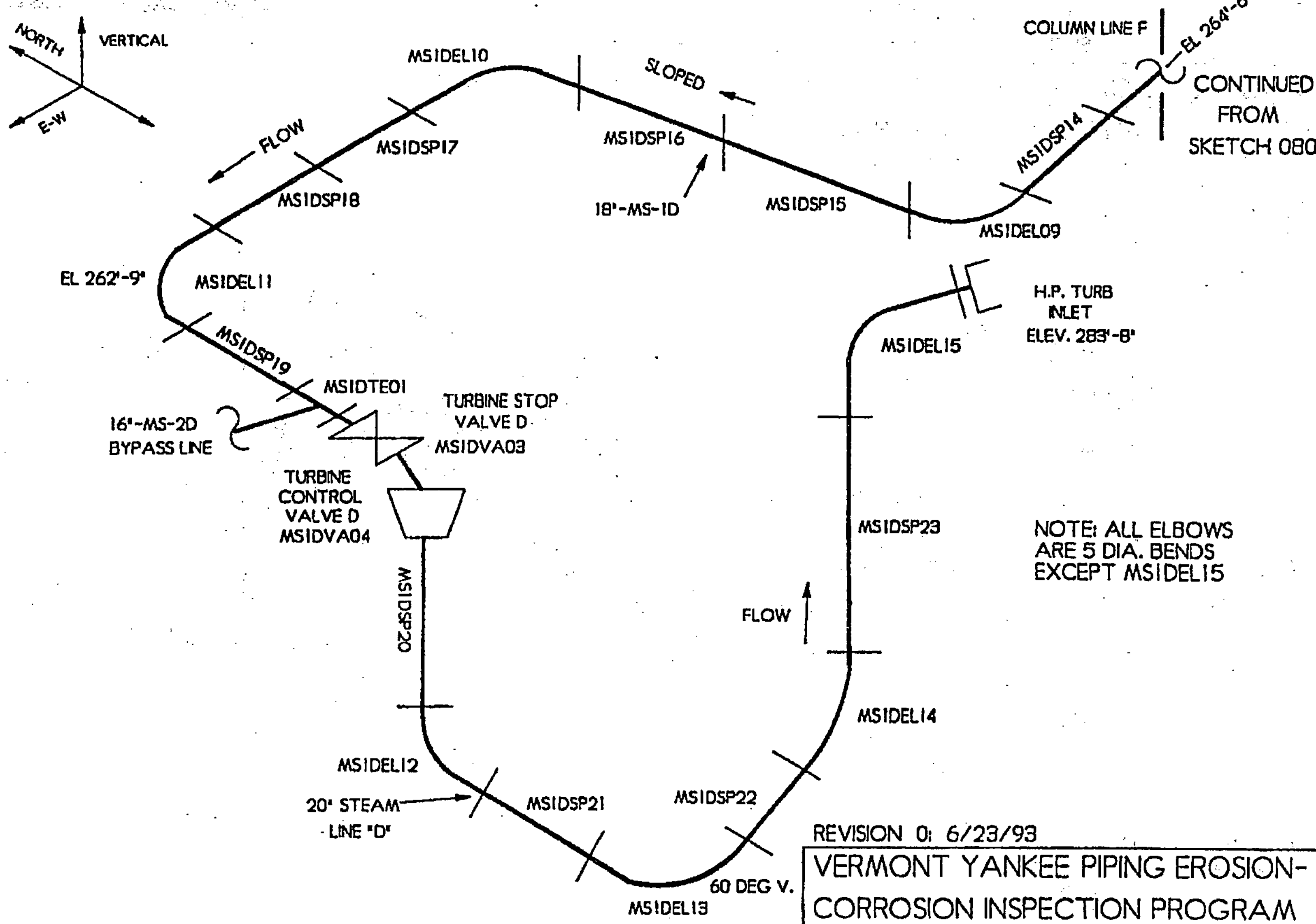

REVISION 0: 6/23/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

MAIN STEAM LINE 18"-MS-1D & 18"-MS-7D

COMPONENT LOCATION SKETCH No.080

DRYWELL & STEAM TUNNEL
REFERENCES: G191167,G191182,5920-FS-13



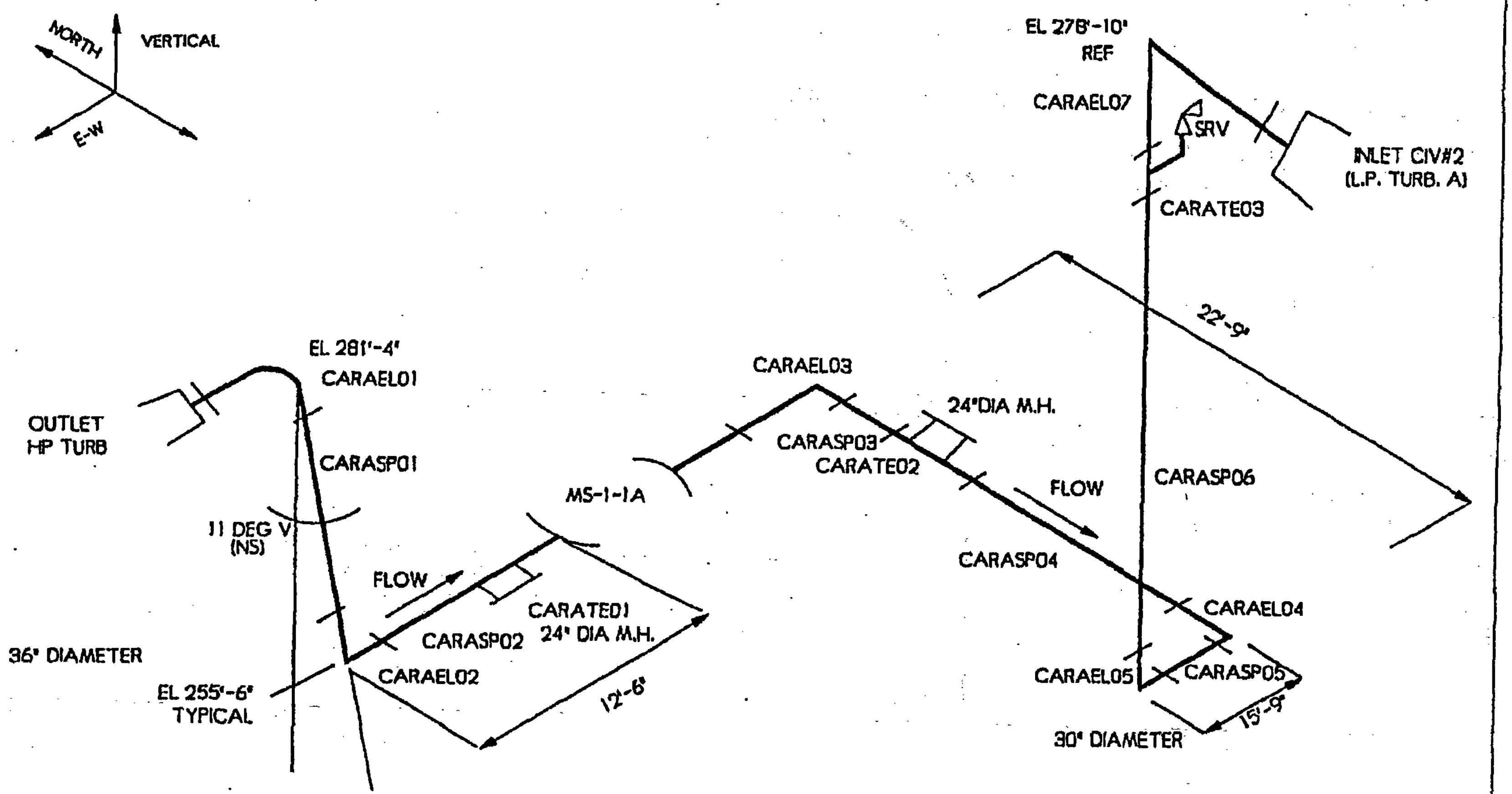

REVISION 0: 6/23/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

MAIN STEAM LINE 18"-MS-1D (CONTINUED)

COMPONENT LOCATION SKETCH No. 081

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I1&I2




REVISION 0: 6/25/93

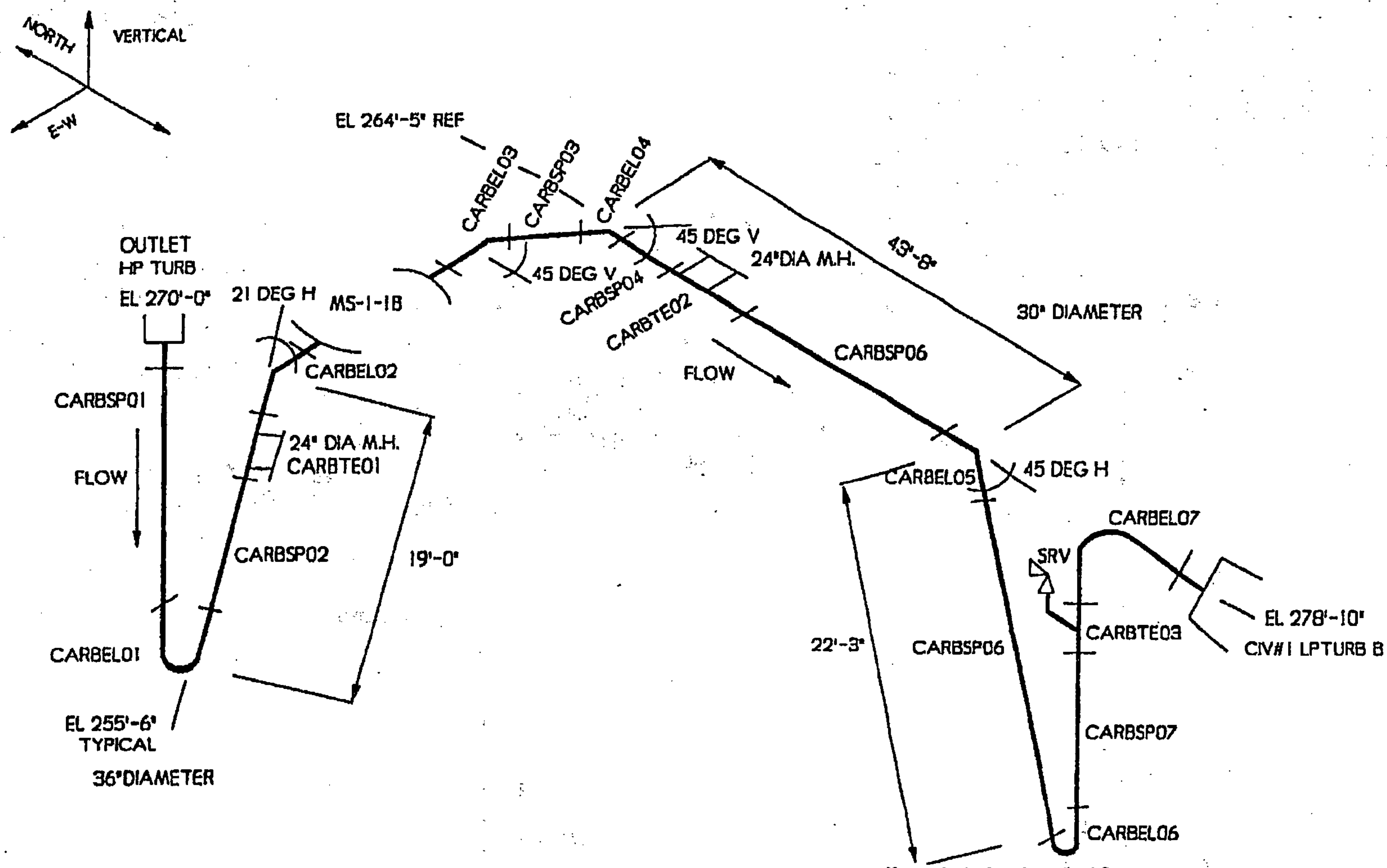
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

30" & 36" TURBINE CROSS AROUND PIPING - "A" LINE

COMPONENT LOCATION SKETCH No.082

TURBINE BULDING-HEATER BAY

REFERENCES: G191156,5920-6841,5920-6846,5920-FS-12



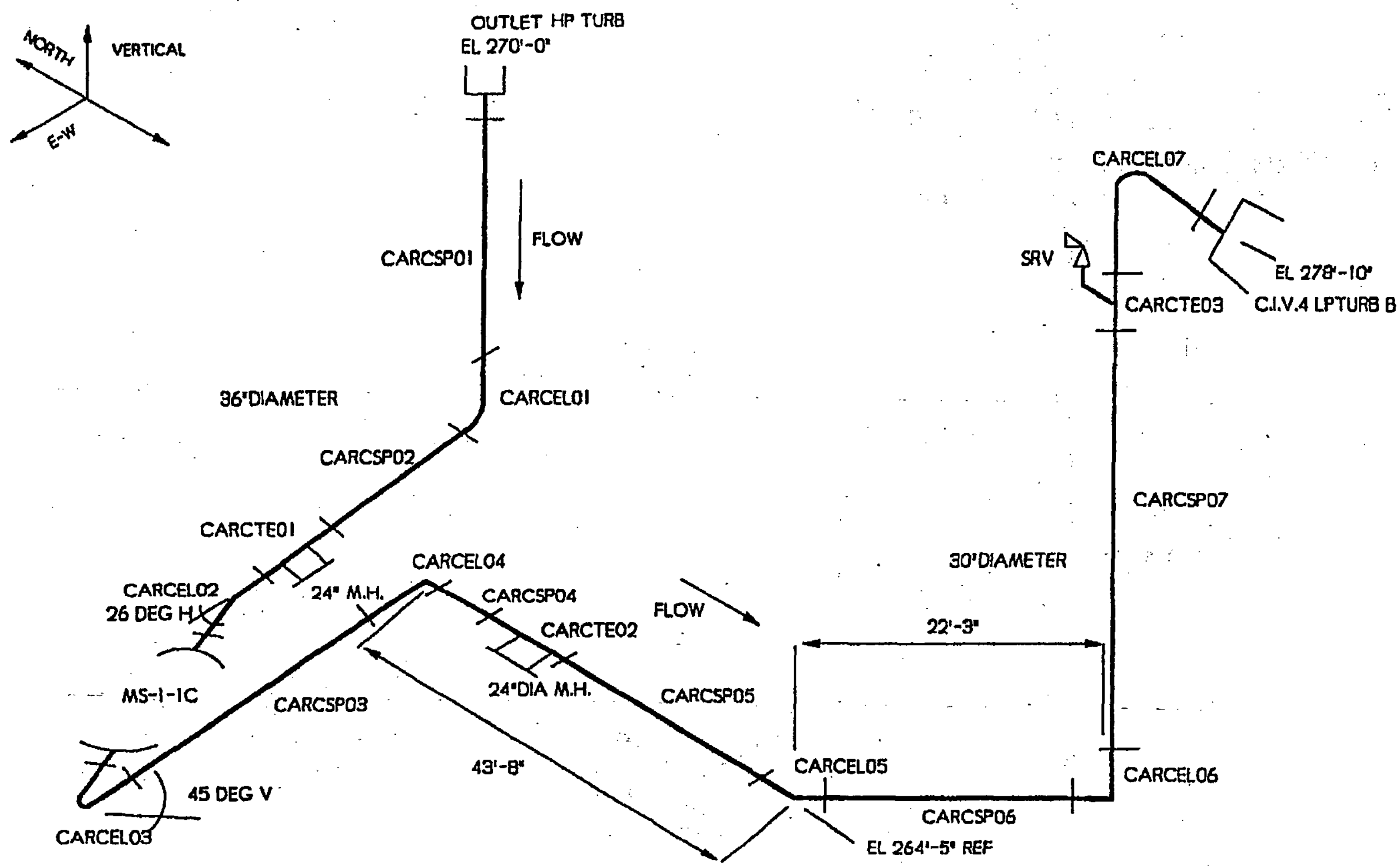

REVISION 0: 6/25/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

30" & 36" TURBINE CROSS AROUND PIPING - "B" LINE

COMPONENT LOCATION SKETCH No.083

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,5920-6841,5920-6846,5920-FS-12



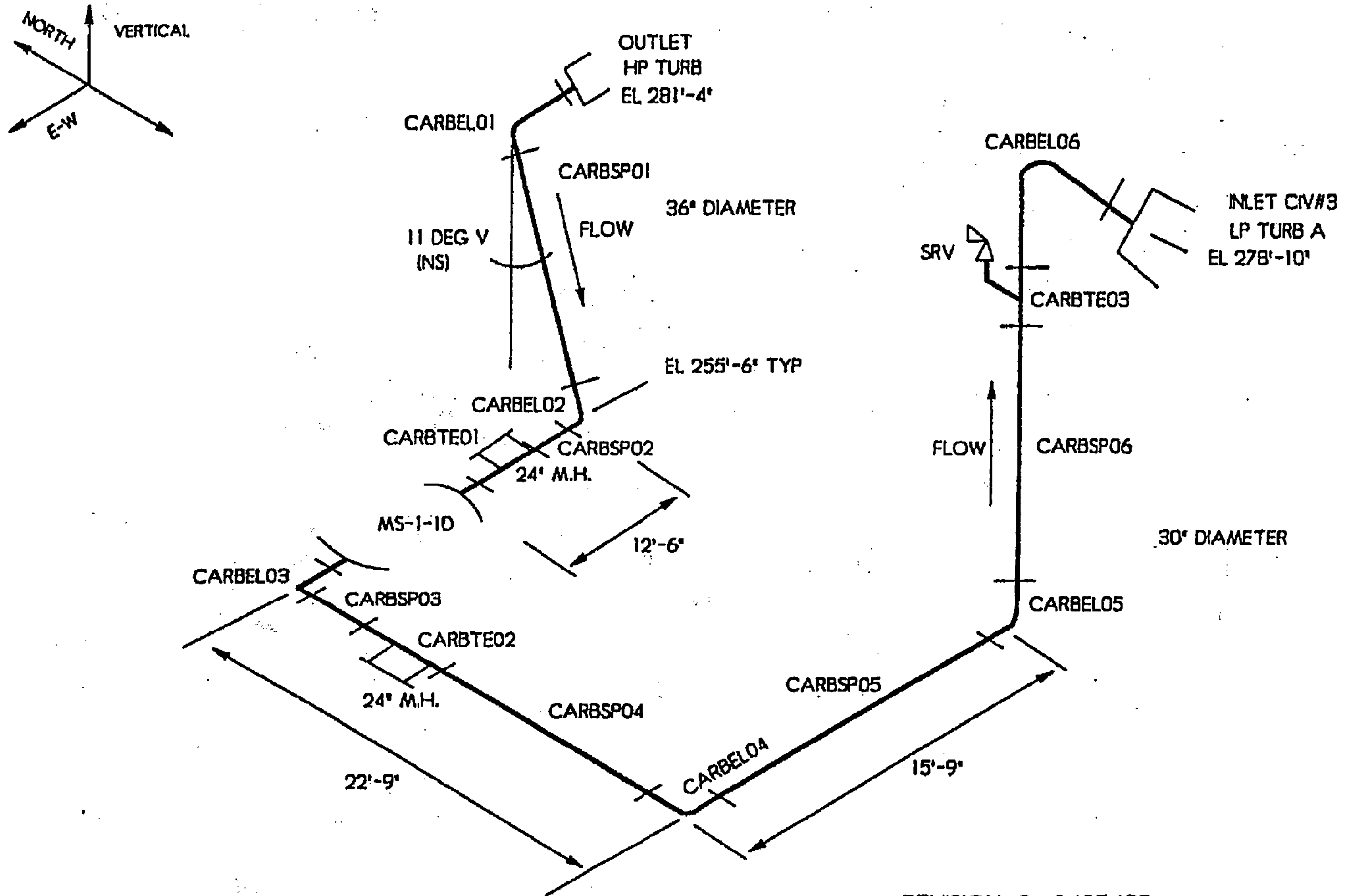

REVISION 0: 6/25/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

30" & 36" TURBINE CROSS AROUND PIPING - "C" LINE

COMPONENT LOCATION SKETCH No.084

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,5920-6841,5920-6846,5920-FS-12



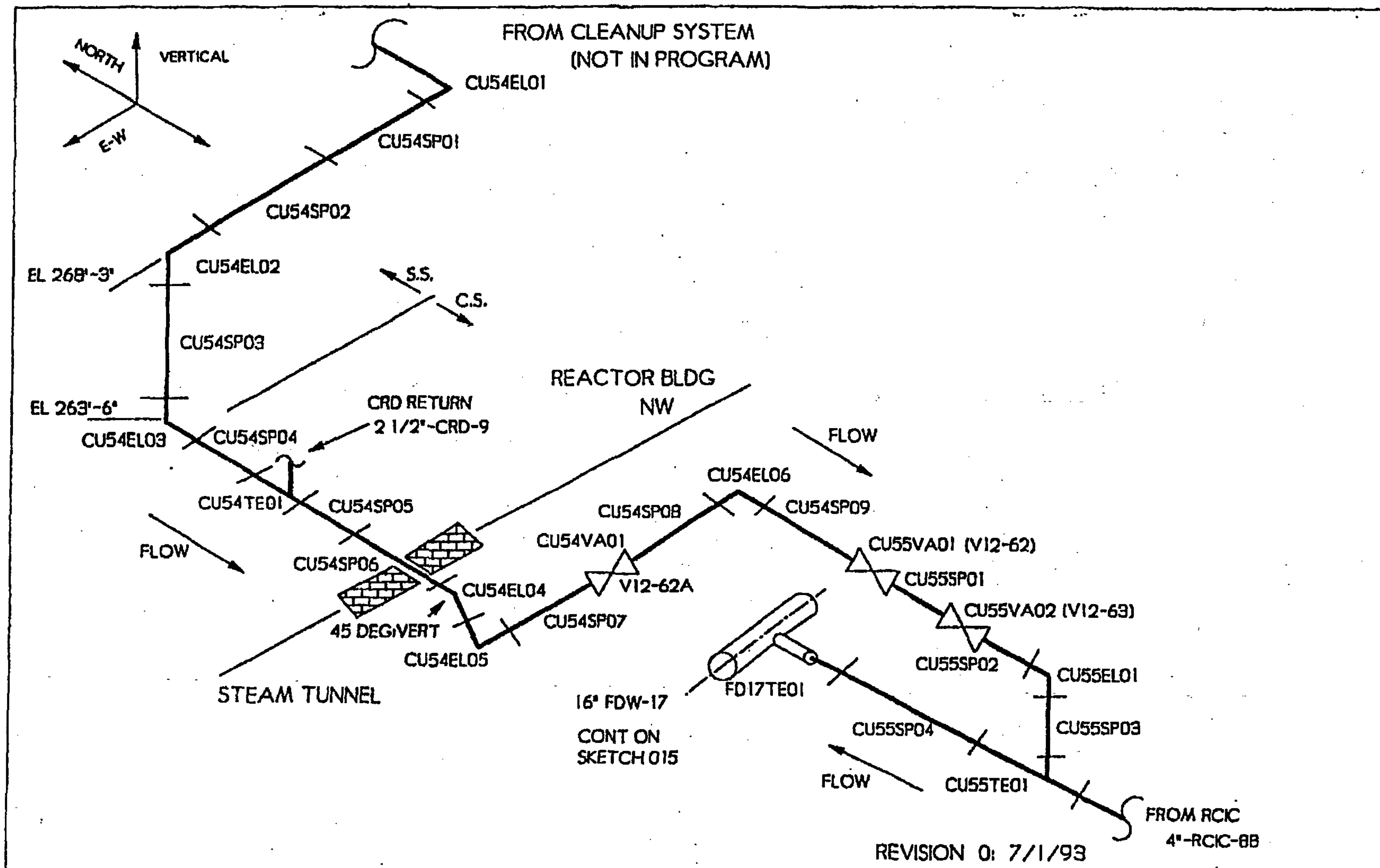

REVISION 0: 6/25/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

30" & 36" TURBINE CROSS AROUND PIPING - "D" LINE

COMPONENT LOCATION SKETCH No.085

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,5920-6841,5920-6846,5920-FS-12



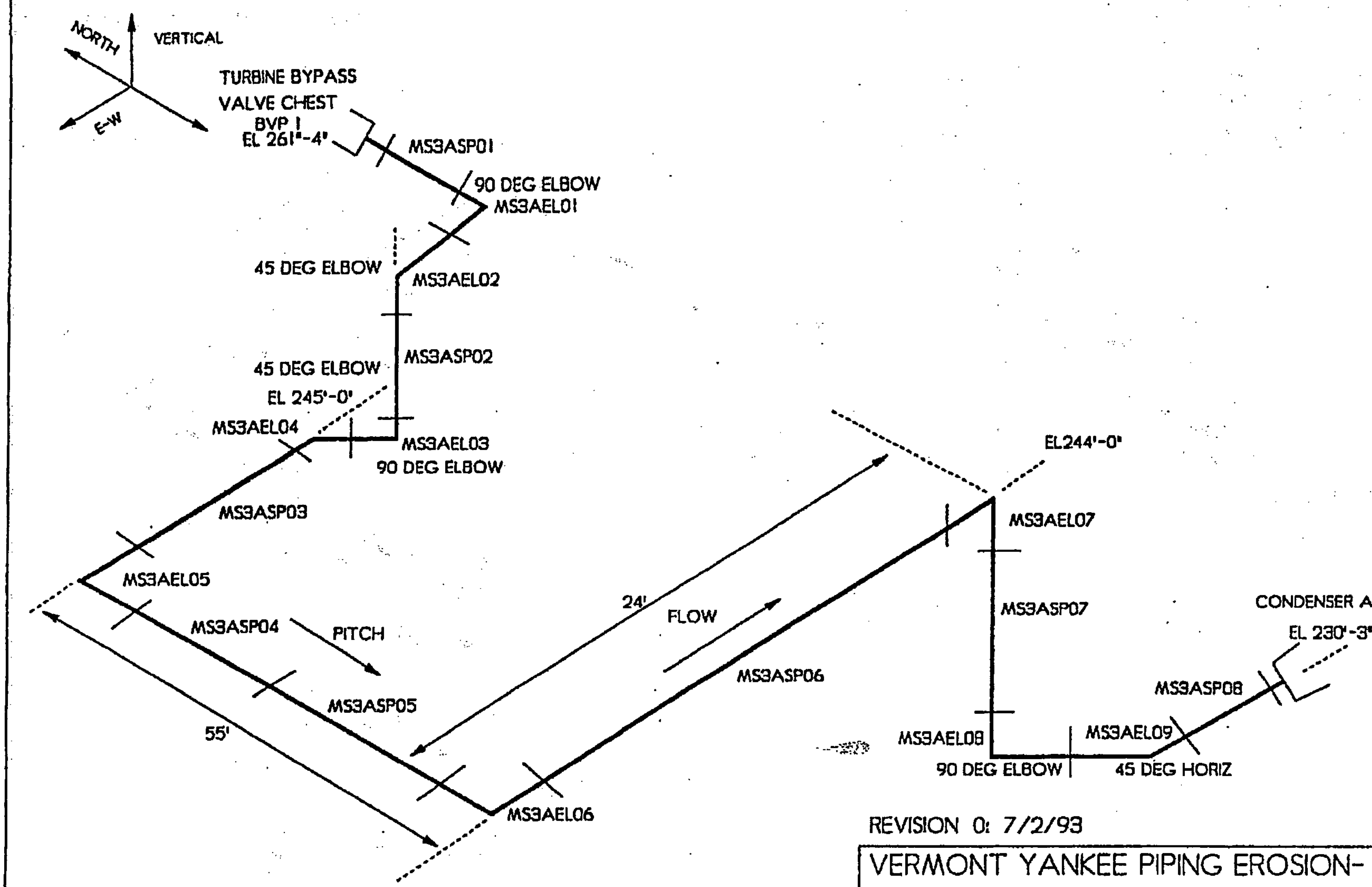

REVISION 0: 7/1/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

REACTOR WATER CLEAN UP
4"-CUW-54 & 4"-CUW-55

COMPONENT LOCATION SKETCH No.086

REACTOR BLDG NW / STEAM TUNNEL
REFERENCES: G191178,VYI-CUW-PART4




REVISION 0: 7/2/93

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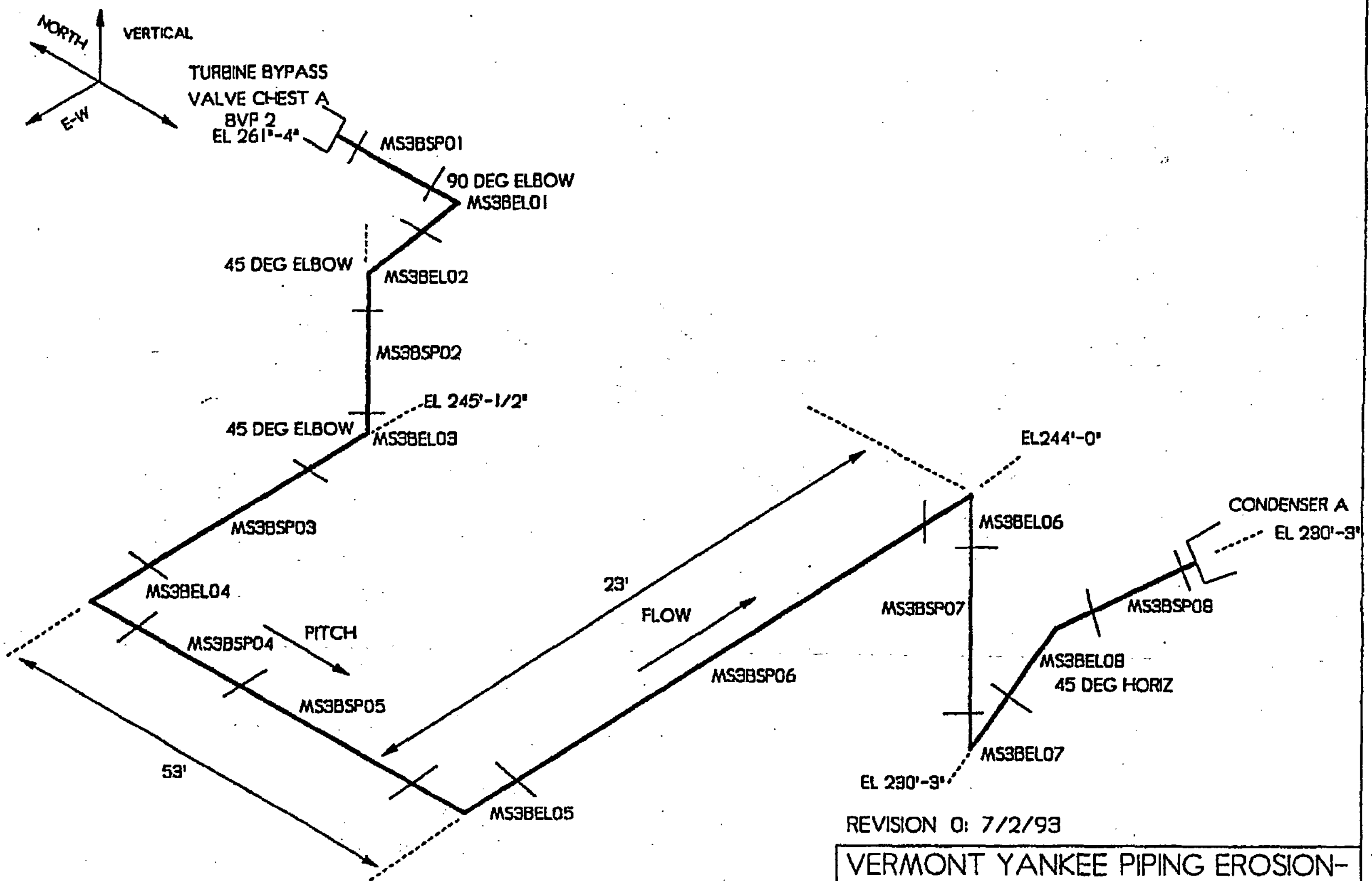
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| 10"-MS-3A |
| COMPONENT LOCATION SKETCH No.087 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-12



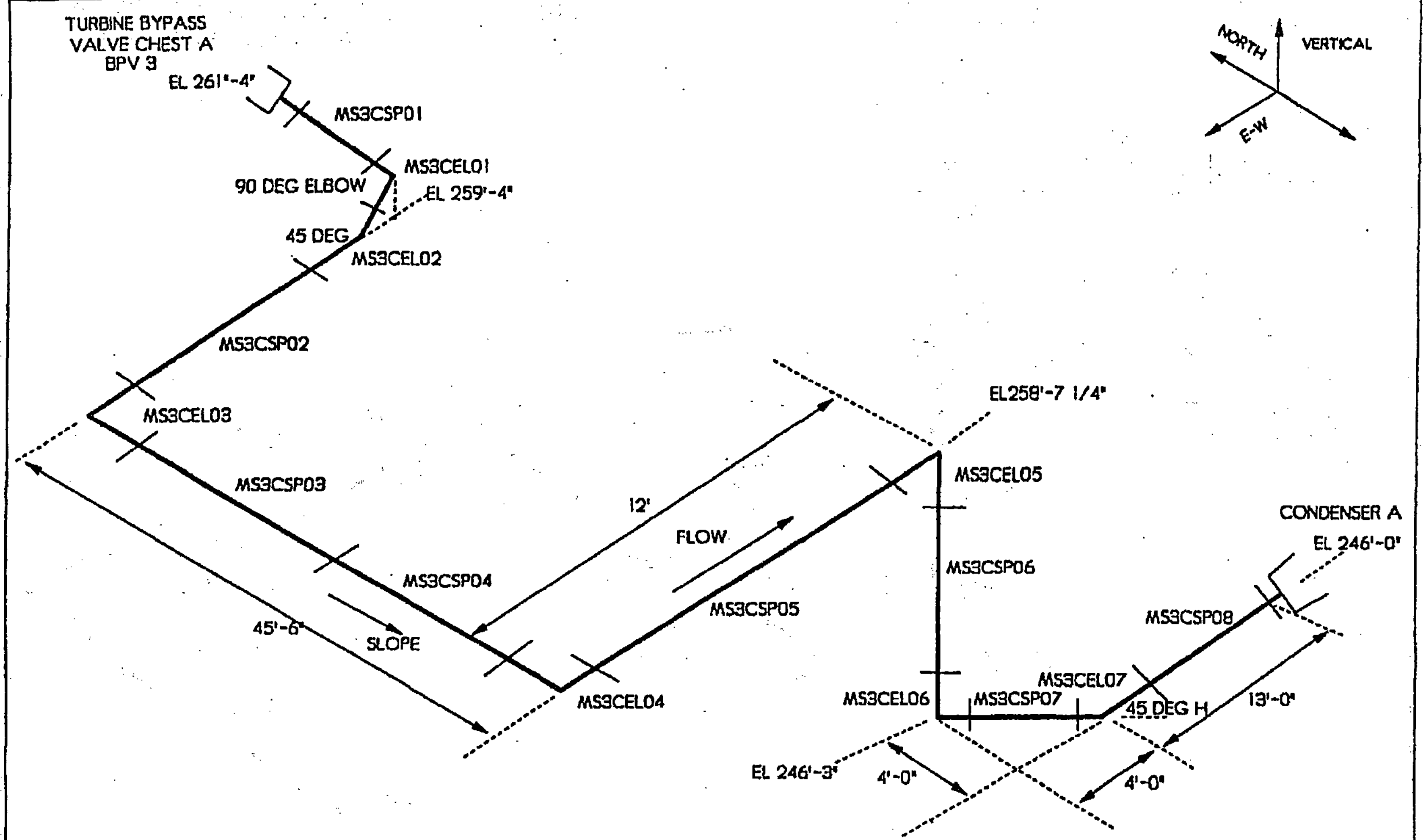

REVISION 0: 7/2/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3B

COMPONENT LOCATION SKETCH No.088

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-12



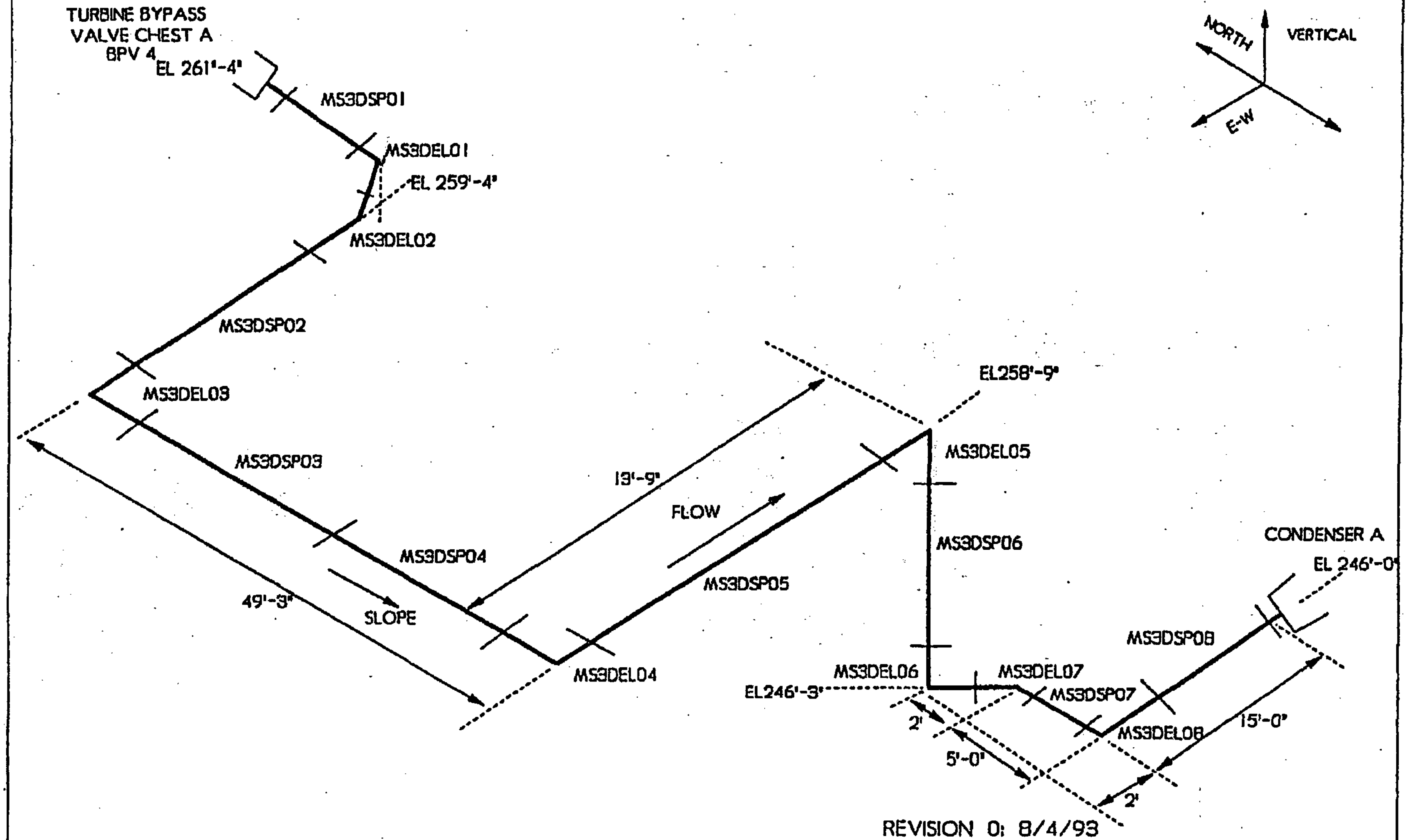

REVISION 0: 8/4/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3C

COMPONENT LOCATION SKETCH No.089

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2



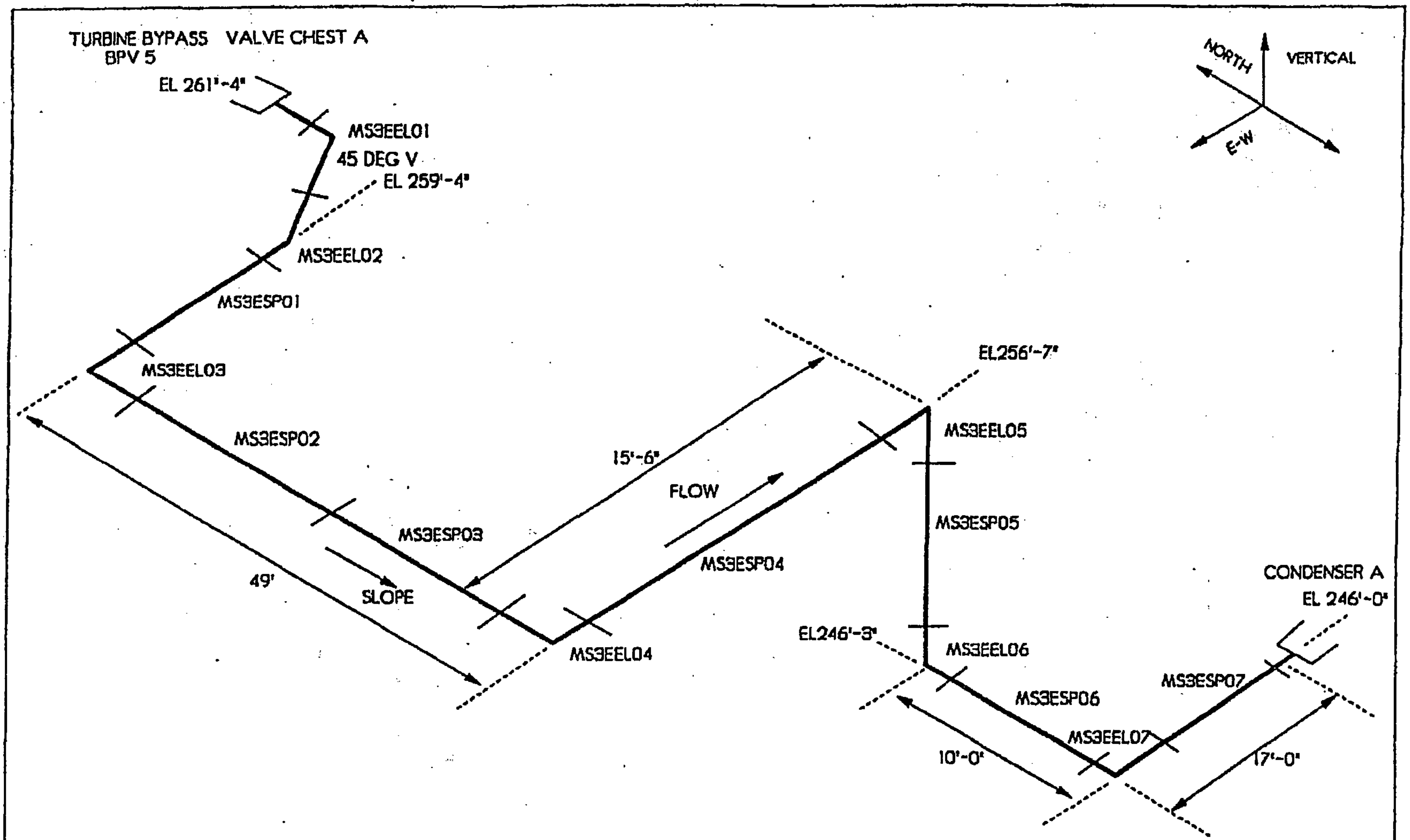

REVISION 0: 8/4/93

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2

| |
|---|
| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
| 10"-MS-3D |
| COMPONENT LOCATION SKETCH No.090 |



[redacted]



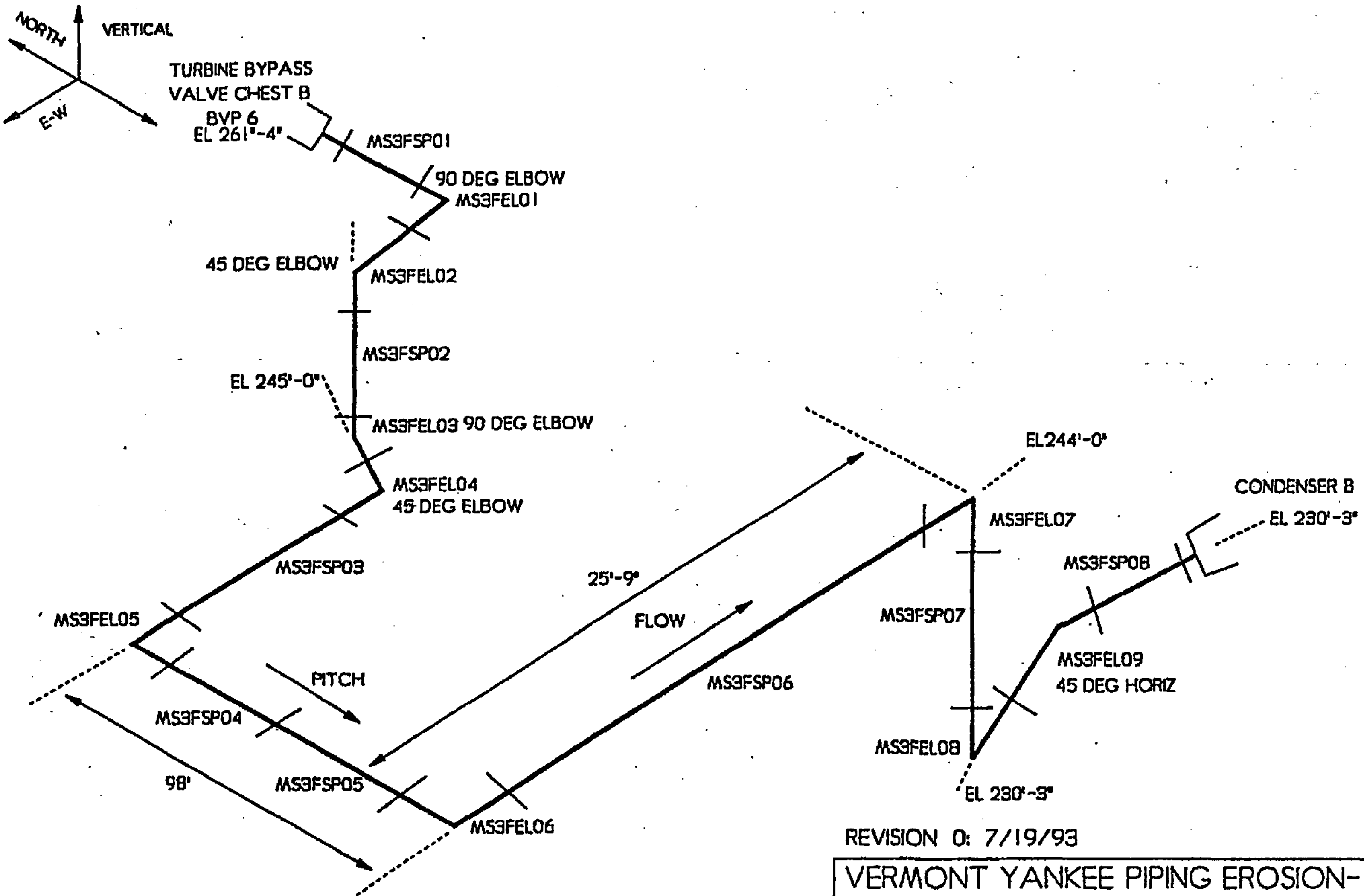

REVISION 0: 8/4/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3E

COMPONENT LOCATION SKETCH No.091

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2



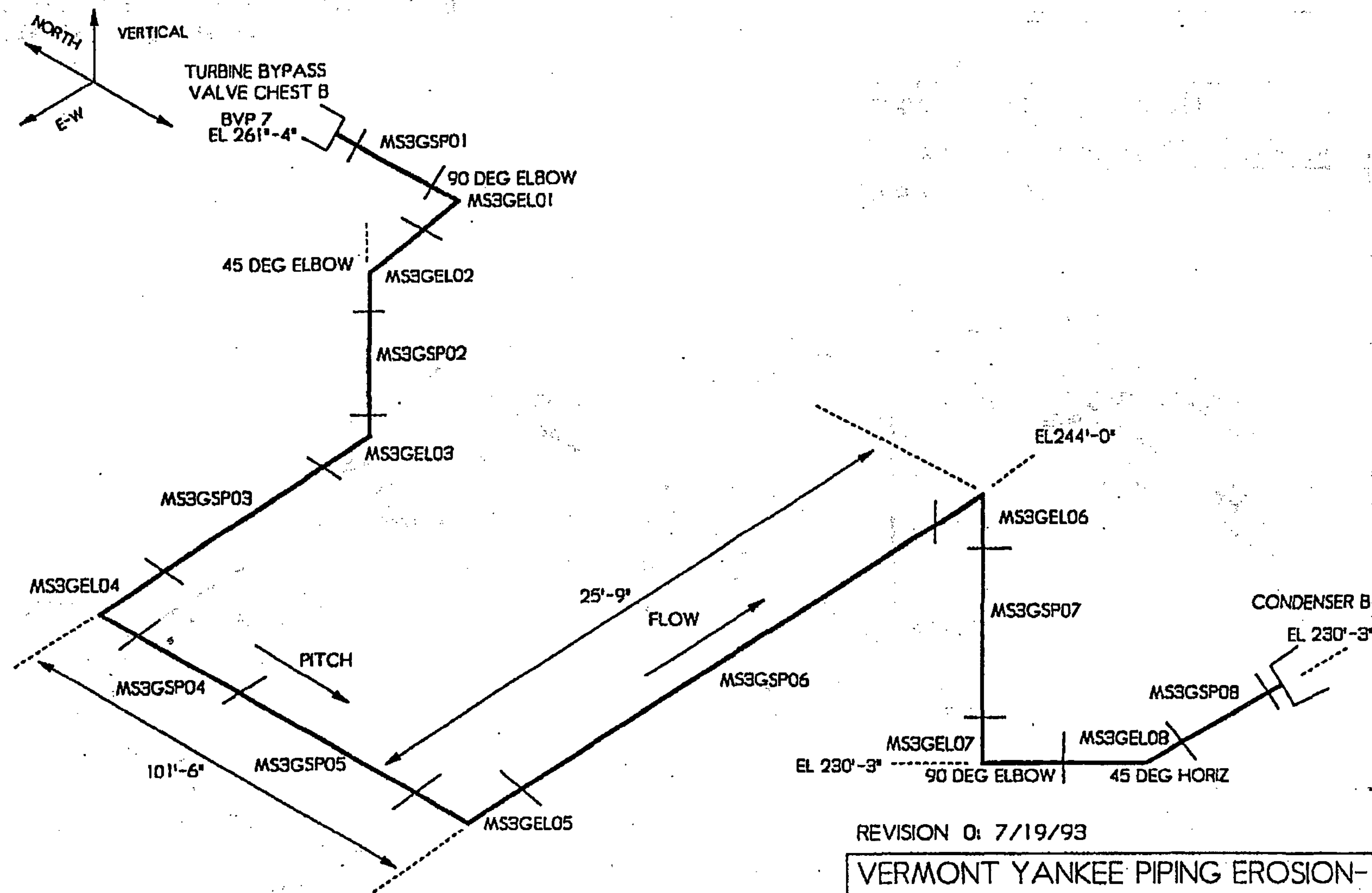

REVISION 0: 7/19/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3F

COMPONENT LOCATION SKETCH No.092

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2



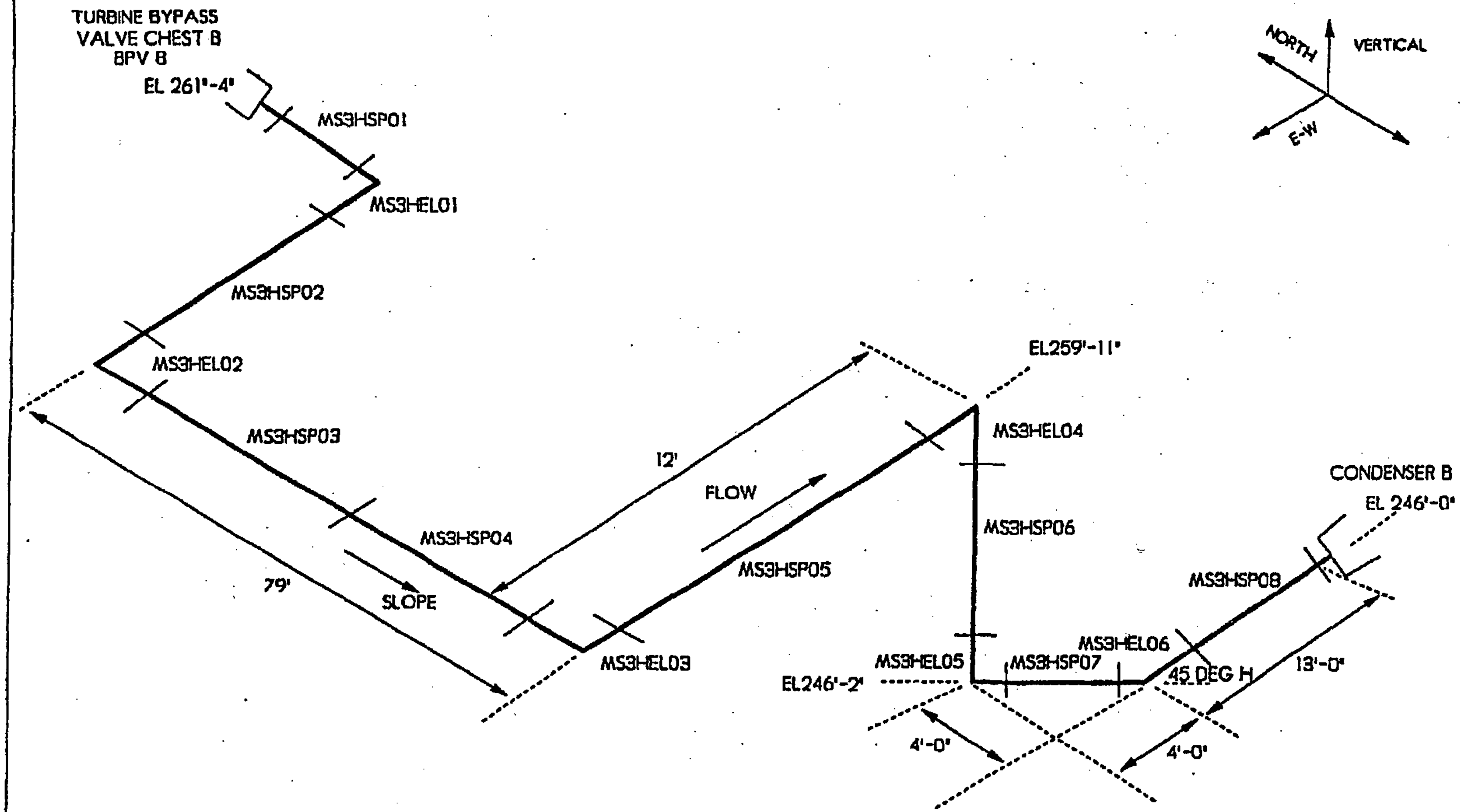

REVISION 0: 7/19/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3G

COMPONENT LOCATION SKETCH No.093

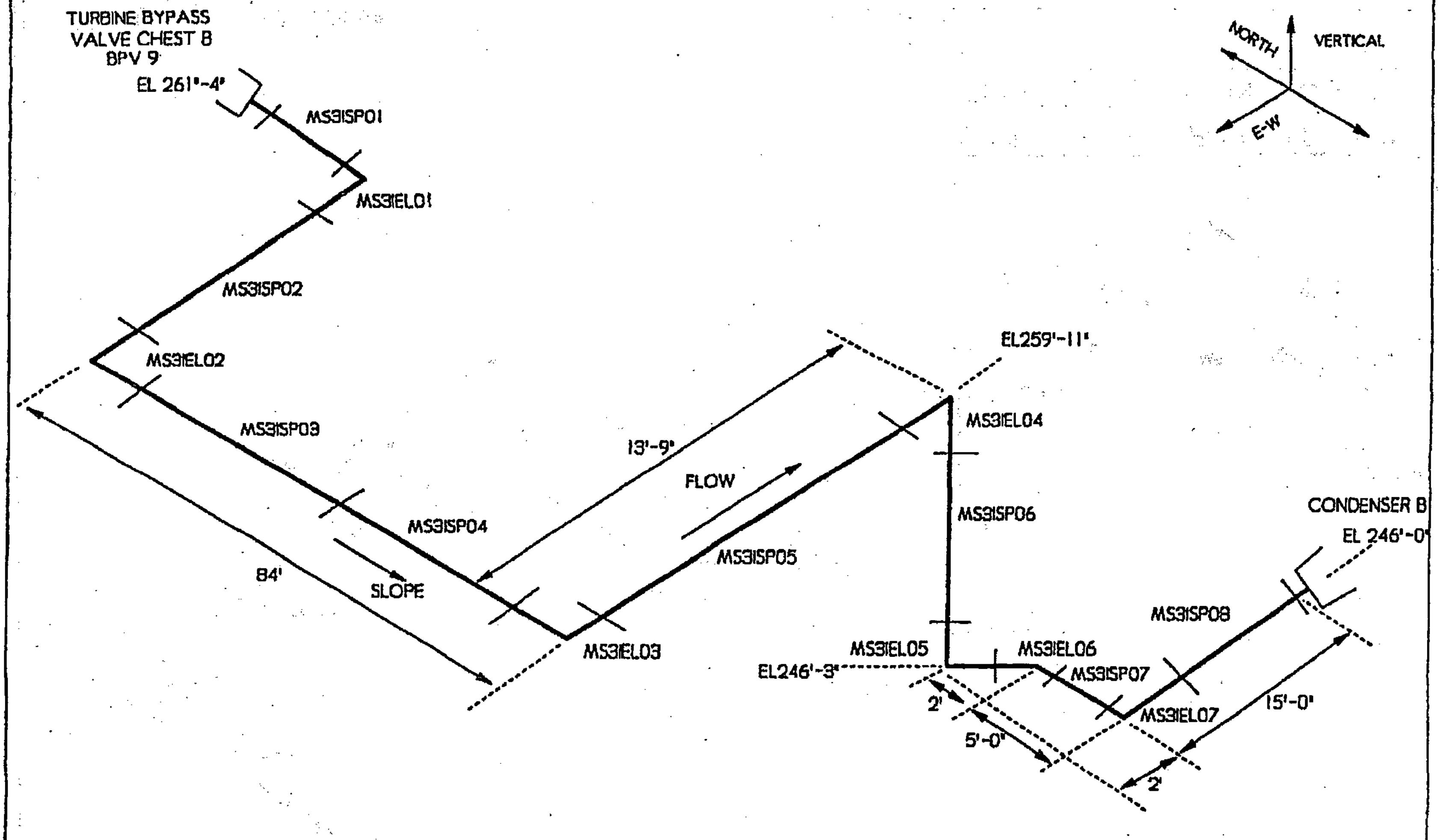
TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2




REVISION 0: 8/2/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| 10"-MS-3H |
| COMPONENT LOCATION SKETCH No.094 |

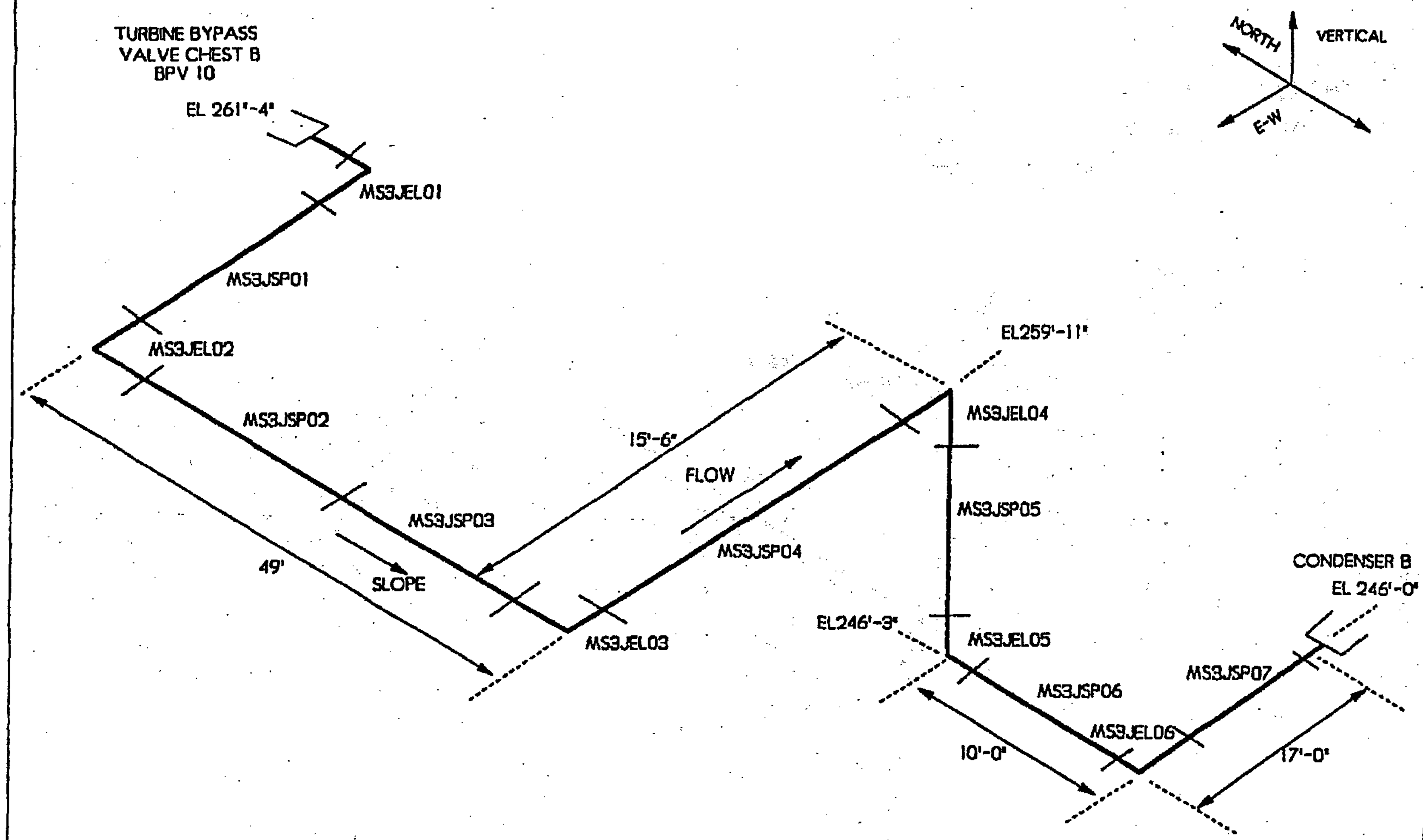
TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2




REVISION 0: 8/3/93

| VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM |
|---|
| 10"-MS-31 |
| COMPONENT LOCATION SKETCH No.095 |

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I2



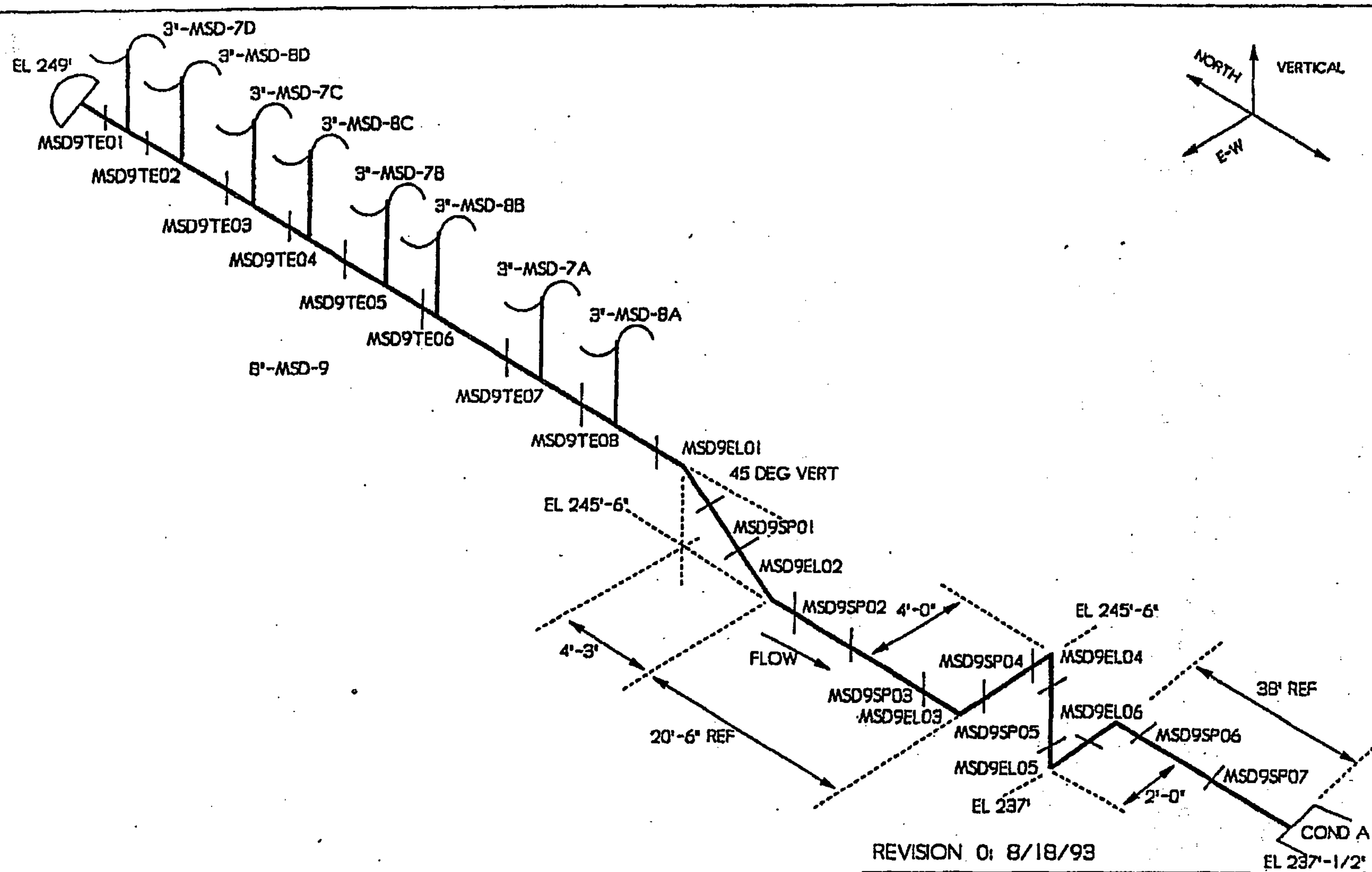

REVISION 0: 8/4/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

10"-MS-3J

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-12

COMPONENT LOCATION SKETCH No.096




REVISION 0: 8/18/93

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

8"-MSD-9

COMPONENT LOCATION SKETCH No.097

TURBINE BULDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5920-FS-I-1B

## APPENDIX B

## SMALL BORE PIPING INSPECTION LOCATION DATABASE

**Identification of Small bore components**

Only specific small bore locations consisting of piping components (valves, steam traps, orifices, etc.) and the adjacent piping will be inspected under this program. These locations were selected and identified in reference 5.4.3., and are compiled in the Small Bore Inspection Database.

Each location has been given a unique point number in the Small Bore Component Database. Additional components will be included into the database as warranted. Since the majority of the small bore components will be inspected only once, the previous system for identification of inspection results was retained.

Each inspection performed is identified as follows:

**"YR-SBxx"**

where: **YR** - is the year the location is inspected.

**SB** - denotes small bore piping ( less than 2-1/2" diameter).

**xx** - a number assigned to the location by the FACPC for that specific refueling outage.

Example: **93-SB04**

The Data base identifies all small bore points inspected up to and including the 1999 RFO.

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 1 | 93-SB01 | MSD | 1" Pipe & Fittings D.S. of valve M-33 | Rx. Bldg. Torus Area | G191167 | MS-33(N.C.)labeled as orificed valve. | 1" | 160 | .250 | .053 |
| 2 | 93-SB02<br>95-SB01 | MSD | 1" Pipe & Fittings D.S. of steam trap ST60-3. | Rx. Bldg. Torus Area | G191167 | Normal flow to condenser is thru ST60-3. (dp=965psi) | 1" | 160 | .250 | .053 |
| 3 | 93-SB03 | MSD | 1" piping D.S. of LCV-2-143 | Rx. Bldg. Torus Area | G191167 | Mn Steam strainer ST60-3 blow down . (dp=965psi) | 1" | 160 | .250 | .053 |
| 4 | 93-SB04 | MSD | 3" & 2½" MSD D. S. of valve MS-79 (3"-MSD-4) | Rx. Bldg. Torus Area | G191167 | N.C. valve (dp=965psi) | 3"<br>2½" | 160<br>160 | .438<br>.375 | 0.141<br>0.116 |
| 5 | 93-SB05 | MSD | 3" MSD-4 U.S. of Condenser A. Nozzle 67 | T. B. - Heater Bay | G191156 | IE | 3" | 160<br>STD | .438<br>.216 | 0.141<br>0.141 |
| 6 | 93-SB06 | MSD | 1" & 2½" MSD-7A D.S. of steam trap, ST-60-2A | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 7 | 93-SB07 | MSD | 1" & 2½" MSD-8A @ LCV-38A. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 8 | 95-SB03 | MSD | 1" & 2½" MSD-7B D.S. of steam trap, ST-60-2B. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 9 | 95-SB04 | MSD | 1" & 2½". MSD-8B @ LCV-38B. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 10 | 93-SB09 | MSD | 1"&2½" MSD-7C D.S. of steam trap ST60-2C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 11 | 93-SB10<br>95-SB02 | MSD | 1" & 2½" MSD-8C @ LCV-38C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 12 | 95-SB05 | MSD | 1" & 2½" MSD-7D D.S. of steam trap, ST-60-2D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 13 | 95-SB-06 | MSD | 1" & 2½" MSD-8D @ LCV-38D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| | 93-SB08 | MSD | 8" MSD-9 Hdr. @ 2½" conn. (See L.B. Sketch 097) | T. B. - Heater Bay | G191156 | (IE) Portions of LB component inspected with SB pipe. | 8" | 80 | .500 | .347 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PT.** | **PREV. INSPECT. No.** | **SYSTEM** | **DESCRIPTION** | **LOCATION** | **DRAWINGS** | **COMMENTS** | **SIZE** | **SCH.** | **Tnom inch** | **T min inch** |
| 14 | 93-SB12 | MSD | 1"&2½" Piping @ valve MS-2A. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 15 | 95-SB-07 | MSD | 1"&2½" Piping @ valve MS-2B. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 16 | 93-SB13 | MSD | 1"&2½" Piping @ valve MS-2C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 17 | 95-SB08 | MSD | 1"&2½" Piping @ valve MS-2D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 18 | 93-SB14 | MSD | D.S. of valve MS-4 on 2½" MSD-6. | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 19 | 93-SB15 | MSD | 2½" MSD-6 @ Fittings U. S. of Condenser A. | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 20 | 95-SB09<br>96-SB01 | MSD | 2½" MSD-6. ( 2 ft. length at Connect. to Conden. A -Noz.33 | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 21 | 93-SB16 | MSD | 1" MSD U.S. & D.S. of valve MS-5A. , | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 22 | 93-SB55 | MSD | 1" MSD U.S. & D.S. of valve MS-5B. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 23 | 93-SB17 | MSD | 1" MSD U.S. & D.S. of valve MS-5C. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 24 | 93-SB56 | MSD | 1" MSD U.S. & D.S. of valve MS-5D. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 25 | 93-SB18 | MSD | 2" MSD hdr. Under 5A & 5C valves. | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 26 | 93-SB19 | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D.. | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 27 | 95-SB10 | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D. at Connect to Condenser. A Noz.34 | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 28 | 92-SB10<br>92-SB11<br>95-SB38 | MSD | 2" pipe & fittings D.S. of valve MS-12 up to tee conn. | T. B. - Heater Bay | G191156 | Leak @ MS-12 valve in 1992 Replaced in 1992 | 2" | 80 | .218 | .096 |
| 29 | 92-SB13 to 92-SB15<br>95-SB11 | MSD | 1" pipe & fittings U.S. & D.S. of R.O. 60-1 up to tee conn. | T. B. - Heater Bay | G191156 | Replaced in 1992. | 1" | 80 | .179 | .053 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PT.** | **PREV. INSPECT. No.** | **SYSTEM** | **DESCRIPTION** | **LOCATION** | **DRAWINGS** | **COMMENTS** | **SIZE** | **SCH.** | **Tnom inch** | **T min inch** |
| 30A | 92-SB12<br>95-SB12 | MSD | 2" piping D.S. of tee conn. D.S. of R.O.60-1. | T. B. - Heater Bay | G191156 | Leak @MS-12 valve in 1992 Replaced in 96 W/ A335 P11 | 2" | 80 | .218 | .096 |
| 30B | 95-SB12 | MSD | 2" piping D.S. of tee conn. D.S. of R.O. 60-1. at condenser | T. B. - Heater Bay | G191156 | Replaced in 96 W/ A335 P11 | | | | |
| 31 | 96-SB03 | MSD (HPCI) | 1" pipe & fittings D.S. of valve HPCI FCV - 43 | RX. - HPCI Room. | G191169<br>VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 1" | 80 | .179 | .053 |
| 32 | 96-SB04 | MSD (RCIC) | 1" pipe & fittings D.S. of valve RCIC FCV-35 | RX. - RCIC Room | G191174<br>VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |
| 33 | | MSD (HPCI/ RCIC) | 2" pipe & fittings U.S. of connect. to Condenser B. | T.B. - Heater Bay | G191156<br>VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |
| 34 | 93-SB20 | HV | 1"-HV-1A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 35 | 93-SB21 | HV | 1"HV -1A, pipe & fittings D.S. of R.O.-1A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 36 | 93-SB22 | HV | 1"HV-1A, pipe & fittings @ valve HV-1A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 37 | 95-SB17 | HV | 1"-HV-1B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 38 | 95-SB16 | HV | 1"- HV-1B, pipe & fittings D.S. of R.O.-1B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 39 | 95-SB18 | HV | 1"-HV-1B, pipe & fittings @ valve HV-1B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 40 | 95-SB19<br>98-SB01 | HV | 1"-HV-2A, pipe & fittings @ valve HV-4A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 41 | 95-SB20<br>98-SB02 | HV | 1"-HV-2A, pipe & fittings @ R.O.-2A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 42 | 95-SB21<br>98-SB03 | HV | 1"-HV-2A, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 43 | 93-SB23 | HV | 1"-HV-2B, pipe & fittings @ valve HV-4B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 44 | 93-SB24 | HV | 1"-HV-2B, pipe & fittings @ R.O.-2B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 45 | 93-SB25 | HV | 1"-HV-2B, pipe & fittings @ condenser A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 46 | | HV | 1½"-HV-3A, pipe & fittings @ valve HV-7A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 47 | 95-SB22 | HV | 1½"-HV-3A, pipe & fittings @ Condenser A. Nozzle 23 | T. B. - Heater Bay | G191158 | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 48 | | HV | 2"-HV-9A, pipe & fittings @ R.O.-3A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 2" | 80 | .218 | .008 |
| 49 | | HV | 2"-HV-9A, pipe & fittings D.S. of valve HV- 15A | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 50 | | HV | 2"-HV-9A, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 51 | | HV | 1½"-HV-3B, pipe & fittings @ valve HV-7B | T. B. - Heater Bay | G191158 | IE | 1½" | 80 | .200 | .007 |
| 52 | 95-SB23 | HV | 1½"-HV-3B, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | IE | 1½" | 80 | .200 | .007 |
| 53 | | HV | 2"-HV-9B, pipe & fittings @ R.O.-3B. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 54 | | HV | 2"-HV-9B, pipe & fittings D.S. of valve HV- 15B | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 55 | | HV | 2"-HV-9B, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |

APPENDIX B (Continued)

**SMALL BORE PIPING INSPECTION LOCATION DATABASE**

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 56 | | HV | 2½"-HV-4A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 57 | | HV | 2½"-HV-4A, pipe & fittings D.S. of R.O.-4A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 58 | | HV | 2½"-HV-4A, pipe & fittings @ valve HV-9A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 59 | | HV | 2½"-HV-4B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 60 | | HV | 2½"- HV-4B, pipe & fittings D.S. of R.O.-4B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 61 | | HV | 2½"-HV-4B, pipe & fittings @ valve HV-9B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 62 | 95-SB24<br>98-SB08 | ES | 2"-ES-12A piping US & DS of LCV-2A near Condenser A | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 63 | 95-SB25 | ES | 2"-ES-10A piping US & DS of LCV-3A near Condenser A | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 64 | 93-SB26 | ES | 2"-ES-12B piping US & DS of LCV-2B near Condenser B. | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 65 | 93-SB27<br>98-SB09 | ES | 2"-ES-10B piping US &DS of LCV-3B near Condenser B | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 66 | 93-SB28 | AS | 1" piping US &DS of valve LCV-101-39 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 67 | 93-SB29<br>98-SB04 | AS | 1" & 2" piping US &DS of steam trap ST 62-1. | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 68 | 93-SB30<br>98-SB03 | AS | 2"-MSD-465 pipe & fittings @ connect. to Condenser B Nozzle 68 | T.B. - Heater Bay | G191156 | Industry Experience Point | 2" | 160 | .344 | .096 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 69 | 95-SB26 | AS | 2"-MSD-465 pipe & fittings DS of valve V-62-2 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 70 | 95-SB27 | AS | 1" piping US &DS of valve LCV-101-40 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 71 | 95-SB28<br>98-SB06 | AS | 1" & 1½" piping US &DS of steam trap ST 62-2. | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 72 | 95-SB29<br>98-SB07 | AS | 1½" -MSD-464 pipe & fittings @ connect. to Condenser B Nozzle 69 | T.B. - Heater Bay | G191156 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 73 | 95-SB30 | AS(AOG) | 2" piping of DS of valve OG PRV -834A | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 74 | 95-SB31 | AS(AOG) | 3/4" piping US &DS of steam trap MS-113-1A. | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 75 | 95-SB32 | AS(AOG) | 3/4" piping US &DS of steam trap MS115-1A | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 76 | 95-SB33 | AS(AOG) | 3/4"MS-189-D3 AS drain from OG @ conn. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4". | 33600-A217 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 77 | 95-SB34 | AS(AOG) | 3/4"HCN-188-H1 AS drain from OG @ conn. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4" | 33600-A217 | I. E. Point, Replaced prior to 1990 | 2" | 160 | .344 | .096 |
| 78 | 93-SB31 | SSL | 1½" & 3" Header for 1SLMSV off Turbine Stop Valves | T.B. - Heater Bay. | 5920-224 | Industry Experience Point | 1½"<br>3" | 80<br>40 | .200<br>.216 | .077<br>.141 |
| 79 | 93-SB32 | SSL | 1½"-1SLMSV - Stop Valve A | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 80 | 93-SB33 | SSL | 1½"-1SLMSV - Stop Valve B | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 81 | 93-SB34 | SSL | 1½"-1SLMSV - Stop Valve C | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 82 | 93-SB35 | SSL | 1½"-1SLMSV - Stop Valve D | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 83 | 93-SB36 | SSL | 1½" Header for 1SCVL off Turbine Control Valves | T.B. - Heater Bay | 5920-224 | | 1½" | 80 | .200 | .067 |
| 84 | 93-SB38 | SSL | ½"-1SCVL - Control Valve A. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 85 | 93-SB39/40 | SSL | ½"-1SCVL - Control Valve B. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 86 | 93-SB41/42 | SSL | ½"-1SCVL - Control Valve C. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 87 | 93-SB37 | SSL | ½"-1SCVL - Control Valve D. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 88 | 93-SB43 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valves A & B | T.B. - Heater Bay | 5920-224 | | 2-1/2"<br>1" | 40<br>80 | .203<br>.179 | .116<br>.053 |
| 89 | 93-SB44 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valve C | T.B. - Heater Bay | 5920-224 | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 90 | 93-SB45 | SSL | 1" - 2SLMSV off Turbine Stop Valve D | T.B. - Heater Bay | 5920-224 | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 91 | 93-SB58 | SSL | 2½" - Header for 2SCVL off Turbine Control Valves | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 92 | 93-SB61 | SSL | 1" - 2SCVL off Control Valve A | T.B. - Heater Bay | 5920-224 | | 2½" | 40 | .203 | .116 |
| 93 | 93-SB60 | SSL | 1" - 2SCVL off Control Valve B | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 94 | 93-SB59 | SSL | 1" - 2SCVL off Control Valve C | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 95 | 93-SB57 | SSL | 1" - 2SCVL off Control Valve D | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 96 | 92-(SB-info only) | SSL | Turbine Bypass Valve Chest 1st Seal Leakoff 1/2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 1/2" | 80 | .147 | .034 |
| 97 | 92-SB01 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 98 | 92-SB02 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 99 | 92-SB03 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 100 | 92-SB04 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 101 | 92-SB05 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 102 | | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Not Inspected in 1992 | 2" | 80 | .218 | .099 |
| 103 | 92-SB07 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 104 | 92-SB08 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 105 | 92-SB09 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Vertical section replaced in 1992. | 2" | 80 | .218 | .099 |
| 106 | 92-SB10 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Loc, of 1992 leak, replaced in 1992. | 2" | 80 | .218 | .099 |
| 107 | 93-SB46 | SSL | TBV Chest 2nd Seal Leakoff 2½" - 2SLBPV | T.B. - Heater Bay | 5920-224 | Continuation of 1992 inspections | 2½" | 40 | .203 | .116 |
| 108 | 93-SB47<br>95-SB35 | SSL | TBV Chest 2nd Seal Leakoff 2½" – 2SLBPV | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .116 |
| 109 | 93-SB48A<br>93-SB48B<br>95-SB36A<br>95-SB36B | SSL | TBV Chest 2nd Seal Leakoff 2½" – 2SLBPV | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .116 |
| 110 | 93-SB49 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | Significant Wear @ Duane Arnold | 2½" | 40 | .203 | .023 |
| 111 | 93-SB50 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 112 | 93-SB51 | SSL | 2½" - 1SPL2 H.P Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 113 | 93-SB52 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 114 | 93-SB53 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket 90 deg elbow | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 115 | 93-SB54 | SSL | 1SPL2 2½" x 2" reducer at 36" CAR pipe. | T.B. - Heater Bay | 5920-224 | " " | 2½"<br>2" | 40<br>40 | .203<br>.154 | .023<br>.019 |

APPENDIX B (Continued)

| SMALL BORE PIPING INSPECTION LOCATION DATABASE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
| 116 | 95-SB37 | C | 1½" & 2½" piping US & DS of LCV 1A-3 | T.B. - Heater Bay | G191157 Sht.1 | IE | 1½"<br>2½" | 80<br>80 | .200<br>.276 | .038<br>.057 |
| 117 | | MSD | Steam Seal Regulator to Steam Seal Piping low point drain | | G191156<br>5920-224 | IE | 1" | | | |
| 118 | | HV | 4"-HV-8A @ Condenser A No.4 continuous vent. | T.B. - Heater Bay | G191158 | IE | | | | |
| 119 | | C | 1" Piping D.S. of R.O. 64-2 | T.B. - Heater Bay | G191157 Sht.1 | IE | | | | |
| 120 | | ES | 3"-ES-8A D.S. of LCV-4A | T.B. - Heater Bay | G191156 | IE | | | | |
| 121 | | ES | 3"-ES-8B D.S. of LCV-4B | T.B. - Heater Bay | G191156 | IE | | | | |
| 122 | 99-SB01 | MSD | 1" piping US & DS valve HPCI-LCV-53 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 123 | 99-SB02 | MSD | 1" piping US & DS of Steam Trap ST-3 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 124 | 99-SB03 | MSD | 1" piping US & DS valve HPCI-FCV-42 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 125 | 99-SB04 | MSD | 1" piping US & DS valve RCIC LCV-32 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 126 | 99-SB05 | MSD | 1" piping US & DS of Steam Trap ST-6 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 127 | 99-SB06 | MSD | 1" piping US & DS valve RCIC FCV-34 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dresden 3 LER 3/96 | 1" | 160 | .250 | .053 |

## APPENDIX C

## IDENTIFICATION OF FAC SUSCEPTIBLE SYSTEMS & COMPONENTS

### C.1 FAC PHENOMENON

Flow-accelerated corrosion is a process that leads to wall thinning (metal loss) in carbon or low alloy steel piping exposed to flowing water or wet steam. The rate of metal loss depends on a complex interplay of several parameters. These include but are not limited to:

- water chemistry; pH, oxygen content, and temperature.
- piping material composition; chromium, copper, and molybdenum content.
- hydrodynamics; fluid flow velocity, piping geometry, and steam quality.

This phenomenon normally occurs in flowing deoxygenated water with a pH between 7.0 and 9.5. It is not a classical erosion process in that the metal loss is not caused by a mechanical process. A large body of experimental work has identified several key variables that influence the rate of attack. These are listed below with an indication of how they impact the material loss behavior.

| Variable: | FAC increases if variable is: |
|---|---|
| Fluid Velocity | Higher |
| Fluid pH level | Lower |
| Fluid oxygen content | Lower |
| Fluid temperature | 250-400 F. |
| Steam Quality | 0.1 - 0.9 |
| Component Geometry | Such as to create more turbulence |
| Component chromium content | Lower |
| Component copper content | Lower |
| Component molybdenum content | Lower |

Single phase FAC is most likely to occur in main feedwater, condensate, and heater drain piping. Areas demonstrated to be especially susceptible include bypass lines for recirculation flow around pumps and control valves. It is also likely to occur downstream of control valves (angle valves in particular), restriction orifices, and in elbows in close proximity to other fittings.

Two-phase FAC often occurs in piping for main steam, extraction steam, moisture separator drains, blowdown piping, feedwater heater drains, and downstream of leaking valves.

## C.2 SYSTEM SELECTION CRITERIA

All Plant piping systems are subject to review for potential inclusion into the Piping FAC Inspection Program . A piping system is defined here as a section of piping within a plant system which has a unique history of operating conditions (temperature, flow, water chemistry). Generally piping systems extend between two major components such as pumps, heaters, and vessels.

There are thousands of piping components in service at VY, most of which do not operate under conditions where FAC is a concern. FAC occurs in single phase water and two-phase water/steam piping under certain thermodynamic and chemistry conditions. In order to focus attention and resources effectively, those components where FAC is not a concern shall be eliminated from the scope of the inspection program. To accomplish this the exclusion criteria developed by EPRI contained in Section 4.2.2 of NSAC 202L (Ref. 5.4.8.) will be used.

**NOTE**

Portions of piping systems which meet certain exclusion criteria, may or may not be excluded from the program scope. The systems excluded by the criteria below could be susceptible to damage from other corrosion or degradation mechanisms. These include cavitation erosion, liquid impingement erosion, intergranular stress corrosion cracking (IGSCC) , microbiologically influenced corrosion (MIC), and solid particle erosion.

**All plant systems are considered as in the scope of the VY Piping FAC Inspection Program unless excluded by one of the criteria listed in Appendix C.3**

## C.3 SYSTEM EXCLUSION CRITERIA

### C.3.1 Stainless Steel or Low Alloy Steel Piping

Systems of stainless steel piping or low alloy steel piping with a nominal chromium content equal to or greater than 1-1/4%. This exclusion pertains only to complete piping systems constructed of FAC resistant alloys. If some components in a high alloy line are carbon steel ( valves) then the line shall not be excluded. In lines with specific components or sections of piping replaced with FAC resistant materials, the entire line shall be identified as susceptible. Note that high chromium materials do not necessarily protect against other damage mechanisms, especially cavitation and liquid impingement erosion. If the damage mechanism which prompted previous material replacement has not been identified, then the system should not automatically be excluded from the program scope.

### C.3.2 Superheated Steam Systems

Superheated steam systems with no moisture content regardless of temperature or pressure levels. However drains, traps, and other potentially high-moisture content lines from super-heated steam systems should not be excluded automatically.

C.3.3 High Dissolved Oxygen or Raw Water Systems

Systems with high levels of dissolved oxygen (oxygen > 1000. ppb), such as service water, circulating water, and fire protection.

C.3.4 Single Phase Systems with Temperature Below 175F.

EPRI recommends exclusion of single phase systems with temperature below 200F (low temperature). A temperature of 175F will be used for conservatism. If measurable wear is found in nearby piping operating slightly above 200F, EPRI recommends that the systems exclusion be reconsidered.

C.3.5 Systems With No Flow, or Which is in Use Less Than 2% of Pant Operating Time

Systems with no flow, or those that operate less than 2% of plant operating time or single phase systems that operate with temperature > 200F less than 2% of plant operating time. If the actual operating conditions of the system can not be confirmed (potentially leaking valves, etc.) or if the service is severe (flashing flow), the system should not be excluded based on operation time alone.

This includes normally closed small bore equipment vents, drains, and level control instrument lines.

C.3.6 Piping Which Carries Fluids Other Than water or Wet Steam

The VY Piping FAC Inspection Program applies only to piping carrying water or wet steam. Therefore non-water systems such as Instrument Air or Turbine Lube Oil Systems are excluded.

A formal evaluation to identify FAC of susceptible piping ("susceptibility analysis") has been performed and is documented in reference 5.4.1.. The susceptibility analysis will be revised as required to reflect changes in plant operation and configuration.

## C.4 COMPONENT SELECTION CRITERIA

All components on large bore lines not excluded by the criteria in Appendix C.3 above are included in the scope of the program. Each component is given a unique identification (Component ID). Each large bore line will be modeled using CHECWORKS as appropriate. When large bore piping is inspected, the results included into the CHECWORKS model and long term wear is trended.

All small bore lines 2-1/2 inch nominal diameter and smaller not excluded by the criteria in Appendix C.3 are included in the scope of the program. However, not all components on these lines are given a unique component identification. Only selected locations on these lines are inspected to determine if significant wear is occurring.

Long term tracking of wear in small bore piping will not generally be performed. Components and attached piping which exhibit FAC damage will preferably be replaced with FAC resistant materials.

## C.5 ADDITIONS TO THE PROGRAM SCOPE

Additional piping systems and components may be added to the inspection program at any time in the future based on: new industry experience, discovered wear during plant maintenance, installation of new piping, and planned or discovered changes in the operation of an existing system.

## APPENDIX D

## USE AND CONTROL OF CHECWORKS MODELS

### D.1 EPRI CHECWORKS

The EPRI developed CHECWORKS code, (REF. 5.4.9.), is a Windows based personal computer code. It is an integrated software platform for evaluating power plant piping systems for the most common types of corrosion that degrade piping and equipment.

Version 1.0 of CHECWORKS contains a FAC module which incorporates the capabilities of the previously used CHECMATE family of codes, CHECMATE, CHEC-NDE, and CHEC-T as parts of the same program. It also contains extensive data base capabilities for: organizing plant design information for input to FAC evaluations, storage of piping inspection data, tracking component wear, and planning and scheduling piping component inspections.

### D.2 TRAINING

As a minimum, the engineers modeling plant piping systems with CHECWORKS shall have received the EPRI/CHUG Introductory FAC and CHECWORKS training.

### D.3 MODELING OF PLANT PIPING SYSTEMS USING CHECWORKS

Evaluation of the susceptible plant piping systems for FAC performed using the EPRI CHECWORKS code shall use references 5.4.9. and 5.4.10. for input conventions and modeling guidance.

### D.4 DOCUMENTATION

CHECWORKS is used as a tool to plan inspections, track inspection results, wear rates, piping component data, and repair and/or replacement history. Results from the code are not used for design or to demonstrate conformance to design bases. The CHECWORKS evaluations are not considered as design basis input. Therefore, the evaluations will not be documented as a formal "VYC" calculation.

The CHECWORKS model inputs, assumptions, and results shall be documented in a manner consistent with the technical content requirements of AP 0017 or AP 6045 Technical Evaluations. The modeling and documentation shall be independently reviewed using Appendix B of AP 0017 as guidance. The models and supporting documentation will be controlled and maintained by the FACPC.

### D.5 REVISIONS & UPDATES

Revisions to the plant CHECWORKS models shall be performed to reflect current plant operation and configuration. The Design changes and plant upgrades will be reviewed by the FACPC for effects on the current plant models.

The CHECWORKS models shall be updated after each refueling outage to incorporate inspection data taken during the outage for use in planning inspections for the following outage.

# APPENDIX E

# CRITERIA FOR SELECTION OF PIPING COMPONENTS FOR INSPECTION AND SAMPLE EXPANSION GUIDELINES

## E.1 Inspection Planning

### E.1.1 GENERAL

The outage inspection scope is determined by the FACPC using: pipe wall thickness measurements from past outages, predictive evaluations performed using the CHECWORKS computer code, industry events related to FAC, results from other plant inspection programs, and engineering judgment.

The FACPC prepares an inspection plan and identifies the inspection scope (specific components) prior to each refueling outage in accordance with outage planning milestones. This scope is used by the ISIPC for resource planning and for input to the outage schedule.

Repeat inspections are performed on piping components which have evidenced FAC damage in the past. Industry events such as a pipe rupture or discovery of eroded components may dictate a change or addition to the inspection scope. Components are added to the inspection scope based on experience or events at other operating plants as information is received. The planned inspection scope for each refueling outage may be increased or decreased during the outage based upon the quantitative inspection results of selected components.

When significant component wear is found, inspections of additional components (sample expansion) shall be performed. Sample expansion is based on the guidelines presented in Appendix E.3 below.

### E.1.2 Long Term Planning

The scope of future piping inspections is dependent on the inspection results from previous outage inspections. For this reason all components to be inspected in the future cannot be scheduled several outages in advance.

With time, previous inspection results and the predictive models correlated with the inspection results will be the driving force behind inspection point selection. By then enough inspection data will have been obtained to predict, with a high degree of confidence, the locations at Vermont Yankee experiencing significant FAC damage.

Other factors to consider in planning future inspections include:

- The consequences of failure of a particular component with respect to personnel safety and plant availability.
- The margin of nominal wall thickness to code minimum wall thickness. It is a function of the original piping design and varies from system to system, and from line to line on the same system.
- Replacement of susceptible components with different piping materials. If wear rates are primarily due to piping material, replacement materials should reduce wear rates. If wear is due primarily to geometry, a partial or full redesign of the system will significantly reduce susceptibility to FAC.

E.1.3 Initial Inspections

Components selected for initial inspection shall be representative of the most susceptible systems and the component ranking within those systems. An effort to select a variety of component types should be made.

The corresponding components on parallel trains or on similar piping systems can be grouped. Each group can contain one or several piping components. At least one component from each group should be inspected.

Parallel trains of the same system should have essentially the same geometry and flow conditions. If not, the trains should be considered a separate group. Piping components downstream of each flow control valve should be considered as a separate group.

**E.2 Selection Methods and/or Basis for Component Inspections**

The basis for selection of specific components for examination during a refueling outage is by one or more of the following:

E.2.1. CHECWORKS Predictive Models

Components are ranked for susceptibility to FAC by the CHECWORKS computer code based on a number of factors including; component geometry, piping material, fluid environment (single-phase or two-phase flow), water chemistry, and temperature. Once actual inspection data is included the CHECWORKS model, the predicted wear rates and thickness values are statistically factored to reflect the actual wear from the inspection data.

a) For piping modeled using the EPRI CHECWORKS code without previous inspection data, select the most susceptible components on a line or section of piping for inspection.

b) For piping modeled using the EPRI CHECWORKS code with previous inspection data, select the components with the highest calculated wear rate and lowest time to minimum code wall thickness. In general, components should be scheduled for inspection by projecting the calculated wear such that it will be inspected prior to reaching 0.875 times the nominal wall thickness.

c) Components can be included in the inspection scope to help calibrate the CHECWORKS models. Generally include components from lines which have no (or a limited amount of) previous inspections data.

E.2.2 Components Identified During Previous Inspections

The Outage Inspection Reports identify components which have experienced wear and specific components to be included in future inspections. Components shall be scheduled for re-inspection for the following reasons:

- Monitoring of identified piping component wear on a component from a previous outage.
- Suspect or questionable inspection results which require confirmation.

E.2.3 Industry Experience Components

Industry experience components from other plant inspection programs or from other plant piping failures are typically identified via INPO industry operating experience (OE) or through the EPRI CHUG. Industry Experience Components include, but are not limited to locations listed below.

Large Bore Piping:

- Downstream of flow control valves.
- Downstream of orifices and /or flow meters.
- Downstream of exit nozzles.
- Downstream of feed pumps.

Small Bore Piping:

- Downstream of flow control valves.
- Downstream of orifices and /or flow meters.
- Upstream and downstream of steam traps.
- Drain and vent connections to large bore piping or components with two-phase flow.
- Last two changes in direction prior to entering the condenser.(i.e. 90 & 45 degree elbows, reducers, orifices, or globe valves).

E.2.4 Systems Not Modeled Using CHECWORKS (Susceptible--Non Modeled, SNM)

Susceptible Piping which has not been modeled using CHECWORKS (SNM) includes systems that contain lines which have unknown or widely varying operating conditions which preclude the development of accurate analytical models. These include vent and drain piping with multi-phase flow and lines subject to off normal flow conditions.

Inspection locations are selected based a combination of industry experience, plant experience, and engineering judgement. Locations should be selected for initial inspection with the objective of identifying a sufficient number and the appropriate locations to confirm system susceptibility.

Locations to inspect include:

a) Isolated lines to the condenser in which leakage is indicated from the turbine performance monitoring system. Data is normally obtained from the Systems Engineering Group, (Thermal Performance Monitoring )

b) Components in susceptible piping which has not been modeled using CHECWORKS and have not received an initial inspection. Specifically:

- Downstream of orifices
- Downstream of flow control valves and level control valves.
- Nozzles
- Tees and laterals, particularly field fabricated tees and laterals
- Complex geometric locations such as components located within two diameters of each other
- Components with backing rings and counterbores.
- Components downstream of replaced components (upstream, if expander).
- Components which have been replaced in the past and not upgraded to a FAC resistant material.

E.2.5 Parametric Studies and Engineering Judgment

In general, piping systems will be modeled using CHECWORKS. However, certain piping systems or portions of lines have usage and flow rates which cannot be accurately quantified due to operating conditions which vary greatly or are controlled by remote level, pressure or temperature signals. An example is the emergency bypass lines to the condenser on the heater drain system.

Alternate methods for selection of components for inspection include parametric studies and the use of seasoned engineering judgment. Comparative studies using the CHECWORKS code or other fluid dynamics analysis tools to model a piping segment while varying parameters such as temperature, flow rate, valve position, etc. can be used to rank the effects of each parameter on susceptibility to FAC. These rankings are then used as a guide in selecting components for inspection.

Certain piping configurations and flow conditions are known to have a high susceptibility to FAC. Lines containing control valves or pressure reducing orifices which flow to a lower pressure sink such as the condenser are important to consider because of possible flashing and high velocities downstream of these components. Other conditions are not as evident, such as leakage by normally closed valves on lines considered to have no flow during normal operation.

**E.3 Sample Expansion Guidelines**

Expansion of the scope is required when significant wall thinning is discovered in a particular piping component. When this occurs, identical or similar piping components in parallel and/or alternate piping components shall be inspected. The EPRI sample expansion guidelines ( Reference 5.4.8. ) shall be used to select additional components.

"Significant wall thinning" in a piping component is determined by the evaluation of inspection data performed by Design Engineering Mechanical/Structural Dept. using DP 0072.

(1) When sample expansion is required per DP 0072, the selection of additional components to be inspected shall be as follows:

   (a) Any component within two diameters downstream of the component displaying significant wear, and within two diameters upstream if that component is an expander or expanding elbow.

   (b) A minimum of the next two most susceptible components from the CHECWORKS relative wear ranking in the same train as the piping component displaying significant wear.

   (c) Corresponding components in each other train of a multi-train line with a configuration similar to that of the piping component displaying significant wear

(2) When inspections of the expanded sample (1) above detect additional components with significant FAC wear the sample should be further expanded to include:

   (a) Any component within two diameters downstream of the component displaying significant wear, and within two diameters upstream if that component is an expander or expanding elbow.

   (b) A minimum of the next two most susceptible components from the relative wear ranking in the same train as the piping component displaying significant wear.

APPENDIX E (Continued)

(3) When inspections of the expanded sample of (2) above detect additional components with significant FAC wear, the sample expansion of (2) above should be repeated until no additional components with significant wear are detected.

# VERMONT YANKEE

# PIPING FLOW ACCELERATED CORROSION

# INSPECTION PROGRAM

# (PP 7028)

# 2001 REFUELING OUTAGE INSPECTION REPORT

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V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2001 REFUELING OUTAGE

INSPECTION REPORT

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## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2001 REFUELING OUTAGE

## INSPECTION REPORT

### 1.0 SUMMARY

This was the first outage in which FAC piping inspection activities were controlled under a new Vermont Yankee Program Procedure, PP-7028 "Piping Flow Assisted Corrosion Inspection Program".

External UT measurements were taken on 25 large bore piping components in the Feedwater and Condensate Systems. Also inspected were 2 sections of small bore piping, on the turbine Steam Seal Regulator drain piping. No internal visual inspections were performed on the Turbine Cross-Around piping.

The large bore results were evaluated using a three level screening process defined in a new plant procedure DP 0072. All components inspected were found to have a wall thickness greater than the code minimum wall thickness. The predicted thickness at the next refueling outage was greater than the code minimum wall thickness for all components. A summary of the large bore piping component screening is contained in Attachment 1. Attachment 2 contains a summary of the small bore piping inspection results.

No piping components required repair or replacement during the refueling outage and there were no immediate operability concerns.

Component selection was based on a combination of; previous inspection experience, industry events, analyses using the EPRI developed CHECWORKS computer code, and the consequences of component failure.

During the 2001 refueling outage, the UT inspections were performed by the same personnel performing the ASME Section XI in-service inspections. Panametrics 26DL+ electronic thickness measurement and data logging equipment was used to collect data. Component preparation, scaffolding, insulation removal, and surface cleaning, were performed by NPS personnel. Due to the small inspection scope, application of grid markings was performed by the UT personnel using guidelines contained in Appendix A of the UT procedure, NE 8053.

This was the first outage that the UT results were directly downloaded from the data loggers into the EPRI CHECWORKS program located on the VY computer network. This reduced both time and effort required to transmit data to engineering personnel and resulted in a faster turn around time for engineering to evaluate the inspection results and release components for restoration.

## 2.0 2001 REFUELING OUTAGE INSPECTION PLAN

The 2001 refueling outage inspection scope (references 4 & 5) was developed to satisfy the following goals:

- To Inspect components requiring follow up inspections, based on UT data from previous refueling outages.
- Inspect components identified by the EPRI CHECWORKS computer code ranked high for susceptibility to wear and/or having the least time remaining to reach code minimum wall thickness.
- Perform repeat inspections on selected components for calibration of the CHECWORKS models.
- To Incorporate industry experience into the program through inspection of components at VY that are similar to those that have either failed or showed significant wall thinning at other plants.
- To perform inspections on any large bore and small bore piping components subjected to off normal flow conditions, such as components downstream of normally closed valves with seat leakage. These components are identified by the cognizant Systems Engineer, using the turbine performance monitoring system. Two Heater Drain system bypass valves at the condenser were identified by the thermal performance monitoring system as leaking by the normally closed valves. The plan was for the outage was for maintenance to disassemble the valves, perform an internal visual inspection for erosion of the valve bodies and the downstream piping. External UT measurements would only be performed if indications of internal wear were identified.

## 3.0 EVALUATION OF INSPECTION RESULTS

### 3.1 Large Bore Piping

Twenty-four (24) large bore piping components and one (1) equipment nozzle were included in the planned inspection scope for external UT exams. Inspections of the turbine cross around piping were deferred until the 2002 RFO based on an evaluation of the inspection results from the 1996, 1998, and 1999 refueling outages.

The UT results were evaluated using a three level screening process as defined in a new procedure, DP 0072. The UT results were directly downloaded from the data loggers into the EPRI CHECWORKS program located on the VY computer network. This reduced both time and effort required to transmit data to engineering personnel and resulted in a faster turn around time for engineering to evaluate the inspection results and release components for restoration.

The UT inspection results for each component were reviewed for anomalies and consistency with piping geometry. Wear rates (wear/cycle) were calculated for each component using methods specified in DP 0072. For component UT results which indicated no wear or minimal wear has occurred, a minimum wear rate of 0.005 inches/cycle was used. Using the calculated wear rates and the 2001 measured thickness, the predicted thickness at the end of the next cycle ( 2002 **T**pred ) was calculated using a safety factor of 1.2 on the calculated wear per cycle. Using both the wear rate and 2001 measurement data, the projected number of cycles beyond the Spring 2001 refueling outage for each component to wear down to the code minimum wall thickness was also calculated.

The methods used to predict wall thickness at the next refueling outage are consistent with NSAC-202L, reference (8). The wear rate calculations and projected times to code minimum wall for single phase flow systems are assumed to be linear. In fact they may not be, but a linear projection is used for the wear rates given that observed wear has occurred at a relatively slow rate (approx. 29 years). These calculated times to code minimum are based on the lowest measured thickness including a safety factor, and generally will be conservative.

Components passing the Level 1 screen have 2002 **T**pred greater than .875**T**nom (the manufacturing tolerance of new piping) and require no further evaluation. The Level 2 screen is for components with 2002 **T**pred less than .875**T**nom but greater than **T**min (the code minimum wall thickness). These components are acceptable for continued operation but future monitoring is recommended. The Level 3 screening is for components with 2002 **T**pred less than **T**min. The Level 3 screening is a detailed analytical methodology. It also requires that additional piping components be inspected this outage (sample expansion), and considered for inspection during future refueling outages.

Twenty-five (25) large bore piping components were inspected. Only the weld area on the equipment nozzle (P-1-1A) was inspected. Eighteen (72%) passed the Level 1 screen, and the remaining seven (28%) passed the Level 2 screen. All components inspected were

**Large Bore Piping – continued**

found to have wall thickness greater than code minimum wall thickness. All predicted wall thickness (at the 2002 refueling outage) values were above code minimum wall thickness.

No large bore repairs or replacements were required. Only one component was identified as requiring future monitoring and is discussed in Section 4.0 of this report. A summary of the large bore piping component screening is contained in Attachment 1.

The Systems Engineer for the thermal performance monitoring program identified possible leakage by two normally closed valves, LCV-103-1A-2 and LCV-103-3B-2. These are the high level emergency dump valves for the 1A and 3B feedwater heaters. They are located adjacent to the condenser. No evidence of erosion was found on the valve body or downstream piping for LCV-103-1A-2. Visual inspections identified erosion below the seat on the valve body and in the 6 inch diameter end of the 6 x 16 expander downstream of the valve LCV-103-3B-2. UT measurements were then taken on the valve body and the expander to determine the remaining wall thickness. The evaluation of the UT data is contained in VY Technical Evaluation No. TE-2001-024, reference(10).

The TE concluded that the as-found wall thickness values for the eroded areas on both the valve body and the 6 inch diameter end of the downstream expander are greater than the code minimum required wall thickness. The TE demonstrated the structural integrity of the valve body and the downstream piping as found during RFO 22 with localized eroded areas. It did not address the possibility of continued degradation from leakage past the seat during future operation. The rate of erosion of the valve body wall due to leakage past the seat could not be estimated. However TPM data indicate that this valve may have been leaking since the TPM system was installed in 1995. The valve seat was repaired/replaced during the outage.

## 3.2 Small Bore Piping

Two sections of small bore piping were scheduled for external UT inspection during the 2001 refueling outage. These were new inspections. They were scheduled due to a leak at the Steam Seal Regulator. No significant wear was found in either section of piping. A summary of the small bore piping inspection results is contained in Attachment 2.

## 4.0 COMPONENTS REQUIRING FUTURE MONITORING

Components requiring future monitoring are identified using the "2001 Predicted Thickness", the "Screening Level" which the component passed, and the "Approximate Cycles to Tmin" shown in Attachment 1. From the wear rates and cycles to Tmin calculated in Attachment 1, only one component, FD01TE05 was identified as with less than 10 cycles to Tmin. This component has multiple year inspection data and a low calculated wear rate. Previous inspection data indicate that that a local region adjacent to the weld to the downstream valve was fabricated with little margin over code minimum wall thickness. This component will be re-inspected during the 2004 refueling outage.

The 2001 refueling outage inspection results will be incorporated into the existing CHECWORKS models of the Condensate and Feedwater Systems. The 2001 inspection data, and data from previous inspections will be used to refine the wear rate predictions. The results shown in Attachment 1 and the updated CHECWORKS analyses will be used to determine the inspection scope for future refueling outages.

## 5.0 COMPONENTS REQUIRING POSSIBLE REPAIR OR REPLACEMENT

No specific components were identified as requiring repairs or replacements. However, with future operation under GE hydrogen water chemistry, wear rates in the Feedwater and Heater Drain systems are expected to increase. The Feedwater System piping from the feed pumps past the feed regulator valves has a relatively low margin for wall loss due to flow accelerated corrosion. This is due to the high design pressure and the installed wall thickness. The CHECWORKS models for this piping will be updated with the 2001 RFO inspection data, and inspections of specific components on the Feedwater System piping will continue in the future.

## 6.0 INSPECTION DATA RETENTION

UT thickness data has been taken using Vermont Yankee owned Panametrics 26DL$^{+}$ digital UT and electronic data logging system. The large bore UT inspection results were downloaded directly into the CHECWORKS data base located on the VY computer network. The measured thickness data for each component is stored in the CHECWORKS data base. A thickness data sheet (form VYNEF8053.01) including the CHECWORKS thickness matrix printout was created for each inspection. The inspection reports are controlled and put into permanent storage by VY ISI personnel per AP 6807 & AP 6809.

## 7.0 RECOMMENDATIONS FOR FUTURE FAC INSPECTIONS

Recommendations made in past refueling outage inspection reports have been formalized and incorporated into the new Program Procedure PP 7028. These have included the continued use of the Panametrics UT/data logging equipment and conversion from ITHACUS to CHECWORKS for data processing.

### 7.1 Prepare for Possible Repair or Replacement of Components During the 2001 Refueling Outage.

The potential for finding significant wear in any piping component exists. Contingency planning as required for either weld repair or replacement of large bore components in the piping systems should be considered. ASME code cases for external weld overlay of eroded piping have been approved in recent years. The applicability and possible use of these of these code cases at VY should be evaluated to provide additional methods for timely and effective repairs to be made during short refueling outages.

## 8.0 REFERENCES


1. V.Y. Program Procedure PP 7028, Piping Flow Accelerated Corrosion (FAC) Inspection Program, Original Issue 5/10/01.

2. V.Y. Department Procedure, DP 0072, "Structural Evaluation of Thinned Wall Piping Components", Original Issue 5/17/01.

3. V.Y. Nondestructive Examination Procedure, NE 8053, "Ultrasonic Thickness Measurement"' Original Issue 11/03/00, LPC 1.

4. Memo J.C.Fitzpatrick to J.H.Callaghan, subject: Piping FAC Inspection Scope for the 2001 Refueling Outage, VYM 2000/051, dated June 15,2000.

5. VY Piping FAC Inspection Program – 2001 Refueling Outage: Inspection Location Worksheets / Methods and Reasons for Component Selection, dated 6/20/00.

6. Memo J.C.Fitzpatrick to S.D.Goodwin, subject: 2001 Refueling Outage Piping Flow Accelerated Corrosion Inspection Summary, VYM 2001/015, dated May 17,2001.

7. Memo J.Fortier/J.C.Fitzpatrick to J.H.Callaghan subject: 1999 Refueling Outage Turbine Cross Around Piping Inspections, VYM 99/129, dated November 28,1999.

8. EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program", EPRI NSAC-202L-R2, April 1999.

9. CHECWORKS - Computer Program User Guide, TR 103496, August 1994 by Altos Engineering Applications Inc. for EPRI.

10. VY Technical Evaluation No. 2001-024, " Evaluation Of Wall Loss Found In Valve LCV-103-2B-2 and Downstream Piping."

## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2001 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspection No. | Comp ID | DIA | Tnom | .875* Tnom | Tmin | 2001 Min Tmeas | Wear Rate(in./ cycle) | 2002 Tpred. | Passed Screen Level | Approx. Cycles to Tmin | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-01 | PUMP1A-NZL | 12 | 1.000 | 0.875 | 0.769 | | | | | | | Note 5 |
| 01-02 | FD01RD01 | 12 | 1.000 | 0.875 | 0.769 | 0.869 | 0.005 | 0.863 | 2 | 16.7 | | |
| | | 16 | 1.219 | 1.067 | 0.984 | 1.035 | 0.005 | 1.029 | 2 | 11.7 | | |
| 01-03 | FD01EL01 | 16 | 1.219 | 1.067 | 0.965 | 1.059 | 0.005 | 1.053 | 2 | 12.5 | | |
| 01-04 | FD01TE05 | 16 | 1.219 | 1.067 | 0.965 | 0.994 | 0.005 | 0.988 | 2 | 4.8 | 2004 RFO | |
| | | | | | | | | | | | | |
| 01-05 | FD01SP02DS | 16 | 1.219 | 1.067 | 0.965 | 1.120 | 0.006 | 1.113 | 1 | 21.5 | | |
| 01-06 | FD01EL03 | 16 | 1.219 | 1.067 | 0.965 | 1.527 | 0.009 | 1.516 | 1 | 49.8 | | |
| 01-07 | FD01SP03US | 16 | 1.219 | 1.067 | 0.965 | 1.069 | 0.005 | 1.063 | 2 | 17.3 | | |
| | | | | | | | | | | | | |
| 01-08 | FD03EL03 | 16 | 1.219 | 1.067 | 0.965 | 1.448 | 0.005 | 1.395 | 1 | 77. | | |
| 01-09 | FD03SP03 | 16 | 1.219 | 1.067 | 0.965 | 1.029 | 0.005 | 1.023 | 2 | 10.7 | | |
| 01-10 | FD03EL04 | 16 | 1.219 | 1.067 | 0.965 | 1.423 | 0.006 | 1.416 | 1 | 65.4 | | |
| 01-11 | FD03SP04 | 16 | 1.219 | 1.067 | 0.965 | 1.068 | 0.006 | 1.061 | 2 | 14.3 | | |
| | | | | | | | | | | | | |
| 01-12 | FD07RD03 | 10 | 0.844 | 0.738 | 0.648 | 0.760 | 0.005 | 0.754 | 1 | 18.7 | | |
| | | 18 | 1.375 | 1.203 | 1.085 | 1.223 | 0.005 | 1.217 | 1 | 23. | | |
| 01-13 | FD08SP03 | 18 | 1.375 | 1.203 | 1.085 | 1.231 | 0.005 | 1.225 | 1 | 24.3 | | |
| | | | | | | | | | | | | |
| 01-14 | FD18TE01 | 16 | 0.844 | 0.738 | 0.645 | 0.906 | 0.0065 | 0.899 | 1 | 33.5 | | @ Row 1 transition from Sch. 80 pipe. |
| | | 16 | 1.219 | 1.067 | 0.645 | 1.494 | 0.0065 | 1.486 | 1 | 108.8 | | Rows 2-11 |
| | | 16 | | | 1.335 | 1.560 | 0.005 | 1.554 | 1 | 37.5 | | @ branch connection reinforcement zone, Note.6 |
| 01-15 | FD18SP04 | 10 | 0.844 | 0.738 | 0.433 | 0.758 | 0.005 | 0.752 | 1 | 54.2 | | Note 7 |
| 01-16 | FD20RD01 | 16 | 1.219 | 1.067 | 0.645 | 1.083 | 0.013 | 1.067 | 1 | 28. | | Note 8 |
| | | 10 | 0.844 | 0.738 | 0.433 | 0.962 | 0.016 | 0.943 | 1 | 27.6 | | rows 6 & 7 on reducer |
| | | 10 | 0.844 | 0.738 | 0.433 | 0.770 | 0.016 | 0.751 | 1 | 17. | | rows 8-10 on pup piece |
| 01-17 | FD20SP01 | 10 | 0.844 | 0.738 | 0.433 | 0.727 | 0.005 | 0.721 | 2 | 49. | | |
| | | | | | | | | | | | | |

# V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2001 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspection No. | Comp ID | DIA | Tnom | .875* Tnom | Tmin | 2001 Min Tmeas | Wear Rate(in./ cycle) | 2002 Tpred. | Passed Screen Level | Approx. Cycles to Tmin | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-18A | CD32FE01 | 20 | 0.594 | 0.520 | 0.393 | 0.793 | 0.005 | 0.787 | 1 | 66.7 | | Note 9. |
| 01-18 | CD32EL04 | 20 | 0.594 | 0.520 | 0.393 | 0.591 | 0.005 | 0.585 | 1 | 32. | | |
| 01-19 | CD32SP02 | 20 | 0.594 | 0.520 | 0.393 | 0.547 | 0.005 | 0.541 | 1 | 25.7 | | |
| 01-20 | CD32EL05 | 20 | 0.594 | 0.520 | 0.393 | 0.626 | 0.012 | 0.612 | 1 | 16.2 | | |
| | | | | | | | | | | | | |
| 01-21 | CD30EL02 | 20 | 0.594 | 0.520 | 0.393 | 0.559 | 0.005 | 0.553 | 1 | 27.7 | | |
| 01-22 | CD30EL03 | 20 | 0.594 | 0.520 | 0.393 | 0.536 | 0.005 | 0.530 | 1 | 23.8 | | |
| 01-23 | CD30SP01 | 20 | 0.594 | 0.520 | 0.393 | 0.561 | 0.005 | 0.555 | 1 | 28 | | |
| | | | | | | | | | | | | |
| 01-24 | CD27EL12 | 20 | 0.594 | 0.520 | 0.393 | 0.649 | 0.010 | 0.637 | 1 | 21.3 | | |
| 01-25 | CD27EL13 | 20 | 0.594 | 0.520 | 0.393 | 0.745 | 0.005 | 0.739 | 1 | 58.7 | | |
| | | | | | | | | | | | | |

**NOTES:**

1. All thickness values are inches.
2. Wear/Cycle is approximately inches/18 months. The wear per cycle was calculated per DP0072 using 15.9 equivalent 18 month cycles based on approx. 157,000 operating hours up to 1996 outage, and 12000 ± hrs./cycle. Minimum Wear/Cycle used to calculate Tpred and Cycles to Tmin is 0.005 inches per cycle.
3. 2002 T predicted = 2001 T measured - F.S. * (Wear/Cycle), F.S. = Factor of Safety = 1.20.
4. Cycles to Tmin is calculated from: $\frac{\text{(2001 T measured} - \text{Tmin)}}{\text{F.S. x Wear/Cycle.}}$ (i.e. Cycles from 2001 RFO)
5. Only area adjacent to weld on Feedwater Pump 1 A discharge nozzle was inspected. Asbestos insulation on pump casing at discharge nozzle was not abated, only attached reducer was exposed.
6. FD18TE01, additional thickness required in branch reinforcement zone for 10" diameter pipe.
7. FR18SP04, conservative measured thickness (single low reading) Tmeas = 0.770in. would be more representative.
8. FD20RD01 conservative measured thickness (single low reading) Tmeas = 1.133 in. would be more representative.
9. Section of pipe supplied with condensate flow element FE-2 appears to be Sch. 60 vs. Sch 40 for Condensate piping.

## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2001 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 2: SUMMARY OF SMALL BORE PIPING UT INSPECTION RESULTS

### SMALL BORE PIPING

| S.B. Inspection. Number (Data Base No.) | Description / Location | Section | Size | Sch. | Tnom. (inch) | .875 * Tnom. (inch) | T min. (inch) (Note 1) | 2001 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) | Cycles to Tmin. (Note2) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-SB01 (117) | 1SLSSR -1" drain off SSR US & DS branches at Tee fitting. TB Heater Bay (Approx. El. 262 under SSR). | Rows: 1-3, & 38-40 | ½" | 40 | .109 | .095 | .039* | .102 | <0.005 | 10.5 | Conservative wear rate used. |
| | | Rows: 4-24,& 41-50 | ¾" | 80 | .154 | .135 | 0.040 | .135 | <0.005 | 15.8 | |
| | | Rows: 25-37,& 51 | 1" | 80 | .179 | .157 | .042 | .160 | <0.005 | 21.3 | |
| 01-SB02 (117) | 1SLSSR -1" drain off SSR piping at connection to 8"- SPE pipe. (Approx. El. 262) | N/A | 1" | 80 | .179 | .157 | .042 | .161 | <0.005 | 19.8 | |

NOTES:

1. Tmin includes a 0.035 inch corrosion allowance per ANSI B31.1 –1967.
2. Cycles to Tmin from 2001 refueling outage. SF (safety factor) = 1.2 was used on the apparent wear rate. Small bore wear is not trended for the purposes of repeat inspections. Small bore components will generally be replaced if significant thinning is observed.

# VERMONT YANKEE

## PIPING FLOW ACCELERATED CORROSION

## INSPECTION PROGRAM

## (PP 7028)

## 2002 REFUELING OUTAGE INSPECTION REPORT

## (RFO 23- Fall 2002)

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V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2002 REFUELING OUTAGE

INSPECTION REPORT

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## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2002 REFUELING OUTAGE

## INSPECTION REPORT

### 1.0 SUMMARY

External UT measurements were taken on 22 large bore piping components in the Feedwater and Condensate Systems. External UT inspections were performed on 3 sections of small bore piping on the Heater Vents piping and the low point drain for the turbine steam seal header. An internal visual inspection of the 30 inch B Turbine Cross-Around line was also performed. Planned UT inspections on the No.1 High Pressure feedwater heaters were deleted from the scope due to the decision to replace all 4 HP feedwater heaters in 2004.

Component selection was based on a combination of; previous inspection data, industry events, analyses using the EPRI developed CHECWORKS computer code, and the consequences of component failure. A detailed selection process was used and was documented in reference (4).

The large bore results were evaluated using a three level screening process defined in plant procedure DP 0072. All components inspected were found to have a wall thickness greater than the code minimum wall thickness. The predicted thickness at the next refueling outage was greater than the code minimum wall thickness for all components. No piping components required repair or replacement during the refueling outage and there were no immediate operability concerns.

A summary of the large bore piping component screening is contained in Attachment 1. Attachment 2 contains a summary of the small bore piping inspection results.

During the 2002 refueling outage, the UT inspections were performed by the same personnel performing the ASME Section XI in-service inspections. Panametrics 26DL+ electronic thickness measurement and data logging equipment was used to collect data. Component preparation, scaffolding, insulation removal, and surface cleaning were performed by NPS personnel. Due to the small inspection scope, application of grid markings was performed by the UT personnel using guidelines contained in Appendix A of the UT procedure, NE 8053. UT results were directly downloaded from the data loggers into the EPRI CHECWORKS program located on the VY computer network. This reduced both time and effort required to transmit data to engineering personnel and resulted in a faster turn around time for Engineering to evaluate the inspection results and release components for restoration.

Of note, but not directly under the scope of the Piping FAC Inspection Program, was the discovery of erosion of internal components found in the Extraction Steam system reverse current valves. The VY valve maintenance procedures include an internal check for erosion /corrosion of valve parts. The damage was discovered during planned maintenance. The erosion of the valve covers and disc stem nuts was due to a material deficiency. The design specification required a chrome-moly material, the vendor supplied a carbon steel material. A contributing cause to the extent of the damage was the lack of maintenance on these valves during the past 30 years of operation.

## 2.0 2002 REFUELING OUTAGE INSPECTION PLAN

The 2002 refueling outage inspection scope was developed to satisfy the following goals:

- Inspect large bore components requiring follow up inspections, based on UT data from previous refueling outages.
- Inspect components identified by the EPRI CHECWORKS computer code as being ranked high for susceptibility to wear and/or having the least time remaining to reach code minimum wall thickness.
- Perform repeat inspections on selected large bore components for calibration of the CHECWORKS models.
- To incorporate industry experience into the program through inspection of components at VY that are similar to those that have either failed or showed significant wall thinning at other plants.
- Perform an internal visual inspection of the 30" B turbine cross around piping. This is the last remaining carbon steel section. The last internal inspection was performed in 1999.
- Inspection of selected small bore components contained in the Small Bore Database which have not had an initial inspection.
- Inspection of selected small bore components based on previous wear or leaks.
- To complete base line UT inspections on the No.1 high pressure (HP) feedwater heaters shells adjacent to the extraction steam inlet nozzles.
- Inspections on any large bore and small bore piping components subjected to off normal flow conditions, such as components downstream of normally closed valves with seat leakage are generally performed each refueling outage. These components are typically identified by the cognizant Systems Engineer, using the turbine performance monitoring system. No components were identified during the scoping for RFO 23.

The planned duration for RFO 23 FAC activities was approximately 15 days. Given the shorter duration consideration was given to optimizing the locations and number of components to be inspected, and also to be consistent with previous outage inspection efforts. The detailed reasoning for component selection is contained in the Inspection Location Worksheets, reference (4). The complete planned scope for RFO 23 is contained in reference (5).

## 3.0 EVALUATION OF INSPECTION RESULTS

### 3.1 Large Bore Piping

The planned large bore piping inspection scope for RFO 23 included external UT exams on 23 large bore piping components at nine locations on the Feedwater and Heater Drain Systems. Three components adjacent to feedwater heater E-2-1A on the Heater Drain System were removed from the scope due to the decision to replace all 4 high pressure feedwater heaters in 2004. Two additional components on the Feedwater System were inspected due to availability. A total of 22 large bore components were inspected using external UT.

The UT results were directly downloaded from the data loggers into the EPRI CHECWORKS program located on the VY computer network. The thickness data were evaluated using a three level screening process as defined in procedure, DP 0072. The UT inspection results for each component were reviewed for anomalies and consistency with piping geometry. Wear rates (wear/cycle) were calculated for each component using methods specified in DP 0072, and are consistent with NSAC-202L, reference (8). For component UT results which indicated no wear or minimal wear has occurred, a minimum wear rate of 0.005 inches/cycle was used. Using the calculated wear rates and the 2002 measured thickness, the predicted thickness at the end of the next cycle ( 2004 Tpred ) was calculated using a safety factor of 1.2 on the calculated wear per cycle. Using both the wear rate and 2002 measurement data, the projected number of cycles beyond the Fall 2002 refueling outage (RFO23) for each component to wear down to the code minimum wall thickness was also calculated.

Components passing the Level 1 screen have 2004 Tpred greater than .875Tnom (the manufacturing tolerance of new piping) and require no further evaluation. The Level 2 screen is for components with 2004 Tpred less than .875Tnom but greater than Tmin (the code minimum wall thickness to resist pressure and mechanical loads). These components are acceptable for continued operation but future monitoring is recommended. The Level 3 screening is for components with 2004 Tpred less than Tmin. The Level 3 screening is a detailed analytical methodology. It also requires that additional piping components be inspected this outage (sample expansion), and considered for inspection during future refueling outages.

All components inspected were found to have wall thickness greater than code minimum wall thickness. All predicted wall thickness (at the 2004 refueling outage) values were above code minimum wall thickness. Of the 22 large bore piping components inspected, 18 (82%) passed the Level 1 screen, and the remaining 4 (18%) passed the Level 2 screen.

No large bore repairs or replacements were required. Only one component was identified as requiring future monitoring and is discussed in Section 4.0 of this report. A summary of the large bore piping component screening is contained in Attachment 1.

## 3.2 Turbine Cross Around Piping

Inspections of the turbine cross around piping had been deferred until the 2002 RFO based on an evaluation of the inspection results from the 1996, 1998, and 1999 refueling outages. An internal visual inspection was performed on the B 30" diameter Cross Around (CAR) line which runs from the B Moisture Separator to the low pressure turbine. This line is the last remaining carbon steel Cross Around line. The last inspection of this pipe was performed during the 1999 Refueling Outage.

During the 1995 refueling outage, new moisture separator internals were installed and extensive weld repairs were made in this line. The weld repairs performed in 1995 essentially restored the wall thickness of the entire run to a minimum of 0.50" (nominal wall thickness). The extent of the weld repairs performed in 1995 was greater than previous efforts. The previous repairs were intended to last only one cycle. The 1995 repairs were originally intended to last until 1998 with an inspection and minor touch up in 1996 as required.

The 30" B line generally appears essentially the same as observed in 1999. No new areas of red/black oxide were identified. Also, the extent of areas of red/black oxide identified in previous inspections is essentially the same. Markings on the interior of the pipe to identify the 1995 inspection/repair locations, and the 1996 inspection locations are still visible. These are evidence that there is no significant wall loss occurring. Based on the visual results no supplemental internal ultrasonic (UT) thickness exams were performed. No repairs were required based on the criteria developed in reference(10).

The series of internal visual inspections performed since 1996 along with limited UT measurements verifies that degradation of the interior surface of the carbon steel 30 inch B Cross Around piping has been minimal as compared to observed damage prior to the internal modifications made in the Moisture Separators. The rate of degradation previously observed and the need for extensive weld repairs has been mitigated by both the repair effort performed in 1995 and the installation of new internals in the moisture separators.

If no changes to plant operation that effect the flow regime (i.e. pressure, flow rate, moisture content, etc.) in this line occur, or are planned, then the next scheduled internal visual inspection can be deferred one operating cycle to the Fall of 2005. However, if the planned modifications to the high pressure turbine and moisture separators as part of the power uprate project are to be executed during the Spring 2004 refueling outage, the changes in operating pressures and flows will require a reassessment of the current Cross Around piping inspection and evaluation methodology. Inputs to reference(10) will change and the current evaluation criteria will be affected.

### 3.3 Small Bore Piping

Three sections of small bore piping were scheduled for external UT inspection during the 2002 refueling outage. These were new inspections. Two sections of Heater Vent piping from the No. 3 feedwater heaters were inspected in RFO 23. This piping was installed in 1992 when the No.3 feedwater heaters were replaced. The other section inspected was on the 1"-LPDR low point drain off the turbine steam seal header line at the condenser. This location is downstream of the location of a through wall leak at a socket welded elbow fitting that occurred in 2001, reference (12). The damaged elbow and adjacent piping were replaced during the outage.

No significant wear was found in any of the small bore piping inspected. A summary of the small bore piping inspection results is contained in Attachment 2.

### 3.4 Feedwater Heater Shells

The planned scope for RFO 23 was to complete baseline UT inspections on the No.1 high pressure (HP) feedwater heater shells adjacent to the extraction steam inlet nozzles. Additional asbestos abatement was planned on these heaters due to planned installation of inspection ports. The extent of the existing grids was to be increased. Also, additional UT measurements on the No. 2 HP heaters shells were to be performed as required to supplement internal visual inspections.

The planned inspections were not performed due to the decision to replace all 4 high pressure feedwater heaters in 2004. Limited internal visual inspections were performed on the No.2 HP feedwater heaters to assess changes since the last RFO, and to confirm conditions for one more operating cycle.

### 3.5 Extraction Steam Reverse Current Valves

Of note, but not directly under the scope of the Piping FAC Inspection Program, was the discovery of erosion of internal components found in the Extraction Steam system reverse current valves. The extraction steam piping routes high pressure and low pressure turbine exhaust steam to the shell sides of the feedwater heaters. The flow rates and steam quality vary in each stage depending on its turbine exhaust point and the line size. The extent of erosion varied in each stage exhaust line, with the most damage found in the 7$^{th}$ stage extraction from the LP turbines.

There are a total of 8 valves located in lines originally constructed using chrome-moly piping. The valve bodies and a majority of the internal parts are cast steel A217-WC6 which is more resistant to wall loss from wet steam flow than the typical A216-WCB carbon steel used in other plant systems. However, the flat covers which form the pressure boundary and the hex nuts which hold the valve disk to the swing arm are carbon steel.

The Adverse Trend Investigation Report for ER 2002-2568, reference (11) identified the root cause of the erosion as a material deficiency. The design specification required a chrome-moly material, the vendor supplied a carbon steel material. The lack of maintenance on these valves during the past 30 years of operation contributed to the extent of the erosion found.

The valve covers and the nuts are located out of the flow stream and partially shielded by the open disc. The severe wear was limited to the covers and the nuts. The chrome-moly internal parts and the valve bodies show no or limited wear considering 30 years of operation. The manufacturers drawing shows blank spaces and then "steel" as the material. Apparently changes to the drawings were made during procurement and fabrication. The replacement covers obtained from the vendor are carbon steel A285 Gr. C as specified by the vendor.

External UT inspections of valves, especially check valves, are not typically performed under the Piping FAC Inspection Program at VY. Based on past experience with UT measurement on valves, line items were added to the valve maintenance procedures to inspect for internal wear/corrosion of the bodies and internal parts. Had we performed UT inspections on these valves, the inspection would have been limited to the flow stream, the covers would not have been included in the inspection since they are located outside the flow stream. This is the first valve cover erosion we have experienced. The erosion was not expected considering the valves bodies are chrome-moly. The carbon steel parts are inconsistent with the chrome-moly bodies with respect to FAC wear resistance. The materials used in the cover and disc nut are incompatible with long term exposure to wet steam flow.

The long term solution should include replacement of carbon steel components with FAC resistant materials, and a review of piece parts in other valves with similar flow regimes to insure this situation does not exist in other valves.

## 4.0 COMPONENTS REQUIRING FUTURE MONITORING

Components requiring future monitoring are identified using the "2004 Predicted Thickness", the "Screening Level" which the component passed, and the "Approximate Cycles to Tmin" shown in Attachment 1. From the wear rates and cycles to Tmin calculated in Attachment 1, only one component, FD18EL01 was identified with less than 10 cycles to Tmin. However, a conservative wear rate based on a single inspection was used in the time calculation. The conservative time to Tmin is approximately 8 cycles. Inspection of this component should be performed in 4 cycles (2007 RFO) to confirm the calculated wear rates.

The 2002 refueling outage inspection results will be incorporated into the existing CHECWORKS models of the Feedwater and Heater Drain Systems . The 2002 inspection data, and data from previous inspections will be used to refine the wear rate predictions. The results shown in Attachment 1 and the updated CHECWORKS analyses will be used to determine the inspection scope for future refueling outages.

## 5.0 COMPONENTS REQUIRING POSSIBLE REPAIR OR REPLACEMENT

No specific components were identified as requiring repairs or replacements. However, with future operation under GE hydrogen water chemistry, wear rates in the Feedwater and Heater Drain systems are expected to increase. The Feedwater System piping from the feed pumps past the feed regulator valves has a relatively low margin for wall loss due to flow accelerated corrosion. This is due to the high design pressure and the installed wall thickness. The CHECWORKS models for this piping will be updated with the 2002 (RFO23) inspection data, and inspections of specific components on the Feedwater System piping will continue in the future.

## 6.0 INSPECTION DATA RETENTION

UT thickness data has been taken using Vermont Yankee owned Panametrics 26DL$^+$ digital UT and electronic data logging system. The large bore UT inspection results were downloaded directly into the CHECWORKS database located on the VY computer network. The measured thickness data for each component is stored in the CHECWORKS data base. A thickness data sheet (form VYNEF8053.01) including the CHECWORKS thickness matrix printout was created for each inspection. The inspection reports are controlled and put into permanent storage by VY ISI personnel per AP 6807. Component evaluations are documented and transferred to Records Management per the FAC Program Procedure PP 7028.

## 7.0 RECOMMENDATIONS FOR FUTURE FAC INSPECTIONS

Based on results from the RFO 23 inspections no new immediate or near term repairs or replacements are required.

Utilization of ISI inspection personnel to perform FAC inspections, use of the Panametric data logging equipment, and the CHECWORKS code has proven to be effective in performing and evaluating the UT inspections required under PP 7028. The continued use of this setup is recommended.

The long term solution for erosion of the carbon steel parts in the Extraction Steam reverse current valves should include replacement of carbon steel components with FAC resistant materials, and a review of the piece parts in other valves with similar flow regimes to insure this situation does not exist in other valves. These recommendations will evaluated by the FAC Program Coordinator under commitment Item No. ER 2002-2586_03.

The planned power uprate project underway at VY will require a complete review of program evaluations, piping modeling, and procedures to account for changes in equipment and flow regimes in plant piping systems. This review should be performed prior to the next refueling outage to insure all required baseline inspections are performed prior to increased power operations.

The potential for finding significant wear in any piping component exists. Contingency planning as required for either weld repair or replacement of large bore components in the piping systems should be considered. ASME code cases for external weld overlay of eroded piping have been approved in recent years. The applicability and possible use of these code cases at VY should be evaluated. These code cases could provide additional methods for timely and effective repairs during short refueling outages.

## 8.0 REFERENCES

1. V.Y. Program Procedure PP 7028, Piping Flow Accelerated Corrosion (FAC) Inspection Program, Original Issue 5/10/01 with LPC 1 dated 12/06/01.

2. V.Y. Department Procedure, DP 0072, "Structural Evaluation of Thinned Wall Piping Components", Original Issue 5/17/01, with LPC 1 dated 10/02/01.

3. V.Y. Nondestructive Examination Procedure, NE 8053, "Ultrasonic Thickness Measurement" Revision 1, dated 9/13/02.

4. VY Piping FAC Inspection Program – 2002 Refueling Outage: Inspection Location Worksheets / Methods and Reasons for Component Selection, dated 10/31/01.

5. Memo J.C.Fitzpatrick to S.D.Goodwin, subject: Piping FAC Inspection Scope for the 2002 Refueling Outage, VYM 2001/025, dated 10/31/01.

6. ENVY Memo J.C.Fitzpatrick to S.D.Goodwin, subject: Summary of RFO 23 Turbine Cross Around Piping Inspections, VYM 2002-009, dated 10/13/02.

7. ENVY Memo J.C.Fitzpatrick to S.D.Goodwin, subject: 2002 Refueling Outage Piping Flow Accelerated Corrosion Inspection Summary, VYM 2002-010, dated 10/21/02.

8. EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program", EPRI NSAC-202L-R2, April 1999.

9. CHECWORKS - Computer Program User Guide, TR 103496, August 1994 by Altos Engineering Applications Inc. for EPRI.

10. VY Calculation No. VYPC 92-004, Rev. 0, "Turbine Cross Around Piping Wall Thinning Evaluation"

11. VY Event Report No. ER 2002-2568, Identification of Adverse Trend with reports of erosion on valve parts in the Extraction Steam (ES) system.

12. VY Event Report No. ER 2001-1823, Steam Seal Pressure Regulator Steam Leak

# V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2002 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspect. No. | Component ID | DIA (in) | Tnom (in) | .875* Tnom (in) | Tmin (in) | 2002 Min Tmeas (in) | Wear Rate(in./cycle) Note 2 | 2004 Tpred. Note 3 | Passed Screen Level | Approx. Cycles to Tmin Note 4 | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 2002-01 | FD01SP11US | 24 | 1.812 | 1.586 | 1.447 | 1.551 | 0.005 | 1.545 | 2 | 17.3 | | |
| 2002-02 | FD08RD01 | 24 | 1.812 | 1.586 | 1.447 | 1.578 | 0.005 | 1.572 | 2 | 21.8 | | |
| | | 18 | 1.375 | 1.203 | 1.085 | 1.263 | 0.005 | 1.257 | 1 | 29.7 | | |
| 2002-03 | FD08EL01 | 18 | 1.375 | 1.203 | 1.085 | 1.328 | 0.010 | 1.314 | 1 | 20.1 | | |
| 2002-03A | FD08SP01US | 18 | 1.375 | 1.203 | 1.085 | 1.224 | 0.0075 | 1.215 | 1 | 15.4 | | Note 5 |
| | | | | | | | | | | | | |
| 2002-04 | FD14SP06DS | 16 | 1.219 | 1.067 | 0.964 | 1.126 | 0.005 | 1.119 | 1 | 22.5 | | |
| 2002-05 | FD14EL05 | 16 | 1.219 | 1.067 | 0.964 | 1.134 | 0.005 | 1.128 | 1 | 26.3 | | |
| 2002-06 | FD14TE02 | 16 | 1.219 | 1.067 | 0.964 | 1.250 | 0.005 | 1.244 | 1 | 47.7 | | Run |
| | | 8 | 0.719 | 0.629 | 0.520 | 0.670 | 0.005 | 0.664 | 1 | 25.0 | | Branch |
| 2002-06A | FD14SP07DS | 16 | 1.219 | 1.067 | 0.964 | 1.155 | 0.005 | 1.149 | 1 | 31.8 | | Note 5 |
| | | | | | | | | | | | | |
| 2002-07 | FD18SP01DS | 16 | 0.844 | 0.739 | 0.645 | 0.785 | 0.005 | 0.779 | 1 | 23.3 | | |
| 2002-08 | FD18EL01 | 16 | 0.844 | 0.739 | 0.645 | 0.797 | 0.016 | 0.778 | 1 | 7.92* | 2007 RFO | *Note 6 |
| 2002-09 | FD18SP02US | 16 | 0.844 | 0.739 | 0.645 | 0.753 | 0.005 | 0.747 | 1 | 18.0 | | |
| | | | | | | | | | | | | |
| 2002-10 | HD12SP20DS | 6 | 0.280 | 0.245 | 0.120 | 0.242 | 0.007 | 0.233 | 2 | 20.3 | | |
| 2002-11 | HD12EL22 | 6 | 0.280 | 0.245 | 0.120 | 0.282 | 0.005 | 0.276 | 1 | 27.0 | | |
| 2002-12 | HD12SP21US | 6 | 0.280 | 0.245 | 0.120 | 0.243 | 0.005 | 0.237 | 2 | 20.5 | | |
| | | | | | | | | | | | | |
| 2002-16 | HD1BEL03 | 6 | 0.280 | 0.245 | 0.200 | 0.299 | 0.007 | 0.291 | 1 | 11.8* | | *Note 6 |
| 2002-17 | HD1BSP05US | 6 | 0.280 | 0.245 | 0.200 | 0.257 | 0.005 | 0.251 | 1 | 12.5* | | *Note 6 |
| | | | | | | | | | | | | |
| 2002-18 | HD3AEL01 | 10 | 0.365 | 0.319 | 0.200 | 0.349 | 0.005 | 0.343 | 1 | 23.9 | | |
| 2002-19 | HD3ASP03US | 10 | 0.365 | 0.319 | 0.154 | 0.348 | 0.005 | 0.342 | 1 | 32.3 | | |
| | | | | | | | | | | | | |

## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2002 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspect. No. | Component ID | DIA (in) | Tnom (in) | .875* Tnom (in) | Tmin (in) | 2002 Min Tmeas (in) | Wear Rate(in./cycle) Note 2 | 2004 Tpred. Note 3 | Passed Screen Level | Approx. Cycles to Tmin Note 4 | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| 2002-20 | HD5BTE01 | 14 | 0.375 | 0.328 | 0.175 | 0.570 | 0.010 | 0.559 | 1 | 33.6 | | Run |
| | | 14 | 0.375 | 0.328 | 0.175 | 0.526 | 0.008 | 0.516 | 1 | 35.5 | | Branch |
| 2002-20A | HD5BSP06DS | 14 | 0.375 | 0.328 | 0.146 | 0.336 | 0.005 | 0.330 | 1 | 31.6 | | Note 5 |
| 2002-21 | HD5BSP07US | 14 | 0.375 | 0.328 | 0.146 | 0.339 | 0.005 | 0.333 | 1 | 32.2 | | |
| | | | | | | | | | | | | |
| 2002-22 | HD7AEL04 | 16 | 0.375 | 0.328 | 0.280 | 0.447 | 0.007 | 0.438 | 1 | 19.1 | | |
| 2002-23 | HD7ASP04US | 16 | 0.375 | 0.328 | 0.140 | 0.328 | 0.005 | 0.322 | 2 | 31.3 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

**NOTES:**

1. All thickness values are inches.
2. Wear/Cycle is approximately inches/18 months. The wear per cycle was calculated per DP0072 using 16.9 equivalent 18 month cycles based on approx. 157,000 operating hours up to 1996 outage, and 12000 ± hrs./cycle. Minimum Wear/Cycle used to calculate Tpred and Cycles to Tmin is 0.005 inches per cycle.
3. 2004 T predicted = 2002 T measured - F.S. * (Wear/Cycle), F.S. = Factor of Safety = 1.20.
4. Cycles to Tmin is calculated from: $\frac{(\text{2002 T measured} - \text{Tmin})}{\text{F.S.} \times \text{Wear/Cycle}}$ (i.e. Cycles from 2002 RFO)
5. Component added to scope due to availability. Scaffolding and insulation removal were already performed for adjacent components.
6. Conservative of wear rate used. Wear rate based on single inspection using band method (max-min).

## V.Y. PIPING F.A.C. INSPECTION PROGRAM: 2002 REFUELING OUTAGE INSPECTION REPORT

## ATTACHMENT 2: SUMMARY OF SMALL BORE PIPING UT INSPECTION RESULTS

### SMALL BORE PIPING

| S.B. Inspection. Number (Data Base No.) | Description / Location | Section | Size (in.) | Sch | Tnom. (inch) | .875 * Tnom. (inch) | T min. (inch) (Note 1) | 2002 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) | Cycles to Tmin. (Note2) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 02-SB01 (48) | 2"-HV-9A Pipe & Fittings @ R.O.-3A at FDW heater E-3-1A / TB Heater Bay (Approx. Elev. 236. ) | A | 2 | 80 | .218 | .191 | .073 | .210 | <0.005 | 22.8 | |
| | | B | 2 | 80 | .218 | .191 | .073 | .207 | <0.005 | 22.3 | |
| | | C | 2 | 80 | .218 | .191 | .073 | .208 | <0.005 | 22.5 | |
| 02-SB02 (55) | 2"-HV-9B Pipe & Fittings @ Condenser Nozzle 23B / TB Heater Bay (Approx. Elev. 236. ) | A | 2 | 80 | .218 | .191 | .073 | .203 | <0.005 | 21.7 | |
| | | B | 2 | 80 | .218 | .191 | .073 | .199 | <0.005 | 21.0 | |
| | | C | 2 | 80 | .218 | .191 | .073 | .206 | <0.005 | 22.2 | |
| 02-SB03 (129) | SSH Low Point Drain 1-LPDR-1" drain off SSH piping & fittings at connection to Condenser A, Nozzle 61. / TB Heater Bay (Approx. Elev. 236. ) | A | 1 | 80 | .179 | .157 | .066 | .169 | <0.005 | 17.2 | |
| | | B | 1" | 160 | .250 | .219 | .066 | .216 | <0.005 | 35.0 | |

NOTES:

1. Tmin includes a 0.065 inch corrosion allowance per ANSI B31.1-1967.
2. Cycles to Tmin from 2002 refueling outage. SF (safety factor) = 1.2 was used on the apparent wear rate. Small bore wear is generally not trended for the purposes of repeat inspections. Small bore components will generally be replaced if significant thinning is observed.

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**Plus attached CD**

ENTERGY NUCLEAR NORTHEAST

Entergy

Engineering Report Cover Sheet

**Engineering Report Title:**

# VERMONT YANKEE PIPING FLOW ACCELERATED CORROSION INSPECTION PROGRAM (PP 7028) 2004 REFUELING OUTAGE INSPECTION REPORT (RFO 24- Spring 2004)

**Engineering Report Type:**

New ☒ Revision ☐ Cancelled ☐ Superceded ☐

**Applicable Site(s)**

IP1 ☐ IP2 ☐ IP3 ☐ JAF ☐ PNPS ☐ VY ☒

**Quality-Related:** ☒ Yes ☐ No

**Prepared by:** James C. Fitzpatrick [signature] Date: 2/15/05
Responsible Engineer (Print Name/Sign)

**Verified/ Reviewed by:** Thomas M. O'Connor [signature] Date: 2/15/05
Design Verifier/Reviewer (Print Name/Sign)

***Reviewed by:** N/A Date: N/A
Authorized Nuclear In-service Inspector (ANII)

**Approved by:** Scott D. Goodwin [signature] Date: 2-15-05
Supervisor (Print Name/Sign)

Multiple Site Review (10)

| Site | Design Verifier/Reviewer (Print Name/Sign) | Supervisor (Print Name/Sign) | Date |
|---|---|---|---|
| | N/A | N/A | N/A |
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*: For ASME Section XI Code Program plans per ENN-DC-120, if required.



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## 1.0 EXECUTIVE SUMMARY

External UT measurements were taken on 26 large bore piping components in the Feedwater, Condensate, Extraction Steam, and Main Steam Drain Systems. External UT inspections were performed on 11 sections of small bore piping on the turbine bypass valve first seal leakoff piping, the high pressure turbine pocket drain line, and the feedwater pump warm-up line. Internal visual inspections of the turbine cross around piping were performed in all four 36 inch diameter lines A to D, and the two west 30 inch diameter lines C and D.

Component selection was based on a combination of; previous inspection data, industry events, analyses using the EPRI developed CHECWORKS computer code, and the consequences of component failure. A detailed selection process was used and was documented in reference (4).

The large bore results were evaluated using a three level screening process defined in plant procedure DP 0072. All components inspected were found to have a wall thickness greater than the code minimum wall thickness. The predicted thickness at the next refueling outage was greater than the code minimum wall thickness for all components. No large bore piping components required repair or replacement during the refueling outage.

Small bore inspections on line 1SLBPV identified localized wall loss and a local "like-for-like" carbon steel replacement at inspection location 04-SB04 was performed during RFO 24. Engineering Request ER 04-0964 was written for replacement of the entire 1SLBPV line with FAC resistant material.

A summary of the large bore piping component screening is contained in Attachment 1. Attachment 2 contains a summary of the small bore piping inspection results.

Section 6.0 discusses the criteria used to screen components as requiring future monitoring. Attachment 3 contains a summary of piping components recommended for future inspections.

Section 7.0 identifies components repaired or replaced during RFO 24.

Section 8.0 contains conclusions and recommendations for future FAC Inspections. There were no immediate operability concerns as the result of FAC inspections performed during RFO24.

## 2.0 PURPOSE

Each refueling outage, ultrasonic thickness (UT) measurements and or/internal visual inspections are performed on plant piping per the Vermont Yankee Piping Flow Accelerated Corrosion (FAC) Inspection Program, PP7028, reference (1). This report summarizes the results of the inspections performed during RFO 24-Spring 2004.

## 3.0 ASSUMPTIONS

There are no assumptions.

## 4.0 2004 REFUELING OUTAGE INSPECTION PLAN

The 2004 refueling outage inspection scope was developed to satisfy the following goals:

- Inspection of large bore components requiring follow up inspections, based on UT data from previous refueling outages.
- Inspection of components identified by the EPRI CHECWORKS computer code as being ranked high for susceptibility to wear and/or having the least time remaining to reach code minimum wall thickness.
- Perform repeat inspections on selected large bore components for calibration of the CHECWORKS models.
- To incorporate industry experience into the program through inspection of components at VY that are similar to those that have either failed or showed significant wall thinning at other plants. During the 2004 RFO, inspections were performed on large bore piping connected directly to the condenser which serves as a drain collector for several small bore lines.
- Perform an internal visual inspection of all four 36" turbine cross around lines exiting the high pressure (HP) turbine. These inspections are to baseline the condition prior to changes in flows due to the HP turbine modifications and power uprate. A priority is to assess the condition of a 12 inch diameter carbon steel stub piece visible from inside the 36"A line.
- Perform an internal visual inspection of the 30" C and D cross around lines to confirm the condition of previous P22 material replacements.
- Inspection of selected small bore components contained in the Small Bore Database which have not had an initial inspection.
- Inspection of selected small bore components based on previous wear or leaks, primarily on the turbine bypass valve chest first seal leak off piping.

- Inspection of selected small bore components connected to the HP turbine to baseline the condition prior to changes in flows due to the HP turbine modification and power uprate.

- Large and small bore piping components subjected to off normal flow conditions, such as components downstream of normally closed valves with seat leakage are generally performed each refueling outage. These components are typically identified by the cognizant Systems Engineer, using the turbine performance monitoring system. No components were identified during the scoping for RFO 24.

- All four HP feedwater heaters were scheduled for replacement in the 2004 RFO. This limits access to piping in the upper heater bay. To optimize the inspection scope a number of inspections will be performed in the feedwater pump room on both the feedwater and condensate systems. These inspections will serve to baseline conditions prior to the increased flows from power uprate.

The planned duration for RFO 24 FAC activities was approximately 18 days. Given the shorter duration consideration was given to optimizing the locations and number of components to be inspected, and also to be consistent with previous outage inspection efforts. The detailed reasoning for component selection is contained in the Inspection Location Worksheets, reference (4). The complete planned scope for RFO 24 is contained in reference (5).

# 5.0 EVALUATION OF INSPECTION RESULTS

## 5.1 Large Bore Piping

The planned large bore piping inspection scope for RFO 24 included external UT exams on 26 large bore piping components at eleven locations on the Feedwater, Condensate, Extraction Steam, and Main Steam Drain Systems. All 26 components were inspected using external UT.

The thickness data were evaluated using a three level screening process as defined in procedure, DP 0072. The UT inspection results for each component were reviewed for anomalies and consistency with piping geometry. Wear rates (wear/cycle) were calculated for each component using methods specified in DP 0072, and are consistent with NSAC-202L, reference (6). For component UT results which indicated no wear or minimal wear has occurred, a minimum wear rate of 0.005 inches/cycle was used. Using the calculated wear rates and the 2004 measured thickness, the predicted thickness at the end of the next cycle (2005 Tpred ) was calculated using a safety factor of 1.2 on the calculated wear per cycle. Using both the wear rate and 2004 measurement data, the projected number of cycles beyond the Spring 2004 refueling outage (RFO24) for each component to wear down to the code minimum wall thickness was also calculated.

Components passing the Level 1 screen have 2005 Tpred greater than .875Tnom (the manufacturing tolerance of new piping) and require no further evaluation. The Level 2 screen is for components with 2005 Tpred less than .875Tnom but greater than Tmin (the code minimum wall thickness to resist pressure and mechanical loads). These components are acceptable for continued operation but future monitoring is recommended. The Level 3 screening is for components with 2005 Tpred less than Tmin. The Level 3 screening is a detailed analytical methodology. It also requires that additional piping components be inspected this outage (sample expansion), and considered for inspection during future refueling outages.

All components inspected were found to have wall thickness greater than code minimum wall thickness. All predicted wall thickness (at the 2005 refueling outage) values were above code minimum wall thickness. Of the 26 large bore piping components inspected, 14 (54%) passed the Level 1 screen, and the remaining 12 (46%) passed the Level 2 screen.

No large bore repairs or replacements were required. Eight components were recommended for future monitoring. These are discussed in Section 6.0 of this report. A summary of the large bore piping component screening is contained in Attachment 1.

## 5.2 Turbine Cross Around Piping

36 Inch Diameter Lines A to D:

Internal visual inspections of the four 36" turbine cross around lines exiting the HP turbine were performed. These inspections were performed to document the condition of the lines prior to operation with the modified turbine and increased flows from power uprate. Also, the visual inspection of a section of 12 inch diameter carbon steel pipe on line 12-ES-1A stub piece visible from inside the 36"A line was performed. This section was also included in the large bore external UT scope as inspection No. 2004-022.

Prior to entering the piping, FAC inspection reports and notes from previous refueling outages and reference (12) were reviewed to identify previously noted conditions.

No areas of active corrosion were identified. Previously identified surface tiger striping with no discernable depth, showed no change in surface extent. The piping is essentially in the same condition as noted in 1998 in reference(12).

Digital photos were taken in each line to document the condition during RFO 24. These will be used for comparison during future outages. The photos are JPEG files contained on the attached CD. Attachment 4 to this report is an index and description of each photo.

30 Inch Diameter Lines C & D:

An internal visual inspection of both the C & D 30 inch diameter cross around lines on the west side of the turbine was performed to confirm the condition of previous P22 material replacements. Both lines have been replaced with P22 Chrome-Moly piping material. The 30" C line was replaced in 1993. This was the first inspection since the replacement. The 30" D line was replaced in 1985 and the last internal inspection was performed in 1995.

Both lines have a smooth grey/blue interior surface with no evidence of wall loss or active surface corrosion. No photos were taken in the 30 inch diameter piping due to resource constraints. For the 30 inch C line the only notable feature is discoloration in the heat affected zone on the downstream weld at elbow CARCEL06 shown on FAC location Sketch No.084. For the 30 inch D line, original fabrication grinding marks on the extrados of elbow CARDEL05 (FAC Location Sketch 085) which were previously identified in 1995 are essentially the same as in 1995.

With 19 years of operation for the 30 inch D line and 10 years for the 30 inch C line, the ASTM A691 P-22 piping material shows no evidence of wall loss due to FAC and has proven as an effective replacement material for the original GE supplied carbon steel piping.

## 5.3 Small Bore Piping

Eleven sections of small bore piping were scheduled for external UT inspection during the 2004 refueling outage. One inspection was a new location from the small bore database. Five locations on the turbine bypass valve chest first seal leakoff line 1SLBPV were inspected to determine the extent of condition due to a through leak during the cycle, reference (9). A temporary engineered leak enclosure, reference (10), was removed and the damaged piping was replaced during the outage. One of the locations inspected on 1SLBPV, 04-SB04 had localized wall loss and was replaced with carbon steel pipe. Engineering Request ER 04-964, reference (11) was written to replace the entire 1SLBPV line with FAC resistant material.

The remaining five locations were on the HP turbine pocket drain line 1SPL2 located directly under the HP turbine. These were repeat inspections performed to assess the condition of the piping prior to the HP turbine modifications and operation under power uprate flows.

No significant wear was found in the small bore piping inspected except for location 04-SB04 on line 1SLBPV. A summary of the small bore piping inspection results and recommendations for future inspections is contained in Attachment 2.

## 5.4 Feedwater Heater Shells

All four HP feedwater heaters were replaced during RFO 24. All ten feedwater heater shells have been replaced with either chrome-moly or stainless steel materials. There are no planned UT inspections for the feedwater heater shells in the near term.

## 6.0 COMPONENTS REQUIRING FUTURE MONITORING

Components requiring future monitoring are identified using the predicted thickness at the next refueling outage (2005 $T_{Predicted}$), the "Screening Level" which the component passed, and the "Approximate Cycles to Tmin" shown in Attachment 1. From the wear rates and cycles to Tmin calculated in Attachment 1, five components were identified with less than 10 cycles to Tmin. These calculated times are based on conservative wear rate estimates. A detailed description is contained in Attachment 3. Re-inspections were recommended for 8 components with lowest calculated times to Tmin. The recommended inspection time is generally one-half the calculated time to reach Tmin.

The 2004 refueling outage inspection results will be incorporated into the existing CHECWORKS models of the Feedwater and Condensate Systems. The 2004 inspection data along with data from previous inspections will be used to refine the wear rate predictions. The results shown in Attachment 1 and the updated CHECWORKS analyses will be used to determine the inspection scope for future refueling outages.

## 7.0 COMPONENTS REQUIRING POSSIBLE REPAIR OR REPLACEMENT

No specific large bore components were identified as requiring repairs or replacements.

Small bore inspections on line 1SLBPV identified localized wall loss and a local "like-for-like" carbon steel replacement at inspection location 04-SB04 was performed during RFO 24. Engineering Request ER 04-0964 was written for replacement of the entire 1SLBPV line replacement with FAC resistant material.

No other small bore piping was identified as requiring repair or replacement.

## 8.0 CONCLUSIONS / RECOMMENDATIONS FOR FUTURE FAC INSPECTIONS

There were no immediate operability concerns as the result of FAC inspections performed during RFO24.

Based on results from the RFO 24 inspections, no new immediate or near term repairs or replacements are required. Replacement of small bore line 1SLBPV piping which has experienced through wall leaks in the past is being addressed in ER 04-0964.

The planned power uprate project underway at VY requires a complete review of program evaluations, piping modeling, and procedures to account for changes in equipment and flow regimes in plant piping systems. Inspection data taken this outage will serve as part of the baseline data prior to operation with the increased flows from power uprate.

## 9.0 REFERENCES


1. V.Y. Program Procedure PP 7028, Piping Flow Accelerated Corrosion (FAC) Inspection Program, Original Issue 5/10/01 with LPC 1 dated 12/06/01.

2. V.Y. Department Procedure, DP 0072, "Structural Evaluation of Thinned Wall Piping Components", Original Issue 5/17/01, with LPC 1 dated 10/02/01.

3. ENN-NDE-9.05, Revision 0, Ultrasonic Thickness Examination.

4. VY Piping FAC Inspection Program – 2004 Refueling Outage: Inspection Location Worksheets / Methods and Reasons for Component Selection, dated 3/27/03.

5. ENVY Memo: J.C.Fitzpatrick to S.D.Goodwin, subject: Piping FAC Inspection Scope for the 2004 Refueling Outage, VYM 2003/009, dated 3/27/03.

6. EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program", EPRI NSAC-202L-R2, April 1999.

7. CHECWORKS - Computer Program User Guide, TR 103496, August 1994 by Altos Engineering Applications Inc. for EPRI.

8. VY Calculation No. VYPC 92-004, Rev. 0, "Turbine Cross Around Piping Wall Thinning Evaluation."

9. Vermont Yankee Event Report ER No. 2003-044, Turbine Bypass Steam Leak , Line #1 1SLBPV, Level 2.

10. Temporary Modification Package No. 2003-002, Installation of Steam Leak Repair Enclosure on 2" Steam Seal Off the Turbine Bypass Valves.

11. Engineering Request ER 04 -0964, Replace Turbine Bypass Valve Chest 1st Seal Leakoff Piping 1SLBPV.

12. VY Design Engineering - Bolton MEMO: J.C. Fitzpatrick to D.Girroir(VY-ISI), VYM 98/91, dated May 8,1998, subject:1998 Refueling Outage Turbine Cross Around Piping Inspections.

## ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspect. No. | Component ID | DIA (in.) | $T_{nom}$ (in.) | $.875T_{nom}$ (in.) | $T_{min}$ (in.) | 2004 Min. $T_{meas}$ (in.) | Wear Rate (in./cycle) Note 2 | 2005 $T_{predicted}$ Note 3 | Passed Screen Level | Approx. Cycles to $T_{min}$ Note 4 | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004-01 | FD01RD01 | 16 | 1.219 | 1.066 | 0.965 | 1.031 | 0.005 | 1.025 | 2 | 11.0 | | |
| | | 12 | 1.000 | 0.875 | 0.769 | 0.906 | 0.005 | 0.900 | 1 | 22.8 | | |
| 2004-02 | FD01EL01 | 16 | 1.219 | 1.066 | 0.984 | 1.074 | 0.005 | 1.068 | 1 | 15.0 | | |
| 2004-03 | FD01TE05 | 16 | 1.219 | 1.066 | 0.965 | 1.010 | 0.005 | 1.004 | 2 | 7.5 | 2008 RFO | Note 5 |
| | | | | | | | | | | | | |
| 2004-04 | FD01EL04 | 16 | 1.219 | 1.066 | 1.090 | 1.431 | 0.006 | 1.423 | 1 | 47.4 | | |
| 2004-05 | FD01SP04 | 16 | 1.219 | 1.066 | 0.965 | 1.065 | 0.005 | 1.059 | 2 | 16.7 | | |
| | | | | | | | | | | | | |
| 2004-06 | FD02RD01 | 16 | 1.219 | 1.066 | 0.965 | 1.026 | 0.005 | 1.020 | 2 | 10.2 | 2011 RFO | |
| | | 12 | 1.000 | 0.875 | 0.769 | 1.052 | 0.005 | 1.046 | 1 | 47.2 | | |
| 2004-07 | FD02EL01 | 16 | 1.219 | 1.066 | 0.984 | 1.187 | 0.005 | 1.181 | 1 | 33.8 | | |
| 2004-08 | FD02TE01 | 16 | 1.219 | 1.066 | 0.965 | 0.986 | 0.005 | 0.980 | 2 | 3.5* | 2007 RFO | Note 5 *See Note 6 |
| | | | | | | | | | | | | |
| 2004-09 | FD03SP01 | 16 | 1.219 | 1.066 | 0.965 | 1.068 | 0.008 | 1.058 | 2 | 10.2 | 2011 RFO | |
| | | | | | | | | | | | | |
| 2004-10 | FD07SP02 | 18 | 1.375 | 1.203 | 1.085 | 1.197 | 0.014 | 1.181 | 2 | 6.8 | 2008 RFO | |
| 2004-11 | FD07EL03 | 18 | 1.375 | 1.203 | 1.160 | 1.385 | 0.009 | 1.374 | 1 | 20.2 | | |
| | | | | | | | | | | | | |
| 2004-12 | FD14SP08US | 16 | 1.219 | 1.066 | 0.965 | 1.113 | 0.007 | 1.105 | 1 | 18.7 | | |
| 2004-13 | FD14EL07 | 16 | 1.219 | 1.066 | 0.965 | 1.164 | 0.007 | 1.155 | 1 | 23 | | Rows 1 to 12 |
| | | 16 | 1.219 | 1.066 | 0.965 | 1.021 | 0.006 | 1.014 | 2 | 5.2 | 2008 RFO | Row 13, pup piece |
| | | | | | | | | | | | | |
| | FD19SP03DS | 16 | 0.844 | 0.739 | 0.645 | 0.789 | 0.005 | 0.783 | 1 | 24.0 | | Rows 1,2 US pipe |
| 2004-14 | FD19TE01 | 16 | 1.219 | 1.066 | 0.645 | 0.910 | 0.005 | 0.904 | 1 | 44.2 | CC N560 | Row 3 |
| 2004-15 | FD19RD01 | 16 | 1.219 | 1.066 | 0.645 | 1.151 | 0.005 | 1.145 | 1 | 84.3 | CC N560 | |
| | | 10 | 0.844 | 0.739 | 0.585 | 0.781 | 0.005 | 0.775 | 1 | 32.7 | | |
| 2004-16 | FD19SP04 | 10 | 0.844 | 0.739 | 0.450 | 0.778 | 0.005 | 0.772 | 1 | 54.7 | CC N560 | |
| 2004-17 | FD21SP01 | 10 | 0.844 | 0.739 | 0.460 | 0.796 | 0.005 | 0.790 | 1 | 56.0 | CC N560 | |
| | FD19TE01 | 10 | 0.844 | 0.739 | 0.460 | 0.769 | 0.005 | 0.763 | 1 | 50.5 | | Branch FD19TE01 |

ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspect. No. | Component ID | DIA (in.) | $T_{nom}$ (in.) | $.875T_{nom}$ (in.) | $T_{min}$ (in.) | 2004 Min.$T_{meas}$ (in.) | Wear Rate (in./cycle) Note 2 | 2005 $T_{predicted}$ Note 3 | Passed Screen Level | Approx. Cycles to $T_{min}$ Note 4 | Future Inspections Recommended | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | CD30SP03 | 24 | 0.688 | 0.602 | 0.472 | 0.660 | 0.005 | 0.654 | 1 | 31.3 | | Rows 1-2 |
| 2004-18 | CD30TE02 | 24 | 0.688 | 0.602 | 0.520 | 0.902 | 0.005 | 0.896 | 1 | 63.7 | | Rows 3-10 |
| | | 20 | 0.594 | 0.520 | 0.440 | 0.649 | 0.005 | 0.643 | 1 | 34.8 | | |
| 2004-19 | CD30SP04 | 24 | 0.688 | 0.602 | 0.472 | 0.629 | 0.005 | 0.623 | 1 | 26.2 | | Rows 11-12 |
| | | | | | | | | | | | | |
| 2004-20 | CD32SP04 | 20 | 0.594 | 0.520 | 0.394 | 0.512 | 0.005 | 0.506 | 2 | 19.7 | | New Designation |
| 2004-21 | CD32EL02 | 20 | 0.594 | 0.520 | 0.450 | 0.601 | 0.005 | 0.595 | 1 | 25.2 | | Rows 1-8 |
| | | 20 | 0.594 | 0.520 | 0.394 | 0.535 | 0.005 | 0.529 | 1 | 23.5 | | Rows 9-10 on Pipe Stub |
| | | | | | | | | | | | | |
| 2004-22 | ES1ASP01 | 12 | 0.375 | 0.328 | 0.180 | 0.305 | 0.005 | 0.299 | 2 | 20.8 | | |
| | | | | | | | | | | | | |
| 2004-23 | MSD9TE01 to MSD9TE08 | 8 | 0.500 | 0.438 | 0.348 | 0.410 | 0.005 | 0.404 | 2 | 10.3 | 2010 RFO | |
| | | | | | | | | | | | | |
| 2004-24 | MSD9EL05 | 8 | 0.500 | 0.438 | 0.380 | 0.432 | 0.007 | 0.424 | 2 | 6.5 | 2010 RFO | |
| 2004-25 | MSD9EL06 | 8 | 0.500 | 0.438 | 0.380 | 0.468 | 0.005 | 0.462 | 1 | 14.7 | | |
| 2004-26 | MSD9SP06US | 8 | 0.500 | 0.438 | 0.348 | 0.482 | 0.005 | 0.476 | 1 | 22.3 | | |
| | | | | | | | | | | | | |

**NOTES:**

1. All thickness values are inches.
2. Wear/Cycle is approximately inches/18 months. The wear per cycle was calculated per DP0072 using 17.9 equivalent 18 month cycles based on approx. 157,000 operating hours up to 1996 outage, and 12000 ± hrs./cycle. Minimum Wear/Cycle used to calculate Tpred and Cycles to Tmin is 0.005 inches per cycle.
3. 2005 T predicted = 2004 T measured - F.S. * (Wear/Cycle), F.S. = Factor of Safety = 1.20.
4. Cycles to Tmin is calculated from: $\frac{\text{(2004 T measured – Tmin)}}{\text{F.S. x Wear/Cycle.}}$ (i.e. Cycles from 2004 RFO)
5. Tee is fabricated from a 4 inch diameter Sweepolet installed on a 16 inch section of straight pipe.
6. 3.5 cycles to Tmin based on default wear rate. Actual point to point measurements from 1999 to 2004 indicate no wear.

ATTACHMENT 2 SUMMARY OF SMALL BORE PIPING UT INSPECTION RESULTS

## SMALL BORE

| Small Bore Inspection. Number (Note 1) | Description / Location | Sect. | Size (in.) | Sch | Tnom. (inch) | .875$T_{nom}$ (inch) | T min. (inch) (Note2) | 2004 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) | Cycles to Tmin. (Note3) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-SB01 | 2"-1SLBPV Pipe @ ½' Weldolet at No.2 Turbine Bypass Valve. | | 2 | 80 | .218 | .191 | .089 | .120 | 0.006 | 4.3 | Note 5 |
| 04-SB02 | 2"-1SLBPV Pipe @ 90 deg. SW elbow @ "C" Cross Around | Horizontal | 2 | 80 | .218 | .191 | .089 | .155 | 0.008 | 6.9 | Note 5 |
| | | Vertical | 2 | 80 | .218 | .191 | .089 | .204 | <0.005 | 19.2 | |
| 04-SB03 (No.98, 92-SB02) | 2"-1SLBPV Pipe both sides of 90 deg. SW elbow | E-W run | 2 | 80 | .218 | .191 | .089 | .197 | <0.005 | 18 | Note 5 |
| | | N-S run | 2 | 80 | .218 | .191 | .089 | .200 | <0.005 | 18.5 | |
| 04-SB04 (No.99, 92-SB03) | 2"-1SLBPV @ 2x2x2 S.W. Tee | North | 2 | 80 | .218 | .191 | .089 | .194 | <0.005 | 17.5 | * Replaced, See Note 4, Note 5 |
| | | South | 2 | 80 | .218 | .191 | .089 | .097 | <0.005 | 1.3 * | |
| | | West | 2 | 80 | .218 | .191 | .089 | .201 | <0.005 | 18.7 | |
| 04-SB05 | 2"-1SLBPV @ 90 deg. SW Elbow | E-W run | 2 | 80 | .218 | .191 | .089 | .202 | <0.005 | 18.8 | Note 5 |
| | | N-S run | 2 | 80 | .218 | .191 | .089 | .197 | <0.005 | 18.0 | |
| 04-SB06 (No.110, 93-SB49) | 2 ½" – 1SPL2, HP Turbine Drain | Vertical | 2 ½" | 40 | .203 | .178 | .094 | 0.177 | <0.005 | 13.8 | Re-inspect at pipe bend in 2007 RFO after EPU operation. |
| | | Pipe bend Rows 30 to 34 | 2 ½" | 40 | .203 | .178 | .094 | 0.143 | <0.005 | 8.2 | |
| | | Horizontal | 2 ½" | 40 | .203 | .178 | .094 | 0.177 | <0.005 | 13.8 | |

SMALL BORE - continued

| Small Bore Inspection. Number (Note 1) | Description / Location | Sect. | Size (in.) | Sch | Tnom. (inch) | .875Tnom (inch) | T min. (inch) (Note2) | 2004 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) | Cycles to Tmin. (Note3) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-SB07 | 2 ½" – 1SPL2 | Elbow Rows 1 to 6 | 2 ½" | 40 | .203 | .178 | .094 | 0.169 | <0.005 | 12.5 | |
| (No.111, 93-SB50) | | Horizontal Rows 7 to 38 | 2 ½" | 40 | .203 | .178 | .094 | 0.174 | <0.005 | 13.3 | |
| 04-SB08 | 2 ½" – 1SPL2 | Pipe Bend Rows 1 to 5 | 2 ½" | 40 | .203 | .178 | .094 | 0.140 | <0.005 | 7.7 | Re-inspect at pipe bend in 2007 RFO after EPU operation. |
| (No.112, 93-SB51) | | Horizontal Rows 6 to 17 | 2 ½" | 40 | .203 | .178 | .094 | 0.173 | <0.005 | 13.2 | |
| 04-SB09<br>04-SB09A | 2 ½" – 1SPL2 | Pipe Bend Rows 1 to4 | 2 ½" | 40 | .203 | .178 | .094 | 0.140 | <0.005 | 7.7 | Re-inspect at pipe bend in 2007 RFO after EPU operation. |
| (No.113, 93-SB52, No.114, 93-SB53)) | | Horizontal Rows 5 to 23 | 2 ½" | 40 | .203 | .178 | .094 | 0.160 | <0.005 | 11 | |
| | | Elbow Rows 24 to 28 | 2 ½" | 40 | .203 | .178 | .094 | 0.177 | <0.005 | 13.8 | |
| 04-SB10 (No.115, 93-SB54) | 2 ½" – 1SPL2, 2 x 2-1/2" Reducer at 36" CAR | Reducer | 2 ½"<br>2" | 40 | .203<br>.154 | .178<br>.135 | .094<br>.089 | 0.191 | <0.005 | 16.2 | |
| 04-SB11 | ½inch piping at FDW Pump warm up line R.O. | D.S. of R.O. | ½" | 160 | .187 | .164 | .116 | 0.190 | <0.005 | 12.3 | |

NOTES:
1. Small Bore Database No. and previous inspection identification are shown in parentheses.
2. Tmin includes a 0.065 inch corrosion allowance per ANSI B31.1-1967.
3. Cycles to Tmin from 2004 refueling outage. SF (safety factor) = 1.2 was used on the apparent wear rate. Small bore wear is generally not trended for the purposes of repeat inspections. Small bore components will generally be replaced if significant thinning is observed.
4. South section was replaced with new C.S. pipe see W.O 03-000084-007.
5. Engineering Request No. ER 04-0964 was written to replace the entire carbon steel 1SLBPV line with FAC resistant materials.

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## ATTACHMENT 3: COMPONENTS RECOMMENDED FOR FUTURE MONITORING

### LARGE BORE PIPING

| Inspection | Component | Calculated Cycles to Tmin | Recommend Re-inspection RFO | Evaluation / Reasons for Recommendation |
|---|---|---|---|---|
| 2004-03 | FD01TE05 | 7.5 | 2008RFO | Estimated time for component to wear to code minimum thickness is based on the default wear rate of 0.005 inch/cycle. Time calculated based on multiple inspection point to point measurements indicates at least 12.5 cycles to code minimum wall. Recommended inspection at 2008 RFO is based on consideration of flow changes due to power uprate. |
| 2004-06 | FD02RD01 | 10.2 | 2011RFO | Estimated time for component to wear to code minimum thickness is based on the default wear rate of 0.005 inch/cycle. Time calculated based on multiple inspection point to point measurements indicates at least 50.8 cycles to code minimum wall. Recommended inspection at 2011 RFO is based on consideration of flow changes due to power uprate. |
| 2004-08 | FD02TE01 | 3.5 | 2007RFO | Estimated time for component to wear to code minimum thickness is based on the default wear rate of 0.005 inch/cycle. Time calculated based on multiple inspection point to point measurements indicates at least 21 cycles to code minimum wall. Recommended inspection at 2007 RFO is based on consideration of flow changes due to power uprate. |
| 2004-09 | FD03SP01 | 10.2 | 2011RFO | Initial inspection. Estimated time for component to wear to code minimum thickness is based on a conservative wear rate calculation. Recommendation for re-inspection at approx. ½ time to reach Tmin. |
| 2004-10 | FD07SP02 | 6.8 | 2008RFO | Initial inspection. Estimated time for component to wear to code minimum thickness is based on a conservative wear rate calculation. Recommendation for re-inspection at approx. ½ time to reach Tmin. |
| 2004-13 | FD14EL07@ DS pup piece | 5.2 | 2008RFO | Initial inspection. Estimated time for component to wear to code minimum thickness is based on a conservative wear rate calculation. Recommendation for re-inspection at approx. ½ time to reach Tmin. |
| 2004-23 | MSD9TE01 to MSD9TE08 | 10.3 | 2010RFO | Initial inspection. Estimated time for component to wear to code minimum thickness is based on a conservative wear rate calculation. Observed thinning was localized to area below connections of small bore lines. Code min wall based on a conservative design pressure of 1250psi. Recommendation for re-inspection at approx. ½ time to reach Tmin. |
| 2004-24 | MSD9EL05 | 6.5 | 2010RFO | Initial inspection. Estimated time for component to wear to code minimum thickness is based on a conservative wear rate calculation. Observed thinning was localized to area below connections of small bore lines. Code min wall based design pressure of 1250psi considering this line connects directly into the condenser. Recommendation for re-inspection at approx. prior to time to reach Tmin. |

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## ATTACHMENT 3: COMPONENTS RECOMMENDED FOR FUTURE MONITORING

SMALL BORE PIPING

| Inspection | Component | Calculated Cycles to Tmin | Recommend Re-Inspection RFO | Evaluation / Reasons for Recommendation |
|---|---|---|---|---|
| 04-SB01<br>04-SB02<br>04-SB03<br>04-SB04<br>04-SB05 | ½" & 1"-1SLBPV | 4.3 Min | NONE | Engineering Request ER 04-0964 was written to replace the 1SLBPV line with FAC resistant material. Additional inspections will only be performed on this line, if the piping is not replaced. |
| 04-SB06,<br>04-SB08,<br>04-SB09A | 2-1/2"-1SPL2 | 8.2<br>7.7<br>7.7 | 2007RFO | The estimated times shown for locations on this line are constructed of bent piping. The calculated times for components to wear to code minimum thickness is based on the default wear rate of 0.005 inch/cycle. Time calculated based on multiple inspection point to point measurements at the piping bends are as follows:<br>Inspection / Time to Tmin DEFAULT / Time to Tmin point to point<br>04-SB06 / 8.2 cycles / 27.2 cycles<br>04-SB08 / 7.7 cycles / 18.2 cycles<br>04-SB09 / 7.7 cycles / 53.7 cycles<br>Recommended inspection at 2007 RFO is based on consideration of flow changes due to high pressure turbine modifications, power uprate flows, previous wall thinning of this line a Duane Arnold. |

## ATTACHMENT 4: CATALOG OF PHOTOS FROM INTERNAL INSPECTION OF 36 INCH DIAMETER CROSS AROUND PIPING

| XX in JPEG FILE NUMBER | 36 INCH C.A.R. LINE | Description / Notes |
|---|---|---|
| 01 | D | Looking upstream at bottom of 90degree elbow. Note surface tiger striping and previous surface grinding on bottom plates in elbow and in HAZ of weld from pipe to elbow. Some surface roughness on bottom half of horizontal run. |
| 02 | D | Same as 01 above rotated 90 degrees. Note small area adjacent to weld to elbow and longitudinal weld in horizontal pipe. |
| 03 | D | Looking downstream at right side of horizontal pipe upstream of manway. General surface roughness on pipe and at weld at manway. |
| 04 | D | Looking downstream at right side and top of horizontal pipe upstream of manway. General surface roughness on top of pipe and at weld at manway. |
| 05 | D | Looking downstream at center of Herzog cone at inlet to MS-1-1D. |
| 06 | D | Close-up of welds on Herzog cone at inlet to MS-1-1D. |
| 07 | D | Close-up of welds on Herzog cone at inlet to MS-1-1D. |
| 08 | D | Close-up of welds on Herzog cone at inlet to MS-1-1D. |
| 09 | D | Looking downstream at bottom right side adjacent to weld to MS 1D inlet. Note previous welds overlay and surface grinding. |
| 10 | D | Looking downstream at bottom left side in bore of inlet nozzle to MS 1D inlet. Note extent of previous surface corrosion and previous surface grinding. |
| 11 | D | General surface condition on bottom of horizontal pipe upstream of manway. Note roughness. |
| 12 | D | General surface condition on left side of horizontal pipe upstream and opposite of manway. Note roughness. |
| 13 | D | Looking downstream at left side in bore of inlet nozzle to MS-1-1D. Note extent of previous surface corrosion, previous surface grinding, and localized areas of previous attack. |
| 14 | D | Looking downstream at left side of pipe and in bore of inlet nozzle to M-1-1D. Note extent of previous surface corrosion, previous surface grinding, and localized areas of previous attack. Also general surface condition of pipe. |
| 15 | C | Looking upstream from manway. Note FME in bottom of pipe from HP turbine modifications. Material was vacuumed out of pipe and CR written to document condition. |
| 16 | C | Same as 015 above rotated 90 degrees. Note area of surface roughness along left side of pipe. |
| 17 | C | Looking upstream from manway. FME in bottom of pipe from HP turbine modifications was removed. Note area of surface roughness and previous surface grinding along left side of pipe and along bottom longitudinal weld in extrados of elbow. |
| 18 | C | Looking downstream from manway. Note area of surface roughness and previous surface grinding along right side of pipe and on extrados of mitered elbow at inlet to MS-1-1C. |
| 19 | C | Looking upstream at elbow. Note area of surface roughness and previous surface grinding along left side of pipe and left bottom plate of elbow. |
| 20 | C | Looking upstream at elbow. Note area of surface roughness and previous surface grinding on right bottom plate of elbow. |
| 21 | C | Looking upstream, close-up of bottom of elbow. Note area of surface roughness and previous surface grinding. Crown of longitudinal weld on extrados of elbow and to downstream pipe has no corrosion surface film. |
| 22 | C | Looking upstream, close-up of upper right side plate in 90 degree elbow (intrados). Note area of surface tiger striping along weld to turning vane and at weld to horizontal pipe. |
| 23 | C | Looking upstream, close-up upper right side of horizontal pipe downstream of weld to 90 degree elbow. Note extent of localized area of surface roughness. |
| 24 | C | Looking upstream, close-up upper trailing edge of turning vane and bottom (extrados) of elbow. |

# ATTACHMENT 4: CATALOG OF PHOTOS FROM INTERNAL INSPECTION OF 36 INCH DIAMETER CROSS AROUND PIPING

| XX in JPEG FILE NUMBER | 36 INCH C.A.R. LINE | Description / Notes |
|---|---|---|
| 25 | C | Looking downstream from manway. Note area of surface roughness and previous surface grinding along right side of pipe and welds and on extrados of mitered elbow at inlet to MS-1-1C. |
| 26 | C | Close up of extrados of mitered elbow. (right side of horizontal run). Note area of surface roughness below the equator and previous surface grinding along longitudinal weld and circumferential weld on upstream end of mitered elbow. |
| 27 | C | Close up of extrados of mitered elbow. (right side of horizontal run). Note area of surface roughness above the equator on extrados of elbow and on bore of inlet nozzle to MS-1-1C. |
| 28 | B | General surface condition on bottom of horizontal pipe upstream of manway. Note roughness. |
| 29 | B | Looking upstream, close-up of bottom of 90 degree elbow. Note Previous tiger striping and previous surface grinding over entire area of left side bottom plate (extrados) in elbow. |
| 30 | B | Looking upstream, close-up of right side of weld at 90 degree elbow to horizontal pipe. Note surface roughness on upper right side plate in elbow (intrados) and on downstream pipe. |
| 31 | B | Looking upstream, close-up of bottom of pipe at weld at 90 degree elbow. Note previous area of surface attack immediately upstream of to horizontal pipe. Note surface roughness on bottom surface of pipe. |
| 32 | B | Looking upstream, close-up of hole bored in left side of horizontal pipe downstream of 90 degree elbow. Hole is for small bore nozzle used in turbine performance testing. Note general surface condition of pipe. |
| 33 | B | Looking upstream, close-up of top left half (intrados) of 90 degree elbow. Note extent of surface tiger striping over entire area of the top left side plate (intrados) in elbow. Also surface roughness on upper surface of turning vane. |
| 34 | B | Looking upstream to vertical drop, in intrados of 90 degree elbow (go into top half of elbow). Note local area of surface corrosion on upper left side of intrados adjacent to the longitudinal weld. |
| 35 | B | Looking downstream on left side of horizontal pipe just opposite and upstream from manway. Localized area of previous surface corrosion and previous surface grinding along longitudinal weld on left side of pipe. |
| 36 | B | Looking downstream on right side of horizontal pipe upstream from manway. Localized area of previous surface corrosion and previous surface grinding along longitudinal weld on right side of pipe. |
| 37 | B | Same area described in photo 35 above. |
| 38 | B | Looking downstream in horizontal pipe upstream from manway. Localized area of previous surface roughness opposite manway above equator. Note PPE for on large engineer for future inspections (PCs, Safety harness, ropes and oxygen monitor. Knee pads are recommended). |
| 39 | B | Looking into 12 inch diameter connection for line 12"-ES-1B. 12 inch piping is chrome-moly. Note fit up miss-match at bottom of 12 inch pipe for future inspections. |
| 40 | B | Looking downstream in horizontal pipe opposite from manway. Localized area of previous surface roughness and surface grinding. |
| 41 | B | Looking downstream of horizontal pipe bottom surface upstream of inlet to MS-1-1B. Localized area of previous surface roughness and surface grinding at bottom center and along circumferential weld at mitered elbow. |
| 42 | B | Looking downstream at right side of horizontal pipe and intrados of mitered elbow at equator of pipe. Note localized area of previous surface corrosion and surface grinding upstream of weld from pipe to elbow. |
| 43 | B | Looking downstream at right side of horizontal pipe and intrados of mitered elbow below equator of pipe. Note localized area of surface roughness. |
| 44 | A | Looking upstream at right side of horizontal pipe upstream of manway. Note extent of previous internal weld repairs and surface grinding on pipe and upstream elbow. |

## ATTACHMENT 4: CATALOG OF PHOTOS FROM INTERNAL INSPECTION OF 36 INCH DIAMETER CROSS AROUND PIPING

| XX in JPEG FILE NUMBER | 36 INCH C.A.R. LINE | Description / Notes |
|---|---|---|
| 45 | A | Looking upstream at right side of horizontal pipe and 90 degree elbow. Note extent of previous internal weld repairs and surface grinding on pipe. Also note extent of previous surface grinding in elbow at bottom extrados and both top and bottom right side plates. |
| 46 | A | Looking upstream into 12 inch diameter connection for line 12"-ES-1A. 12 inch piping is chrome-moly EXCEPT for C.S. pup piece approx. 5 inches long shown between welds in photo. Note fit up miss-match at bottom and left side of 12 inch pipe for future inspections. Also note previous weld repair and surface grinding at left side of 12 inch opening and general surface condition of 36 inch pipe. |
| 47 | A | Looking downstream at top left side of entrance to MS-1-1A. Note localized area of previous surface corrosion and surface grinding in bore of nozzle and general condition of circumferential weld. |
| 48 | A | Looking downstream at right side of pipe at entrance to MS-1-1A. Note previous weld repair and surface grinding. |
| 49 | A | Looking downstream at top of pipe at entrance to MS-1-1A. Note previous surface grinding and general condition of piping upstream of circumferential weld. |
| 50 | A | Looking downstream at bottom left side of Herzog cone at inlet to MS-1-1A. Note condition of fillet welds. |
| | | |

Notes:
1. Pictures are in JPEG format. File names on CD are "RFO24picturexx.JPG" where "xx" is in column 1 above.
2. In descriptions above, directions for orientation are given looking downstream (i.e. left side of pipe means looking downstream on left side on interior surface.
3. Reference VY drawings 5920-0150 Sheets 1 & 2 for piping arrangement. And 5920-6841 Sheet 1 of 2 for spool piece details.

ATTACHMENT 9.3 TECHNICAL REVIEW COMMENTS AND RESOLUTION FORM

Entergy

ENN Site Applicability: ☐ IP1 ☐ IP2 ☐ IP3 ☐ JAF ☐ PNPS ☒ VY

Engineering Report
Technical Review Comments and Resolutions Form

| Engineering Report Number: | VY-RPT-04-00010 | Rev. 0 | Title: Vermont Yankee Piping Flow Accelerated Corrosion Inspection Program (PP 7028), 2004 Refueling Outage Inspection Report (RFO 24 – Spring 2004) |
|---|---|---|---|
| Quality Related: ☒ Yes ☐ No | | Special Notes or Instructions:None | |

| Comment Number | Section/ Page No. | Review Comment | Response/Resolution | Responsible Engineer's Accept Initials |
|---|---|---|---|---|
| 1 | 5.1/6 | Percentages of components | Incorp'd. | JZF |
| 2 | Attach. 1 | Inspect. No. 2004-09 adjust Tpred. | Incorp'd. | JZF |
| 3 | Attach. 1 | Notes, 17.9 equivalent cycles | Incorp'd. | JZF |
| 4 | Attach. 2 | Inspect. No. 04-SB06, adjust Cycles to Tmin. | Incorp'd. | JZF |
| 5 | Attach. 2 | Inspect. No. 04-SB09, adjust Tmeas. | Incorp'd. | JZF |

| Reviewed/ Verified By: | T. M. O'Connor | Date:2-15-05 |
|---|---|---|
| Site/Department: | VY/MSD | Phone:x3092 |

FAC PROGRAM RECORDS 2005 RFO.PDF

TAB 8



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Engineering Report Cover Sheet

**Engineering Report Title:**

**VERMONT YANKEE PIPING FLOW ACCELERATED CORROSION INSPECTION PROGRAM (PP 7028)**
**2005 REFUELING OUTAGE INSPECTION REPORT**
**(RFO 25- Fall 2005)**

**Engineering Report Type:**

New ☒ Revision ☐ Cancelled ☐ Superseded ☐

**Applicable Site(s)**

IP1 ☐ IP2 ☐ IP3 ☐ JAF ☐ PNPS ☐ VY ☒ WPO ☐
ANO1 ☐ ANO2 ☐ ECH ☐ GGNS ☐ RBS ☐ WF3 ☐

**DRN No.** ☒N/A; ☐

(5) **Report Origin:** ☒ Entergy ☐ Vendor
Vendor Document No.: N/A

(6) **Quality-Related:** ☒ Yes ☐ No

| | | | |
|---|---|---|---|
| **Prepared by:** | James C. Fitzpatrick [signature]<br>Responsible Engineer (Print Name/Sign) | Date: | 5/8/06 |
| **Verified/ Reviewed by:** | Thomas M. O'Connor [signature]<br>Design Verifier/Reviewer (Print Name/Sign) | Date: | 5/9/06 |
| **Reviewed by:*** | N/A<br>Authorized Nuclear In-service Inspector (ANII) | Date: | N/A |
| **Approved by:** | Scott D. Goodwin [signature]<br>Supervisor (Print Name/Sign) | Date: | 5-15-06 |

*: For ASME Section XI Code Program plans per ENN-DC-120, if required.

# EN-DC-147 Rev.0 Engineering Report

## No. VY-RPT-06-00002

## REVISION SUMMARY

| Revision No. | Description of Change | Reason for Change |
|---|---|---|
| 0 | Original Report | N/A |
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## 1.0 EXECUTIVE SUMMARY

External UT measurements were taken on 27 large bore piping components in the Feedwater, Condensate, and Main Steam Systems. External UT inspections were performed on 5 sections of carbon steel small bore piping in the condensate and control rod drive systems. Internal visual inspections of the turbine cross around piping were performed in the A and C 36 inch diameter lines and in the B 30 inch diameter line. The inspections were performed under EMPAC Work Order 04-004983.

Component selection was based on a combination of; previous inspection data, industry events, analyses using the EPRI developed CHECWORKS computer code, and the consequences of component failure. A detailed selection process was used and was documented in reference (4).

The large bore and small bore inspection results were evaluated using a three level screening process defined in plant procedure DP 0072. All components inspected were found to have a wall thickness greater than the code minimum wall thickness. The predicted thickness at the next refueling outage was greater than the code minimum wall thickness for all components. No large bore piping components required repair or replacement during the refueling outage. Remaining service life (RSL) calculations based on the UT inspection data have been factored to account for a 20% extended power update commencing in March 2006.

A summary of the large bore piping component screening is contained in Attachment 1. Attachment 2 contains a summary of the small bore piping inspection results.

Section 6.0 discusses the criteria used to screen components as requiring future monitoring. Attachment 3 contains a summary of piping components recommended for future inspections.

No components inspected in RFO 25 required repair or replacement. ER 04-0964 was implemented outside the scope of this program to replace piping previously recommended for replacement in RFO 24, reference(9).

Section 8.0 contains conclusions and recommendations for future FAC Inspections. There were no immediate operability concerns as the result of FAC inspections performed during RFO25.

Components on the SSH and SPE lines scheduled for inspection in RFO25 and were de-scoped due to higher priority LP turbine work in the same location. These locations should be inspected in RFO 26.

## 2.0 SCOPE / PURPOSE

Each refueling outage, ultrasonic thickness (UT) measurements and/or internal visual inspections are performed on plant piping per the Vermont Yankee Piping Flow Accelerated Corrosion (FAC) Inspection Program, PP 7028, reference (1). For RFO 25, the inspections, scaffolding installation, insulation removal, and surface preparation activities were performed under EMPAC Work Orders 04-004983-000 to 04-004983-010.

This report summarizes the results of the inspections performed during Fall 2005 Refueling Outage (RFO 25).

## 3.0 ASSUMPTIONS

There are no assumptions.

## 4.0 2005 REFUELING OUTAGE INSPECTION PLAN

The 2005 refueling outage Inspection scope was developed to satisfy the following goals:

- Inspection of large bore components, requiring or recommended for follow up inspections, based on UT data from previous refueling outages.

- Inspection of components identified by the EPRI CHECWORKS computer code as being ranked high for susceptibility to wear and/or having the least time remaining to reach code minimum wall thickness.

- Perform repeat inspections and new inspections on selected large bore components for calibration of the CHECWORKS models.

- To incorporate industry experience into the program through inspection of components at VY that are similar to those that have either failed or showed significant wall thinning at other plants. During the 2005 RFO, inspections were performed on piping at and downstream of flow elements in the condensate system in response to the Mihama event, reference (12).

- Perform an internal visual inspection of two of the four 36" turbine cross around lines exiting the high pressure (HP) turbine. The HP turbine modifications performed in RFO 24 were for power uprate flows. These inspections were to verify the condition on the piping as documented in reference (14), given the new HP turbine was operated for one full cycle off its peak efficiency. Also the last remaining carbon steel 30 inch line was inspected to confirm its condition prior to power uprate flows.

- Inspection of selected small bore components contained in the Small Bore Database which have not had an initial inspection and/or identified through review of industry operation experience (OE).

- Inspection of Large bore piping components subjected to off normal flow conditions, such as components downstream of normally closed valves which connect directly to the condenser. These components are typically identified by the cognizant Systems Engineer, using the turbine performance monitoring system. The feedwater pump recirc lines were inspected during RFO 25.

- Inspect piping components identified as having the largest change in projected wear rate under EPU conditions to obtain current pre-EPU conditions. Component selection was based primarily on the increased velocity. Piping downstream of the Feedwater Reg valve FCV-6-12B was selected for inspection.

- Inspect components based on leaks at VY. Inspections on the Turbine Steam Seal header (SSH) and the Steam Packing Exhauster (SPE) lines to determine the extent of condition for CR-VTY-2004-02985, reference (13).

The planned duration for RFO 25 FAC activities was approximately 10 days. Given the shorter duration consideration was given to optimizing the locations and number of components to be inspected, and also to be consistent with previous outage inspection efforts. The detailed reasoning for component selection is contained in the Inspection Location Worksheets, reference (4). The complete planned scope for RFO 25 is contained in reference (5).

## 5.0 EVALUATION OF INSPECTION RESULTS

### 5.1 Large Bore Piping

The planned large bore piping inspection scope for RFO 25 included external UT exams on 37 large bore piping components at sixteen locations on the Feedwater, Condensate, Main Steam, Turbine Steam Seal, and Steam Packing Exhauster Systems. Planned inspections on the turbine Steam Seal header (SSH) and the Steam Packing Exhauster (SPE) lines to determine the extent of condition for CR-VTY-2004-02985 were "de-scoped" from the 2005 RFO due to higher priority LP turbine work in the same location. A total of 27 large bore components were inspected using external UT.

The thickness data were evaluated using a three level screening process as defined in procedure, DP 0072. The UT inspection results for each component were reviewed for anomalies and consistency with piping geometry. Wear rates (wear/cycle) were calculated for each component using methods specified in DP 0072, and are consistent with NSAC-202L, reference (6). The calculated wear rates for piping components which experience flow during normal operation were increased by a factor of 1.25 to account for a 20% extended power update (EPU) commencing in March 2006. The 1.25 factor is to envelope possible increases in wear rates due to the increased EPU flow velocities. The larger of the factored wear rate or a minimum wear rate of 0.005 inches/cycle was used in the trending projections.

Using the calculated wear rates and the 2005 measured thickness, the predicted thickness at the end of the next cycle (2007 Tpred ) was calculated using a safety factor of 1.2 on the calculated wear per cycle. Using both the wear rate and 2005 measurement data, the Remaining Service Life (RSL) for each component was calculated. The RSL is the projected number of cycles beyond the Fall 2005 refueling outage (RFO25) for each component to wear down to the code minimum wall thickness.

Components passing the Level 1 screen have 2007 Tpred greater than .875Tnom (the manufacturing tolerance of new piping) and require no further evaluation. The Level 2 screen is for components with 2007 Tpred less than .875Tnom but greater than Tmin (the code minimum wall thickness to resist pressure and mechanical loads). These components are acceptable for continued operation but future monitoring may be recommended. The Level 3 screening is for components with 2007 Tpred less than Tmin. The Level 3 screening is a detailed analytical methodology. It also requires that additional piping components be inspected this outage (sample expansion), and considered for inspection during future refueling outages.

All components inspected were found to have wall thickness greater than code minimum wall thickness. All predicted wall thickness (at the 2007 refueling outage) values were above code minimum wall thickness. Of the 27 large bore piping components inspected, 16 (59%) passed the Level 1 screen, and the remaining 11 (41%) passed the Level 2 screen. A summary of the large bore piping component screening is contained in Attachment 1.

No large bore repairs or replacements were required. Two components which experience continuous flow in the Feedwater system were recommended for future monitoring. These are discussed in Section 6.0 of this report. Additional discussion on monitoring of the carbon steel sections of the Feedwater Pump Recirc. lines, and inspection of components removed from the inspection scope in 2005 are included in Section 6.0.

## 5.2 Turbine Cross Around Piping

36 Inch Diameter Lines A & C :

Internal visual inspections in two of the four 36" turbine cross around lines exiting the HP turbine were performed. The HP turbine modifications performed in RFO 24 were for power uprate flows. The plant was operated for one full operating cycle at Current Licensed Thermal Power (CLTP), which is off the HP turbine peak efficiency. These inspections were to verify the condition of the piping as documented in Attachment 4 of the 2004 FAC Inspection Report, reference(14). Internal inspection of the 36"A line included the visual inspection of a section of 12 inch diameter carbon steel pipe on line 12-ES-1A stub piece visible from inside the 36"A line..

Comparison of the internal condition of the 36 inch A and C lines with photos contained Attachment 4 of reference (14) showed only one discernable difference. A localized section on the bottom portion of the 36" C line contained a circular area of ferrous oxide centered directly under the 2 inch diameter connection for the turbine bypass valves common 1st seal leakoff line. The oxide was reddish in color, and tightly adhering to the inside surface of the pipe. No localized wall loss was noted in the 36" C piping.

The entire carbon steel Turbine Bypass Valve Chest 1st Seal Leakoff line, 1SLBPV, was replaced with Chrome-Moly material in RFO25, reference(9). Two local sections on this line were replaced with carbon steel in RFO 24. The sources of the corrosion products in the bottom of 36" C line are suspected to be the initial internal surface corrosion products from the partial small bore replacements, which were scoured off the small bore sections and deposited in the bottom of the 36" C line. Two plant trips which occurred during the cycle would result in high flows from the turbine bypass valves seals to the 36" C cross around line.

No areas of active corrosion were identified in either the 36" A or 36"C line.

30 Inch Diameter Line B:

The 30 inch diameter B line is the only remaining original carbon steel line. The other three lines have been completely replaced with Chrome-Moly material (P22) which has been demonstrated to be resistant to FAC damage. A partial internal visual inspection of the north end of the B 30 inch diameter cross around line on the east side of the turbine was performed to confirm the internal condition of the line prior to operation under EPU flows. Only the north end of the line near the manway was inspected due to lack of an open airway for internal ventilation from the south end of the line.

The interior of the line generally appears the same as observed in 1999 and 2002. The extent of areas of red/black oxide identified in previous inspections is essentially the same. Markings on the interior of the pipe to identify the 1995 inspection/repair locations and the 1996 UT locations are still visible. These are evidence that there is no significant wall loss occurring in the north end of the line under current power flows and Moisture Separator (MS) efficiency.

Increased steam flows under EPU conditions may cause a reduction in MS efficiency and result in a decrease in the steam quality in the 30 inch CAR piping. Any significant reduction in steam quality could result in resumption of FAC damage to the carbon steel line. The efficiency of the Moisture Separators can only be confirmed by testing at EPU flows. Unless a test to confirm MS efficiency is performed to determine steam quality it is prudent to perform a complete internal inspection of the 30" B line in RFO26. Also reference (8) should be revised to reflect the increase in design pressure from 269psi. to 300psi. for EPU conditions.

## 5.3 Small Bore Piping

Five sections of small bore piping were scheduled for external UT inspection during the 2005 refueling outage. All inspections were first time inspections. All were selected based on industry Operating Experience (OE) with wall loss downstream of flow orifices, reference (11).

No significant wear was found in the small bore piping inspected. All projected remaining service life (RSL) values are greater than the life of the plant (including a projected 20 year license renewal period). A summary of the small bore piping inspection results is contained in Attachment 2. No recommendations for future inspections were made for small bore piping.

## 5.4 Feedwater Heater Shells

All four HP feedwater heaters were replaced during RFO 24. All ten feedwater heater shells have been replaced with either chrome-moly or stainless steel materials. There are no planned UT inspections for the feedwater heater shells in the near term.

## 6.0 COMPONENTS REQUIRING FUTURE MONITORING

Large bore components requiring future monitoring are identified using the predicted thickness at the next refueling outage (2007 $T_{Predicted}$ ), the "Screening Level" which the component passed, and the "RSL", the approximate Cycles to Tmin, shown in Attachment 1. From the wear rates and cycles to Tmin calculated in Attachment 1, only one component in piping with continuous flow, was identified with less than 10 cycles to Tmin. Re-inspection was recommended for this component and the adjacent downstream component. See Attachment 3 for a detailed description.

The carbon steel piping component connecting to and adjacent to the condenser on the Reactor Feedwater Pump Recirculation lines have experienced some degree of wall loss due to past flows through normally closed valves. The upstream piping has been replaced with A335 P11 Chrome–Moly piping. During normal operation there is no flow in these lines.. No current leakage is indicated since the upstream FCV repairs were performed during RFO24. This piping was inspected to determine if past leakage has caused wear since the last inspections and to insure the condition of the piping for Extend Power Uprate conditions. The Thermal Performance Monitoring (TPM) system will be used to determine if flow is occurring in this pipe during normal operation. The Thermal Performance Monitoring (TPM) system will be used as a trigger to determine if future inspections are required.

The 2005 refueling outage inspection results will be incorporated into the existing CHECWORKS models. The 2005 inspection data along with data from previous inspections will be used to refine the wear rate predictions. The results shown in Attachment 1 and the updated CHECWORKS analyses will be used to determine the inspection scope for future refueling outages.

Planned inspections on the turbine Steam Seal header (SSH) and the Steam Packing Exhauster (SPE) lines to determine the extent of condition for CR-VTY-2004-02985 CA 03 were "de-scoped" from the 2005 RFO due to higher priority LP turbine work in the same location. These inspections should be performed in RFO26.

No small bore components inspected in RFO 25 require future monitoring.

Increased steam flows under EPU conditions may cause a reduction in Moisture Separator efficiency and result in a decrease in the steam quality in the 30 inch CAR piping. Any significant reduction in steam quality could result in resumption of FAC damage to the CS line. Unless a test to confirm MS efficiency is performed to determine steam quality it is prudent to perform a complete internal inspection of the 30" B line in RFO26.

## 7.0 COMPONENTS REQUIRING POSSIBLE REPAIR OR REPLACEMENT

No specific large bore components or small bore components were identified as requiring repairs or replacements during RFO 25.

## 8.0 CONCLUSIONS / RECOMMENDATIONS FOR FUTURE FAC INSPECTIONS

There were no immediate operability concerns as the result of FAC inspections performed during RFO25.

Based on results from the RFO 25 inspections, no new immediate or near term repairs or replacements are required. ER 04-0964, reference(9), replaced small bore line 1SLBPV piping which has experienced through wall leaks in the past and eliminates any need for repeat inspections on this line.

Inspection data taken this outage will serve as part of the baseline data prior to operation with the increased flows from power uprate.

Data from repeat inspections of large bore components in the Feedwater System which experience continuous flow shows essentially no wear is occurring under CLTP flow conditions. Measured differences are within the tolerances of the UT equipment ( +/- 0.004 inch).

Wear rates calculated from a single (initial) UT inspection using the EPRI recommended methods from reference (2) & (6) in single phase system piping (Condensate and Feedwater) have proven to be conservative when compared to components with multiple inspections.

Components on the SSH and SPE lines scheduled for inspection in RFO25 and were de-scoped due to higher priority LP turbine work in the same location. These locations should be inspected in RFO 26.

A complete internal inspection of the 30" B turbine cross around line should be performed in RFO26.

Reference (8) is a contingency calculation used prior to 1995 pipe repair and moisture separator internal replacement efforts for acceptance criteria for as-found wall loss in the 30 inch diameter carbon steel turbine cross around lines. The calculation should be revised to reflect the increase in design pressure from 269psi. to 300psi. for EPU conditions for the CAR piping.

## 9.0 REFERENCES


1. V.Y. Program Procedure PP 7028, Piping Flow Accelerated Corrosion (FAC) Inspection Program, Original Issue 5/10/01 with LPC 1 dated 12/06/01.
2. V.Y. Department Procedure, DP 0072, "Structural Evaluation of Thinned Wall Piping Components", Original Issue 5/17/01, with LPC 1 dated 10/02/01.
3. ENN-NDE-9.05, Revision 0, Ultrasonic Thickness Examination
4. V.Y. Piping FAC Inspection Program – 2005 Refueling Outage: Inspection Location Worksheets / Methods and Reasons for Component Selection, revised 3/1/05.
5. ENVY Memo: J.C.Fitzpatrick to S.D.Goodwin, subject: Piping FAC Inspection Scope for the 2005 Refueling Outage (Revision 1a), VYM 2004/007a, dated 5/1/05.
6. EPRI Report, "Recommendations for an Effective Flow-Accelerated Corrosion Program", EPRI NSAC-202L-R2, April 1999.
7. CHECWORKS - Computer Program User Guide, TR 103496, August 1994 by Altos Engineering Applications Inc. for EPRI.
8. VY Calculation No. VYPC 92-004, Rev. 0, "Turbine Cross Around Piping Wall Thinning Evaluation"
9. Engineering Request ER 04 -0964, "Replace Turbine Bypass Valve Chest 1st Seal Leakoff Piping 1SLBPV"
10. VY Design Engineering - Bolton MEMO: J.C. Fitzpatrick to D.Girroir(VY-ISI), VYM 98/91, dated May 8,1998, subject:1998 Refueling Outage Turbine Cross Around Piping Inspections.
11. INPO OE17654, "Potential Trend for Adverse Equipment Conditions Downstream of Orifices" Clinton Power Station, January 16, 2004)
12. INPO OE19368/OE18895: Mihama 3 – PWR, 8/9/2004 Rupture of Condensate line downstream of restriction orifice.
13. CR-VTY-2004-02985, Through wall leaks in the Turbine Steam Seal Header Piping. (Corrective Action: CA-03 for additional inspections)
14. VY-RPT-04-00010, Revision.0 ," Vermont Yankee Piping Flow Accelerated Corrosion Inspection Program (PP 7028) 2004 Refueling Outage Inspection Report (RFO 24)"

## LARGE BORE

| Inspect. No. | Component ID | DIA (in.) | $T_{nom}$ (in.) | .875$T_{nom}$ (in.) | $T_{min}$ (in.) | 2005 Min.$T_{meas}$ (in.) | Wear Rate (in./cycle) Notes 2,3 | Factored Wear Rate for EPU Note 4 | 2007 $T_{predicted}$ Note 5 | Passed Screen Level Note 6 | (RSL) Note 7 | Comments / Future Inspections Recommended |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005-01 | FD14EL03 | 16 | 1.219 | 1.067 | 0.964 | 1.169 | 0.0003 | 0.005 | 1.163 | 1 | 34.1 | |
| 2005-02 | FD14SP03US | 16 | 1.219 | 1.067 | 0.964 | 1.052 | 0.0000 | 0.005 | 1.046 | 2 | 14.6 | Row 1 at counterbore, using default wear rate |
| | | 16 | 1.219 | 1.067 | 0.964 | 1.205 | 0.0000 | 0.005 | 1.199 | | 40.1 | Rows 2-8 |
| 2005-03 | FD04RD01 | 4 | 0.438 | 0.383 | 0.248 | 0.318 | 0.0080 | *0.0080 | 0.306 | 2 | *5.7 | *Note 8, No flow at normal operation. |
| | | 6 | 0.562 | 0.492 | 0.215 | 0.436 | 0.0103 | *0.0103 | 0.426 | | *23.0 | |
| 2005-04 | FD04TE01 Run | 6 | 0.562 | 0.492 | 0.246 | 0.553 | 0.0148 | *0.0148 | 0.535 | | *17.3 | |
| | Branch | 6 | 0.562 | 0.492 | 0.246 | 0.462 | 0.0215 | *0.0215 | 0.436 | 2 | *8.2 | |
| | End Cap | 6 | | | 0.151 | 0.370 | 0.0055 | *0.0055 | 0.363 | | | |
| 2005-05 | Cond Noz 32A | 6 | 0.562 | 0.492 | 0.215 | 0.348 | 0.0103 | *0.0103 | 0.336 | 2 | *10.8 | |
| 2005-06 | FD05RD01 | 4 | 0.438 | 0.383 | 0.246 | 0.340 | 0.0074 | *0.0074 | 0.331 | 2 | *10.6 | *Note 8, No flow at normal operation. |
| | | 6 | 0.562 | 0.492 | 0.215 | 0.448 | 0.0074 | *0.0074 | 0.439 | | *26.2 | |
| 2005-07 | FD05TE01 Run | 6 | 0.562 | 0.492 | 0.246 | 0.461 | 0.0124 | *0.0124 | 0.446 | 2 | *14.4 | |
| | Branch | 6 | 0.562 | 0.492 | 0.246 | 0.623 | 0.0060 | *0.0060 | 0.616 | | *52.4 | |
| | End Cap | 6 | | | 0.151 | 0.347 | 0.0069 | *0.0069 | 0.339 | | | |
| 2005-08 | Cond Noz 32B | 6 | 0.562 | 0.417 | 0.215 | 0.417 | 0.0060 | *0.0060 | 0.410 | 2 | *28.8 | |
| 2005-09 | FD06RD01 | 4 | 0.438 | 0.383 | 0.163 | 0.308 | 0.0070 | *0.0070 | 0.300 | 2 | *17.3 | *Note 8, No flow at normal operation. |
| | | 6 | 0.562 | 0.492 | 0.227 | 0.419 | 0.0053 | *0.0053 | 0.413 | | *30.1 | |
| 2005-10 | FD06TE01 Run | 6 | 0.562 | 0.492 | 0.246 | 0.684 | 0.0098 | *0.0098 | 0.672 | | *32.2 | |
| | Branch | 6 | 0.562 | 0.492 | 0.246 | 0.539 | 0.0050 | *0.0050 | 0.533 | 1 | *48.8 | |
| | End Cap | 6 | | | 0.151 | 0.270 | 0.0050 | *0.0050 | 0.264 | | | |
| 2005-11 | Cond Noz 32C | 6 | 0.562 | 0.492 | 0.215 | 0.352 | 0.0110 | *0.0110 | 0.338 | 2 | *10.4 | |

ATTACHMENT 1: SUMMARY OF LARGE BORE PIPING UT INSPECTION RESULTS

| Inspect. No. | Component ID | DIA (in.) | $T_{nom}$ (in.) | $.875T_{nom}$ (in.) | $T_{min}$ (in.) | 2005 Min. $T_{meas}$ (in.) | Wear Rate (in./cycle) Notes 2,3 | Factored Wear Rate for EPU Note 4 | 2007 $T_{predicted}$ Note 5 | Passed Screen Level Note 6 | (RSL) Note 7 | Comments / Future Inspections Recommended |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005-12 | FD08RD03 | 10 | 0.844 | 0.739 | 0.740 | 0.794 | 0.002 | 0.005 | 0.788 | 1 | 9.0 | |
| | | 18 | 1.375 | 1.203 | 1.085 | 1.254 | 0.002 | 0.005 | 1.248 | | 28.2 | |
| 2005-13 | FD08SP02 | 18 | 1.375 | 1.203 | 1.085 | 1.191 | 0.000 | 0.005 | 1.185 | 2 | 17.7 | Row 1 at counterbore, using default wear rate |
| | | 18 | 1.375 | 1.203 | 1.085 | 1.301 | 0.000 | 0.005 | 1.295 | | 36.0 | Rows 2-12 |
| | FD12SP07US | 18 | 1.375 | 1.203 | 1.085 | 1.248 | 0.004 | 0.0050 | 1.242 | 1 | 27.2 | |
| 2005-14 | FD12EL06 | 18 | 1.375 | 1.203 | 1.085 | 1.379 | 0.007 | 0.0088 | 1.368 | 1 | 27.8 | |
| 2005-15 | FD12SP08US | 18 | 1.375 | 1.203 | 1.085 | 1.216 | 0.0084 | 0.0105 | 1.203 | 1 | 10.4 | Row 1 at counterbore |
| | | 18 | 1.375 | 1.203 | 1.085 | 1.278 | 0.0051 | 0.0064 | 1.270 | | 25.1 | Rows 2 to 5 |
| 2005-16 | CD30FE01 | 20 | *0.812 | 0.711 | 0.394 | 0.839 | 0.0018 | 0.005 | 0.833 | 1 | 74.2 | *Note 9 |
| 2005-17 | CD30EL11 | 20 | 0.594 | 0.520 | 0.394 | 0.689 | 0.001 | 0.005 | 0.683 | 1 | 49.2 | |
| 2005-18 | CD30SP12 | 20 | 0.594 | 0.520 | 0.394 | 0.553 | 0.002 | 0.005 | 0.547 | 1 | 26.5 | |
| 2005-19 | CD31FE01 | 20 | *0.812 | 0.711 | 0.394 | 0.764 | 0.0035 | 0.005 | 0.758 | 1 | 61.7 | *Note 9 |
| 2005-20 | CD31EL04 | 20 | 0.594 | 0.520 | 0.394 | 0.677 | 0.0083 | 0.0104 | 0.665 | 1 | 22.7 | |
| 2005-21 | CD30SP04 | 20 | 0.594 | 0.520 | 0.394 | 0.5480 | .003 | 0.005 | 0.542 | 1 | 25.7 | |
| 2005-22 | CD21RD02 | 6 | 0.280 | 0.245 | 0.146 | 0.232 | 0.0096 | 0.0120 | 0.218 | 2 | 5.97 | Note 10 |
| | | 14 | 0.375 | 0.328 | 0.276 | 0.352 | 0.0029 | 0.005 | 0.346 | | 12.7 | |
| 2005-23 | CD21RD01 | 6 | 0.280 | 0.245 | 0.146 | 0.256 | 0.0051 | 0.0064 | 0.248 | 1 | 14.3 | Note 10 |
| | | 14 | 0.375 | 0.328 | 0.276 | 0.353 | 0.0028 | 0.005 | 0.347 | | 12.8 | |
| | MS1DSP12DS | 18 | 0.938 | 0.820 | 0.726 | 0.935 | 0.0010 | 0.0013 | 0.929 | 1 | 34.8 | |
| 2005-36 | MS1DEL07 | 18 | 0.938 | 0.820 | 0.726 | 0.974 | 0.0053 | 0.0067 | 0.966 | 1 | 30.8 | |
| 2005-37 | MS1DSP13US | 18 | 0.938 | 0.820 | 0.726 | 0.905 | 0.004 | 0.005 | 0.899 | 1 | 29.8 | |

**NOTES:**

1. All thickness values are inches.
2. Wear/Cycle is approximately inches/18 months. The wear per cycle was calculated per DP0072 using 18.9 equivalent 18 month cycles based on approx. 157,000 operating hours up to 1996 outage, and 12000 ± hrs./cycle.
3. Minimum Wear/Cycle used to calculate Tpred and Cycles to Tmin is 0.005 inches per cycle.
4. Factored Wear Rate to account for EPU flows = 1.25 x calculated wear rate or 0.005 in/cycle whichever is less larger
5. 2007 T predicted = 2005 T measured - F.S. * (Factored Wear Rate/Cycle), F.S. = Factor of Safety = 1.20.
6. Highest screening level for the entire piping component. For example when multiple areas of a component such as the small end & large end of a piping reducer are evaluated, the highest screening level for either end the component governs.
7. Remaining Service Life = Cycles to Tmin is calculated from: $\frac{(\text{2005 T measured} - \text{Tmin})}{\text{F.S. x Factored Wear Rate /Cycle}}$ (i.e. Cycles from 2005 RFO)
8. During normal operation there is no flow in these lines. No current leakage is indicated since the upstream FCV repairs were performed during RFO24. This piping was inspected to determine if past leakage has caused wear since the last inspections and to insure the condition of the piping for Extend Power Uprate conditions. Wear rates were calculated on a per cycle basis, actual wear rates per cycle may be higher if leakage past the normally closed FCVs occurs. The Thermal Performance Monitoring (TPM) system will be used to determine if flow is occurring in this pipe during normal operation. The Thermal Performance Monitoring (TPM) system will be used as a trigger to determine if future inspections are required.
9. Condensate flow element fabricated from schedule 60 pipe vs. the schedule 40 specification for Condensate piping. Ends are machined to Sch. 40 for fit up to piping. Reference Drawing 5920-5141.
10. Reducers are upstream and downstream of FCV -4 which is the hot well makeup & dump. This line is used only at low feedwater flows, typically during startup. Inspections were performed due to suspected cavitation in or near the control valve. Calculated wear rates based on a single inspection using the EPRI Band Method are conservative.

## SMALL BORE

| Small Bore Inspection. Number (Note 1) | Description / Location | Sect. | Size (in.) | Sch | Tnom. (inch) | .875T$_{nom}$ (inch) | T min. (inch) (Note2) | 2005 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) (Note 3) | Cycles to Tmin. (Note5) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 05-SB01 (119) | 1" piping DS of R.O. 64-2 Condensate system TB Heater bay (Small bore Data base Point 119) | DS of RO to V64-15 | 1 | 80 | .179 | .157 | 0.072 | 0.150 | 0.002 | 32.5 | Note 4 |
| | | DS V64-15 toward the condenser | | | | | | 0.158<br>0.180<br>0.176 | 0.0014<br>0.000<br>0.0002 | >50 | Note 4 |
| | | US of RO to V64-20 | 1 | 80 | .179 | .157 | 0.091 | 0.186<br>0.176<br>0.178 | 0.000<br>0.0002<br>0.0001 | >50 | |
| | | DS of V64-20 to V64-22 | | | | | | 0.178 | 0.0001 | >50 | |
| | | DS of V64-22 toward the ECCS keep fill system | | | | | | 0.177<br>0.180<br>0.170 | 0.0001<br>0.000<br>0.0005 | >50 | |
| | | | | | | | | | | | |
| 05-SB02 (128) | CRD PUMP Min Flow Line DS of R.O. 3-24A (Smallbore Data Base Point 128) | DS RO to V3-37A | 1 | 160 | .250 | .218 | 0.072 | 0.182 | 0.0036 | 25 | Original, Sch 160 |
| | | DS of V3-37A | 1 | 80 | .179 | .157 | 0.072 | 0.176<br>0.178 | 0.0008<br>0.0003 | >50 | Installed in 1999 |
| 05-SB03 (129) | CRD PUMP Min Flow Line DS of R.O. 3-25A (Smallbore Data Base Point 129) | DS RO to V3-34A | 1 | 160 | .250 | .218 | 0.072 | 0.241 | 0.0023 | >50 | Installed in 1999 |
| | | DS of V3-34A | 1 | 80 | .179 | .157 | 0.072 | 0.172<br>0.179 | 0.0018<br>0.000 | 46.2 | Installed in 1999 |
| | | DS of reducing Tee | 1.5 | 80 | 0.200 | .175 | 0.074 | 0.198 | 0.0005 | >50 | Installed in 1999 |
| | | | | | | | | | | | |
| 05-SB04 (130) | CRD PUMP Min Flow Line DS of R.O. 3-24B (Smallbore Data Base Point 130) | DS RO to V3-37B | 1 | 160 | .250 | .218 | 0.072 | 0.181 | 0.0037 | 25 | Original, Sch 160 |
| | | DS of V3-37B | 1 | 80 | .179 | .157 | 0.072 | 0.176<br>0.184 | 0.0008<br>0.000 | >50 | Original, Sch 80 |

## SMALL BORE –continued

| Small Bore Inspection. Number (Note 1) | Description / Location | Sect. | Size (in.) | Sch | Tnom. (inch) | .875$T_{nom}$ (inch) | T min. (inch) (Note2) | 2005 Min. Measured Thickness (inch) | Apparent Wear Rate (inch/cycle) | Cycles to Tmin. (Note3) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 05-SB05 (131) | CRD PUMP Min Flow Line DS of R.O. 3-25B (Smallbore Data Base Point 131) | DS RO to V3-34B | 1 | 160 | .250 | .218 | .072 | 0.255 | 0.000 | >50 | Installed in 1999 |
| | | DS of V3-34B | 1 | 80 | .179 | .157 | 0.072 | 0.172<br>0.178 | 0.0018<br>0.0003 | 46 | Installed in 1999 |
| | | DS of reducing Tee | 1.5 | 80 | 0.200 | .175 | 0.074 | 0.190 | 0.0005 | >50 | Installed in 1999 |

NOTES:
1. Small Bore Database Number is shown in parentheses.
2. Tmin includes a 0.065 inch corrosion allowance per ANSI B31.1-1967.
3. Apparent wear = Tnom – Tmeasured.
4. Apparent Wear Rate includes 1.25 factor to account for EPU flows DS of RO-64-2 only
5. Cycles to Tmin from 2005 refueling outage. Wear rate = (Tnom-Tmeasured) / 18.9 Equivalent 18 month cycles and a SF (safety factor) = 1.2 was used on the apparent wear rate. Small bore wear is generally not trended for the purposes of repeat inspections. Small bore components will generally be replaced if significant thinning is observed.

| Inspection | Component | Calculated Cycles to Tmin | Recommend Re-inspection RFO | Evaluation / Reasons for Recommendation |
|---|---|---|---|---|
| 2005-12 | FD08RD03 | 9.0 | 2010 RFO (RFO28) | Estimated time for component to wear to code minimum thickness is based on a default wear rate of 0.005 inch/cycle. The default wear rate considers increased EPU flows. Actual point to point measurements indicate no wear is occurring under current license power flows. RSL calculated based on multiple inspection point to point measurements and CLTP flows is 22.5 cycles. Given this location has the highest velocity in the feedwater system, recommended inspection at RFO28 (Spring 2010.)<br><br>**Inspect both FD08RD03 and FD08SP02 during RFO28 in the Spring of 2010, based on consideration of flow changes due to power uprate.** |
| 2005-03<br>2005-04<br>2005-05<br><br>2005-06<br>2005-07<br>2005-08<br><br>2005-09<br>2005-10<br>2005-11 | FD04RD01<br>FD04TE01<br>Cond Nzl 32A<br><br>FD05RD01<br>FD05TE01<br>Cond Nzl 32B<br><br>FD06RD01<br>FD06TE01<br>Cond Nzl 32C | **** | Per Thermal performance Monitoring System | These are carbon steel components connecting to and adjacent to the condenser. Upstream piping has been replaced with A335 P11 Chrome–Moly piping. During normal operation there is no flow in these lines. No current leakage is indicated since the upstream FCV repairs were performed during RFO24. This piping was inspected to determine if past leakage has caused wear since the last inspections and to insure the condition of the piping for Extend Power Uprate conditions. Wear rates were calculated on a per cycle basis, actual wear rates per cycle may be higher if leakage past the normally closed FCVs occurs.<br><br>The Thermal Performance Monitoring (TPM) system will be used to determine if flow is occurring in this pipe during normal operation. The Thermal Performance Monitoring (TPM) system will be used as a trigger to determine if future inspections are required. |

ATTACHMENT 3: COMPONENTS RECOMMENDED FOR FUTURE MONITORING

| Inspection | Component | Calculated Cycles to Tmin | Recommend Re-inspection RFO | Evaluation / Reasons for Recommendation |
|---|---|---|---|---|
| 2005-24<br>2005-25<br>2005-26<br>2005-27<br>2005-28<br>2005-29<br>2005-30<br>2005-31 | 1SSH3EL05<br>1SSH3SP06US<br>1SSH4EL01<br>1SSH4SP02US<br>1SSH5EL01<br>1SSH5SP02US<br>1SSH6EL06<br>1SSH6SP08US | *<br>*<br>*<br>*<br>*<br>*<br>*<br>* | *<br>*<br>*<br>*<br>*<br>*<br>*<br>* | * Planned inspections on the turbine Steam Seal header (SSH) and the Steam Packing Exhauster (SPE) lines to determine the extent of condition for CR-VTY-2004-02985 CA 03 were "de-scoped" from the 2005 RFO due to higher priority LP turbine work in the same location.<br><br>Inspect these locations during RFO26 in Spring 2007. |
| | | | | |
| 2005-32<br>2005-33<br>2005-34<br>2005-35 | 2SPE3EL01<br>2SPE3SP01US<br>2SPE5EL01<br>2SPE5SP01US | *<br>*<br>*<br>* | *<br>*<br>*<br>* | * Planned inspections on the turbine Steam Seal header (SSH) and the Steam Packing Exhauster (SPE) lines to determine the extent of condition for CR-VTY-2004-02985 CA 03 were "de-scoped" from the 2005 RFO due to higher priority LP turbine work in the same location.<br><br>Inspect these locations during RFO26 in Spring 2007. |
| 2005-40 | 30" B CAR | N/A | RFO26 | Given increased flows and possible reduction in steam quality under EPU conditions, a complete internal inspection of the 30" B turbine cross around line should be performed in RFO26. |

## CHECWORKS™ FAC Application, Version 1.0G Enhancements

*The following enhancements have been incorporated into FAC v1.0G. Please review this list to determine what action, if any, you need to take to make effective use of this new version of the software*

1. The user can now enter the hydrazine concentration sampled at the Blowdown of recirculating steam generators as an alternate to the Steam Generator Steam Outlet location. Experience has shown that it is very difficult to obtain an accurate measurement of hydrazine concentration in the steam outlet. To accomplish this, a location selection option "Blowdown" has been added to the "Hydrazine at: SG" drop down window in the PWR Complex Water Treatment data entry form.

2. With Version 1.0F, when the user has entered improper hydrazine concentration values at one or more of the Final Feedwater/Condensate, SG Outlet/Blowdown, or MSR Drain locations and tries to perform an analysis, an error message appears triggered by a hydrazine mass imbalance. This error message only allows the user to abort the analysis so as to correct the input. Version 1.0G has changed the error message, giving the user the additional option of continuing the analysis. In either case the user will then need to correct the hydrazine input concentration values, and rerun the analysis until the imbalance message no longer occurs. See the FAC Version 1.0G User Guide for more details.

3 A new fourth analysis option "NFA→HBD→ARD→COMP" is added to the Wear Rate Analysis Run Definition form. This will allow the user to avoid having to zero out operating conditions in the Component Data form when analyzing multiple power levels and wanting to use the operation conditions from the respective Heat Balance Diagrams. With this new option, the FAC Application will retrieve operating conditions in the following order: first in the Network Flow Analysis results (if available), secondly in the Water Chemistry Analysis results for the lines associated to the Heat Balance Diagram, then the data entered in the wear rate run Advanced Run Definition form, and finally data in the component data form. The other three option labels are also changed to be more intuitive. The revised labels are "COMP→HBD→ARD" (formerly: Ignore NFA Results); NFA→COMP→HBD→ARD" (Formerly: NFA Results 1st Priority); COMP→NFA" (formerly: User Input 1st Priority).

4. The Chemistry Analysis Report now prints input data with 3 digits after the decimal point.

5. The non-applicable data fields (Valve Coefficient, Valve Size, Orifice Size, etc.) in the Operating Data and Component Size/Acceptance pages of the Component Data entry form are now grayed-out and set to 0.

VY Piping FAC Inspection Program PP 7028 - 2004 Refueling Outage

Inspection Location Worksheets / Methods and Reasons for Component Selection

By: [signature] 3/21/03 Reviewed [signature] 3/21/03

Piping components are selected for inspection during the 2004 refueling outage based on the following groupings and/or criteria.

Large Bore Piping

LA: Components selected from measured or apparent wear found in previous inspection results.

LB: Components ranked high for susceptibility from current CHECWORKS evaluation.

LC: Components identified by industry events/experience via the Nuclear Network or through the EPRI CHUG.

LD: Components selected to calibrate the CHECWORKS models.

LE: Components subjected to off normal flow conditions. Primarily isolated lines to the condenser in which leakage is indicated from the turbine performance monitoring system. (through the Systems Engineering Group).

LF: Engineering judgment / Other

LG: Piping identified from EMPAC Work Orders (malfunctioning equip., leaking valves, etc.)

Small Bore Piping

SA: Susceptible piping locations (groups of components) contained in the Small Bore Piping data base which have not received an initial inspection.

SB: Components selected from measured or apparent wear found in previous inspection results.

SC: Components identified by industry events/experience via the Nuclear Network or through the EPRI CHUG.

SD: Components subjected to off normal flow conditions. Primarily isolated lines to the condenser in which leakage is indicated from the turbine performance monitoring system. (through the Systems Engineering Group).

SE: Engineering Judgment / Other.

SG: Piping identified from EMPAC Work Orders (malfunctioning equip., leaking valves, etc.)

Feedwater Heater Shells

No feedwater heater shell inspections will be performed during the 2004 RFO. Previous plans were to complete the UT grids on the No.1 & 2 heaters have been made moot by the decision to replace all 4 HP feedwater heaters for EPU. The shells on all four new heaters will be a chrome-moly material (P-11). Informational visual inspections of the open ends of Feedwater, Extraction Steam, Heater Drain, Vents and Moisture Separator piping will be performed as access is available.

**LA: Large Bore Components selected(identified) from previous Inspection Results**

From the 1995/1996/1998/1999/2001/2002 Refueling Outage Inspections (Large Bore Piping) these components were identified as requiring future monitoring. The following components have either yet to be inspected as recommended, or the recommended inspection is in a future outage

| Inspect. No. | Loc. SK. | Component ID | Notes /Comments / Conclusions |
|---|---|---|---|
| 96-13<br>96-14 | 001 | FD01EL04<br>FD01SP04 | 1996 report recommended inclusion of FD01SP04 into 2001 RFO Scope (lower readings at U.S. counterbore).<br>**UT inspect elbow and downstream pipe in 2004** |
| 99-03<br>99-04 | 002 | FD02EL01<br>FD02TE01 | 1999 Recommendation to inspect tee in 2002. Component is downstream of pump 1B. "B" Pump is used a standby pump, based on usage, inspection was deferred until 2004.<br>**UT inspect elbow and downstream tee in 2004** |
| 99-25<br>99-26 | 008 | FD14EL03<br>FD14SP03 | 1999 recommendation to inspect pipe at upstream counterbore in 2004. Given that the only low readings were at the pipe counterbore and that 2004 RFO work includes replacement of both No.1 feedwater heaters located under the elbow.<br>**Defer re-inspection of the elbow FD14EL03 & pipe FD14SP03 until the 2005 RFO.** |
| 01-03<br>01-04 | 001 | FD01EL01<br>FD01TE05 | 2001 recommendation to inspect the tee in 2004. **UT inspect elbow and downstream tee in 2004** (1998 RFO results recommended inspection in 2001) Also add inspection of the reducer upstream of the elbow. |
| 02-08<br>02-09 | 016 | FD18EL01<br>FD18SP02US | 2002 recommendation to inspect the elbow in 2007 based on a single measurement. **Re-inspect elbow and downstream pipe in 2007 (3 cycles from 2002).** |

**LA: Large Bore Components selected (identified) from previous Inspection Results - continued**

Turbine Cross-around Piping:

Previous Internal Visual UT & Repair History:

| Line | Mat. | Year Replaced | Internal Visual =V, Internal Thickness =UT, Repairs Performed =R | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | RFO16 S1992 | RFO17 F1993 | RFO18 S1995 | RFO19 F1996 | RFO20 S1998 | RFO21 F1999 | RFO22 S2001 | RFO23 F2002 |
| 36"-A | GE** | 1983 | | **V** | **V** | **V** | **V** | | | |
| 36"-B | GE** | 1981 | **V** | **V** | **V** | **V** | **V** | **V** | | |
| 36"-C | GE** | 1981 | **V** | **V** | **V** | | **V** | | | |
| 36"-D | GE** | 1983 | | **V** | **V** | | **V** | | | |
| 30"-A | P-22* | 1985 | **V** | | **V** | | **V** | | | |
| 30"-B | C.S. | Original | **V/UT/R** | **V/UT/R** | **V/UT/R** | **V/UT** | **V** | **V** | | **V** |
| 30"-C | P-22* | 1993 | **V/UT/R** | | | | | | | |
| 30"-D | P-22* | 1985 | | | **V** | | | | | |

** 36" straight pipe sections replaced with GE B50A242E, elbows on the B & C lines are original GE specification D50A67D, elbows on A &D lines are D50A67E (Tnom =0.625 inch).
* 30" A,B,C replaced with A691 CL22 (2-1/4Cr), Fittings A234 WP22. (Tnom. = 0.625 inch)
30" B remains GE B50A242D, fittings and GE D50A67D carbon steel (Tnom = 0.50 inch).

**NOTE: Reference Dwg. No. 5920-6841 Sh. 1 of 2 needs to be updated with correct information. This will be performed during the EPU design change effort.**

**2004 RFO** HP turbine work and MS internals/drain line work will have all (4) 36 inch line manways open for access to perform internal visual inspections.

Perform internal visual inspection of all four lines. Priority is A 36" line for access to internals of the 12 inch diameter CS stub piece in extraction steam line. Also if manways and CIV SRVs are removed, perform visual inspection of the 30" C & D lines to confirm condition of P22 replacement materials.

**2005 RFO** based on increased flows and the possibility of different flow regimes in both the 36 & 30 inch piping, perform a visual inspection. LP turbine work in 2005 RFO may provide opportunity for access to the 30 " lines. As a minimum inspect (2) 36 inch lines and the 30" B line.

**LB: Large Bore Components Ranked High for Susceptibility from CHECWORKS Evaluation**

The current CHECWORKS wear rate calculations contain inspection data up to the 1999 RFO and wear rate predictions are current to the 2001 RFO. The 2001 and 2002 RFO inspection data has been entered into the CHECWORKS database. However, updated wear rate calculations are not complete, and won't be in time to support the schedule date for issuing the inspection scope for the Spring 2004 outage. Based on a review of the 2001 and 2002 RFO inspection data for components on the Feedwater, Condensate, and Heater Drain Systems, the CHECWORKS models still appear to over-predict actual wear. Nothing new or unanticipated was observed in 2002.

Feedwater System

Listed below are components which meet the following criteria:

a) negative time to Tmin from the predictive CHECWORKS runs which include inspection data up to the 1999 RFO,

b) no inspections have been performed on these components or the corresponding components in a parallel train since the 1999 RFO.

| Component ID | Location Sketch | Location | Notes |
|---|---|---|---|
| FD07EL03 | 005 | T.B Feed Pump Room | No inspection data for corresponding component FD08EL02 in other train. **Inspect this or the other train component in 2004. This component will be inspected in 2004.** |
| FD07TE01<br>FD07EL11 | 006 | T.B Heater Bay Elevs 228 & 248 | Components on other train were inspected in 1998. Results indicate minimal wear. **After updating the CHECWORKs model with newer data, assess need for additional inspections in 2005 RFO.** |
| FD07EL12 | 006 | T.B Heater Bay Elev. 248 | Feedwater heater replacement to occur in 2004 RFO. **Perform internal visual inspection at open end on this component.** |
| FD14EL07 | 009 | RX Steam Tunnel El. 266 | Internal visual of elbow performed in 1996 during check valve replacement. no indication of wall loss at that time. **Inspect this or the other train component in 2004. (Inspect this component in 2004).** |
| FD08EL02 | 011 | T.B Feed Pump Room | No inspection data for corresponding component FD07EL03 in other train. **Inspect this or the other train component in 2004. FD07El03 will be inspected in 2004.** |
| FD08TE01<br>FD08EL07 | 012 | T.B Heater Bay Elevs 228 & 248 | Intermediate components FD08EL06 & FD08SP06 were inspected in 1998. Results indicate minimal wear. **After updating CHECWORKs model with newer data, assess need for inspecting components on the train vs. these.** |
| FD08EL08 | 012 | T.B Heater Bay Elev. 248 | Feedwater heater replacement to occur in 2004 RFO. **Perform internal visual inspection at open end on this component.** |
| FD15EL08 | 013 | RX Steam Tunnel El. 266 | Internal visual of elbow performed in 1996 during check valve replacement. no indication of wall loss at that time. **After updating CHECWORKs model with newer data, assess need for inspecting this component in 2005 RFO.** |

**LB: Large Bore Components Ranked High for Susceptibility from CHECWORKS Evaluation - continued**

Condensate System

Only one component was identified as having a negative time to Tmin. This was CD30TE02DS, the downstream side of a 24x24x20 tee on the condensate header in the feed pump room. The CHECWORKS prediction for the downstream side of the tee has a small negative hrs relative to the remainder of the components in the system and relative to the upstream side of the same tee. Other tees on the same header have been previously inspected and show no significant wear. The CHECWORKS model includes UT data up to the 1999 RFO. The inspections on this system performed in 2001 indicate minimal wear. The 2001 inspection data will be input to CHECWORKS to better calibrate the model.

To inspect the components with the highest susceptibility as ranked by CHECWORKS and to obtain a more complete set of inspection data for the Condensate System inspect additional components between the No.3 feedwater heaters and the feedwater pumps. **Inspect CD30TE02 and CD30SP04 in 2004.**

Moisture Separator Drains & Heater Drain System.

No components identified as having negative times to Tmin. No components were selected for inspection in 2001 or 2002 based on high susceptibility. However future operation under HWC will change dissolved oxygen in system. A separate evaluation has been performed and components were selected for inspection in 2002. See Section LD below.

Extraction Steam System

Three components on this system with negative time to code min. wall. The piping is Chrome-Moly. ES4ATE01 & ES4ATE02, 30inch diameter tees inside the condenser have negative prediction (-3426Hrs.) for time to min wall. The negative times to tmin may be conservative based on the modeling techniques used. Refinement of the model of this system is in progress. The negative time to tmin is most likely a function of lack of inspection data vs. actual wear. Due to external lagging on this piping and the location inside the condenser, no components are selected for external UT inspection in 2004 based on high susceptibility. However, an opportunity to perform an internal visual inspection of all the Extraction Steam lines inside the condenser during planed LP turbine work in the 2005 RFO may present itself. See Section LF below.

Note the short section of A106 Gr. B straight pipe on line 12"-ES-1A at the connection to the 36 inch A cross around line is not modeled in CHECWORKS. The component material should be included in the next model update.

**LC: Large Bore Components Identified by Industry Events/Experience.**

Review of FAC related Large Bore Operating Experience (OE) and/or piping failures reported since January 2001

| Date | Plant – Type | Description & Recommended Actions at VY |
|---|---|---|
| | | |
| 4/7/01 | Callaway - PWR | Unexpected extent of thinning in feedwater piping (NRC IN 2001-009 & INPO OE12342) Additional components were inspected in the feedwater system in the Drywell during the 2002 RFO in response to this event. |
| 5/9/01 | Grand Gulf - BWR | Pin Hole Leak in 4 inch carbon steel elbow in RHR min flow line. System has low use at VY (<2% of time). A review of VY drawings VYI-RHR-Part 14 Sht.1/1 and VYI-RHR Part 15 Sht.1/1 show elbows downstream of restriction orifices. Additional research into this event is warranted. Inspections can be performed with the plant operating. Don't include in the scope of 2004 RFO. |
| 11/20/01 | Hamoka 1 - BWR | Rupture of HPCI/RCI 6 inch steam supply line at a section of pipe to RHR Hx sprays. VY is an older design which does not have this configuration. |
| 9/24/02 | IP2 - PWR | Pin hole leak on 26 ½" cross-under piping (HP to MSR) in vicinity of dog bones at expansion joint under location of weld overlay localized wear under/around a previous weld overlay repair. VY has solid piping (no expansion joints. Visual Inspections of CAR piping will be performed in 2004. |
| 1/2/02 | Point Lepreau-PHWR | Failure of Extraction Steam Bellows from LP turbine. VY bellows are made from stainless steel. Primary causes of past failures have been cracking of convolutions and vibration failures of tie rods. The bellows were replaced in 1995 and should not be susceptible to FAC damage. |
| 1/15/02 CHUG Meeting | Surry 1-PWR | Leak in 8 inch Condenser drain header for 3rd/4th pt. FDW Heater vents. Also thinning in Gland Steam Piping inside the condenser and the12" Condenser Drain header from MS Drain trap lines. **The only large bore drain collector at VY is the 8 inch diameter low point drain header. Inspect sections of this line during the 2004 RFO.** |
| 1/15/02 CHUG Meeting | Cooper - BWR | Thinning found in two 20 inch diameter exit nozzles off LP turbine for extraction steam piping. (VY has replaced all LP turbine stub pieces upstream of the expansion bellows with P-11 material. No actions are required at this time. |
| 6/02 CHUG Meeting. | Oconee 1 | Wear found in Heater Drain piping downstream of block valve. Ops was using the gate valve to control flow. All valves on VY HD system are control valves. Normal flow downstream of valves is directly into the feedwater heaters. Bypass valve discharge directly into condenser. TPM monitors possible leakage past the Bypass valves. |
| 6/24/02 | Prairie Island 1 - PWR | Preliminary notice of possible extraction steam line piping/bellows failure inside condenser. (See 1/2/02 Point Lepreau notice above). |
| 8/29/02 | Turkey Point 3 - PWR | Failure of a 6x10 Schedule 40 carbon steel expander in Heater Drain System downstream of a level control valve. Same valve on other train was replaced. However, no inspections were performed on this valve (from INPO Event 250-020829-1, OE 14865, & Info at 1/03 CHUG Meeting). Location is similar to millstone 2 & 3 events in 1991/92. Piping on HD system at VY DS of normal level control valves is constructed from FAC resistant materials or planned for replacement with new Feedwater Heaters. No actions are required for this OE. |
| 10/9/02 | Clinton -BWR | Interconnecting piping (4 and 6 inch diameter) between RWCU Heat Exchanger not included in FAC program. Plant assumed they were equipment when in fact they are piping. VY has replaced the original 3 Perflex Hx design with a U-tube Hx. RWCU piping in this area is stainless steel. Therefore not an immediate concern. |



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**LD: Large Bore Components Selected to Calibrate CHECWORKS**

The CHECWORKS models have been upgraded to include the 96, 98, & 99 RFO inspection data. The 2001 and 2002 inspection data has been loaded however wear rate analyses are not complete at this time. In 2001 components on the higher temperature end of the Condensate System were inspected to calibrate the CHECWORKS models. The inspection data indicate minimal wear and should reinforce the assessment of low wear in the Condensate System. Additional components selected for inspection in 2004 in Section LB above will be used to calibrate the CHECWORKS model.

Prior to the 2002 there was limited inspection data for the Heater Drain system. The current CHECWORKS models (Pass 1 and some Pass 2) indicate low wear rates. During 2002 a number of new inspections were performed to obtain base line data prior to operation under GE Noble Metals HWC. No additional components on the Heater Drain system will be inspected in 2004.

**LE: Large Bore Components subjected to off normal flow conditions identified by turbine performance monitoring system (Systems Engineering Group).**

The Systems Engineering Production Variance Reports for 2002 & since startup from 2002 (RFO23) do not identify any leaking valves. No other leaking valves or steam traps have been identified (to date) using the Turbine Performance Monitoring (TPM) system. No components will be scheduled for the 2004 RFO based on the TPM reports to date. However, if new data indicates leaking valves then, additions to the outage scope may be required.

**LF: Engineering Judgment / Other**

Nine ASME Section XI Class 1 Category B-J welds are to be inspected by the FAC program per Code Case N-560 in lieu of a Section ~~XI~~ volumetric weld inspection. The VY ISI Program Interval 4 schedule for inspection of these welds is as follows:

| Refueling Outage | Section XI ISI Program Weld ID | Description | FAC Program Components |
|---|---|---|---|
| **Spring 2004** (RFO24) Interval 4 Period 1, Outage 1. | FW19-F3B<br>FW19-F3C<br>FW19-F4<br>FW21-F1 | upstream pipe to tee<br>tee to reducer<br>reducer to pipe<br>tee to pipe | "A" Feedwater on Sketch 010<br>FD19TE01<br>FD19RD01<br>FD19SP04<br>FD21SP01 |
| **Fall 2011 (RFO29)** Interval 4 Period 3, Outage 6. | FW18-3A<br>FW20-3A<br>FW20-F1<br>FW20-F1B<br>FW18-F4 | upstream pipe to tee<br>tee to reducer<br>reducer to pipe<br>horizontal pipe to pipe<br>tee to pipe | "B" Feedwater on Sketch 016<br>FD18TE01<br>FD20RD01<br>FD20SP01<br>FD18SP04 |

**LF: Engineering Judgment / Other – continued**

All Extraction Steam piping is A335-P11, a 1-1/4 chrome material, except for a short carbon steel stub piece in line 12"-ES-1A at the connection to the 36" A cross around line. Internal visual inspection of this stub piece will be performed along with the 36" A cross around line. This extraction stream line (6th point extraction) has the highest quality steam of all extraction lines which indicates a relatively lower wear rate. Based on the 1996 inspection data for the carbon steel section, ES1ASP01 (inspection 96-07A) showing a small area of wall thickness less than 0.875 x nominal thickness, the expected changes in flow regime due to power uprate, and that this is the only carbon steel section in the ES system, a repeat inspection to confirm actual wall thickness and also to obtain a baseline thickness prior to power uprate should be performed. **Perform external UT inspection of ES1ASP01 in RFO24.**

Extraction Steam piping in the condenser has external lagging which requires significant effort for removal when performing external UT inspections (plus there are significant staging costs). The piping is A335-P11. However an opportunity to perform an internal visual inspection of all the Extraction Steam lines inside the condenser during planed LP turbine work in the 2005 RFO may present itself.

**LG: Piping identified from EMPAC Work Orders (malfunctioning equip., leaking valves, etc.)**

Word searches of open work orders on EMPAC were performed for the following keywords: trap, leak, valve, replace, repair, erosion, corrosion, steam, FAC, wear, hole, drain, and inspect. No previously unidentified components or piping were identified as requiring monitoring during the Spring 2004 RFO.

Small Bore Piping

**SA: Susceptible piping locations (groups of components) contained in the Small Bore Piping data base which have not received an initial inspection.**

Locations on the continuous FDW heater vents to the condenser on the No. 3 heaters were inspected in 2002. The continuous vents on the No. 4 heater were installed new in 1995. The start up vents operate less than 2% of operating time. No wear was found in previous inspections on Heater Vent piping from the No.1 & 2 heaters. Given that and the lower pressure in the No. 4, shells a complete inspection of the remainder of the No. 4 heater vent piping can be deferred. The existing small bore date base and the piping susceptibility analysis is under revision. No additional components from Revision 1 of the data base will be inspected.

**SB: Components selected from measured or apparent wear found in previous inspection results.**

Small Bore Point No. 20. 2-1/2" MSD-6 @ connection to condenser A at Nozzle 33 (Inspection No. 96-SB01 identified a low reading at weld on stub to condenser). Upstream valves are normally closed. TPM system does not indicate any abnormal flow. No inspections will be performed on this line in 2004.

A through wall leak in the turbine bypass valve chest 1st seal leak-off line form the No. 1 bypass vales occurred in 2003. (ER 2003-044) A temporary leak enclosure has been installed (T.M.2003-002 to contain the leak). W.O. 03-0364 was written to inspect/repair/replace/line. The line should be completely replaced with chrome-moly piping. (Dresden has already done this) Given the amount of work already scheduled for the heater bay during the 2004 RFO a complete replacement will be deferred. A local code repair of the piping will performed to remove the temp Mod during the 2004 RFO. Additional inspections should be performed to insure the integrity of the line. The long tern solution (if license renewal is pursued) should include replacement the entire line with chrome-moly material.

| System | Description | Inspection No. |
|---|---|---|
| 2"-1SLBPV | 2 inch header off the turbine bypass valve chest first seal leak-off connections. Inspect five locations on this line. Include the ½ line at the No. 2 valve. It has the next highest usage from the no.1 valve. | 2004 SB01 to SB05 |
| 2-1/2" 1SPL2 | HP Turbine pocket drains, inspect first two elbows and connecting piping under turbine based on reading from 1993 (inspections 93-SB49 to 93-SB52) | 2004 SB06 & SB07 |



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Small Bore Piping

SC: Components identified by industry events/experience via the Nuclear Network or through the EPRI CHUG.

| Date | Plant – Type | Description & Recommended Actions at VY |
|---|---|---|
| 7/23/98 | Calvert Cliffs 2 -PWR | Rupture of a moisture separator re-heater (MSR) 2 inch vent line (INPO Event 318-980723-1) No MSRs at VY, therefore no equivalent line at VY. |
| 11/03/98 | Hamoka 2 – BWR | Leak due to FAC in turbine driven feed pump casing drain line No turbine driven feed pump at VY, therefore no equivalent line at VY. |
| 4/29/99 | Darlington 1 - PHWR | Severed line at steam trap discharge pipe at threaded connection. Equivalent to HHS system at VY. (INPO Event 931-990429-1) Threaded connections typically on condensate side of HHS piping. Lower energy/consequence of leak. **Consider during next update of the Small bore data base.** |
| 5/07/99 | Darlington 4 - PHWR | Leak on HP Feedwater Heater Vent Line downstream of orifice (INPO Event 934-990507-1). At VY inspections have performed DS of orifices on HV lines. |
| 6/14/99 | Darlington 2 - PHWR | Leak on steam trap discharge pipe at threaded connection. Equivalent to HHS system at VY. (INPO Event 932-990614-1) **Same as above.** |
| 10/07/99 | Darlington 2 - PHWR | Leak on Feedwater Heater Vent Line downstream of orifice (INPO Event 932-991007-1). At VY inspections have performed DS of orifices on HV lines. |
| 10/1/00 | Ocone3 -PWR | From 1/2001 CHUG Meeting. MSR Scavenging steam line Pinhole leak in 1" pipe downstream of flow control valve. No equivalent system ay VY. |
| 1/8/01 | Oyster Creek - BWR | Rupture of 2 inch line connecting controller/transmitter level column to re-heater drain tank. No MSRs at VY, therefore no equivalent line at VY. |
| 9/1/01 | Peach Bottom 3 -BWR | (From 1/14/02 CHUG Meeting), leak on 1 inch Sch. 80 line from in Off Gas Re-combiner pre-heater drain line to condenser. **Additional review of AOG steam supply system is required. Consider during next update of the Small bore data base.** |
| 6/22/01 | Pilgrim - BWR | Leak on 2 inch feedwater heater vent line (OE discussed at 1/02 CHUG Meeting), Equivalent lines at VY have been Inspected. |
| 10/22/01 | St. Lucie 1 - PWR | (From 1/14/02 CHUG Meeting), Leak on 1 inch Sch. 80 normally isolated drain line remote from process system. TPM used to determine leaks from N.C. valves. |
| 11/28/01 | Browns Ferry 3 - BWR | Through – wall leaks in drain lines from extraction stream non-return check valves back to condenser. (Similar lines at VY are chrome-moly and there have been previous inspections performed on these lines. No additional inspections are required. |
| 1/15//02 CHUG Mtg. | Hatch1/2 -BWR | Condenser in leakage due to through wall erosion (external ?) of 1-1/2 inch "slop" drains lines inside the condenser. Lines in each unit were cut and capped similar events at Byron Unit 1 (OE 12609) and Columbia (OE12145). Limerick & Dresden. VY slop drain lines do not show up on VY P&IDs. |
| 1/15/02 CHUG Mtg. | Catawba 2 - PWR | Leak in HP turbine pocket shell drain 1 inch dia. OEM showed pipe as P-11. However, A-106 Gr. B was installed. Inspections will be performed on this line in 2004 to base line condition prior to HP turbine rotor replacement. |
| 1/15/02 CHUG Mtg. | Columbia - BWR | Leak in 2 inch drain line from bleed steam trap to condenser. At VY SB piping DS of steam traps is included in the small bore data base. |
| 1/15/02 CHUG Mtg. | Peach Bottom2 - BWR | Pin Hole leaks in 1" schedule 160 HPCI Steam Supply drains (Plant thought piping was replaced with P-11 , However field conditions showed that is was not. Piping at VY inspected in 1999 (99-SB01 to 99-SB03) |

continued



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Small Bore Piping

**SC: Components identified by industry events/experience via the Nuclear Network or through the EPRI CHUG – continued.**

| Date | Plant – Type | Description & Recommended Actions at VY |
|---|---|---|
| 1/15/02 CHUG Mtg. | Dresden 2 BWR | Thinning found in Bypass valve leak-off line to the 7th stage extraction steam line. Line is 2" Sch. 80, GE B4A39B. Lowest reading was 0.070" found using Phosphor Plate radiography. Line was replaced with A335 P-11. **Same line as recent VY through wall leak, RFO 2004 inspect locally, then long term replacement with A335-P11.** |
| 6/02 CHUG Mtg. | ANO1 & ANO 2 PWR | Leaks in Gland seal steam to No.3 bearing 1-1/4 vendor supplied line. Leak in 1" Sch.80 drain from Reheat 2nd stage drain tank to condenser. **Additional review of GE supplied steam seal & drains is required. Consider during next update of the Small bore data base.** |
| 6/02 CHUG Mtg. | Brunswick 1 - BWR | Replaced continuous vent lines on #4 feedwater heaters with chrome-moly pipe. (Smart move for long term.) New vent lines on No.1 & 2 FDW heaters at VY will be chrome-moly. |
| 6/02 CHUG Mtg. | Calvert Cliffs 1 PWR | Pin hole leak in ¾ inch Sch. 80 drain line off MS supply to stream generator feed pump just downstream of orifice. No steam driven feed pumps at VY. |
| 6/02 CHUG Mtg. | Fermi 2 - BWR | Leak in first elbow downstream of AOV in 1/1/2" continuous vent from Turbine Bypass Valve seat drain to condenser. Valve has travel stop which prevents complete closure. Fermi has no steam traps, AOVs are used instead. Piping DS of steam traps on MSD lines are included in the SB program. The only continuous opening to the condenser at VY is the steam leads drains through RO 60-1. This piping has been replaced with chrome-moly piping. |
| 1/03 CHUG Meeting. | JAF -BWR | Through wall leaks in 2" Sch. 80 C.S. lines from 5th/6th extraction drain lines immediately downstream of restricting orifices. At VY the only drain lines on the extraction steam piping are upstream of the reverse current valves. There are no restriction orifices at VY. The piping is chrome-moly. |
| 1/03 CHUG Meeting. | Turkey Pt.4 – PWR | Leak in HP turbine bowl drain. 1" sch 80 C.S. pipe. OEM recommended replacement with SS pipe in 1982, did not occur. **Equivalent line at VY will be inspected in 2004 to baseline thickness prior to HP turbine rotor replacement.** |
| | | |

**SD: Components subjected to off normal flow conditions, as indicated from the turbine performance monitoring system (Systems Engineering Group).**

No small bore lines have been identified by Systems Engineering on or before 2/27/2003

**SE: Engineering judgment**

(None at this time.)

**SG: Piping identified from EMPAC Work Orders (malfunctioning equip., leaking valves, etc.)**

See LG above. The EMPAC search performed in LG above is applicable to both Large and Small components.



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ATTACHMENT TO (Pg 1 of 2) 2004 SCORING WORKSHEET. OE / PEER GROUP INFORMATION.



- The meeting then split into breakout sessions. Aaron Kelley led a session on BWR issues. The following discussions were noted:

  FAC Problem Areas.
  - Hatch has had lots of wear and repairs to their 8th stage extraction (3rd highest), even though the heat balance diagram shows it to be 99% steam.
  - LaSalle is wondering if there may be problems in their carbon steel turbine nozzles to extraction steam. Riverbend has had to inspect these locations from the turbine side because of the shields.
  - Quad Cities has had lots of problems in their expansion bellows.
  - Riverbend replaced the extraction steam check valves using chrome moly. Unfortunately, the internals were carbon steel and they had problems after only two cycles.
  - LaSalle had a failure caused by droplet impingement in a heater vent line 17' downstream of the valve.
  - LaSalle is experiencing impingement damage in an 8" common drain header to condenser that collects six to eight 2" and smaller diameter lines. Stainless will help, but they still will need to inspect.
  - Hope Creek has seen a lot of damage in the drain to condenser of the steam to reactor feed pump turbines.

  Water Chemistry.
  - Riverbend experienced significant increases to iron transport after applying hydrogen injection (medium level of injection). GE did a mini-test.
  - Nine Mile Point had unexpected failures on the lower end of the heater drains after applying HWC.
  - LaSalle measured oxygen on the heater drains, and then used the data to revise the CHECWORKS model. The data caused to LCFs on the MSR drains, 1st stage reheaters, and 2nd stage reheaters to skyrocket.
  - Columbia River has tentatively concluded that noble metals does not effect the fuel. It is too soon to see if hydrogen water chemistry affects the FAC rates.

  RPV Bottom Head Drain.
  - LaSalle has not inspected the first elbow below the vessel because of its inaccessibility and high radiation dose involved. For this reason, they selected the second 90° elbow which is outside the vessel pedestal. Results were provided on FACNet. Additionally, the sump will maintain water level if there is a break at the first elbow.
  - It was noted that it may be possible to inspect the nominally inaccessible areas when there is a 10% disassembly to replace some blades.
  - LaSalle and Clinton plan to inspect the accessible portions of the line.
  - Columbia River has inspected several locations on the line. No wear was found. Three inspections were also performed on the RWCU near the drywell. No damage was found.
  - Exelon (Harold Crockett) volunteered to collate and publish a summary of industry inspections on the line.

ATTACHMENT TO 2004 SCOPING WORKSHEETS (Pg 2 of 2)



Inspection Methods.

- LaSalle is performing some pre-outage RTs in selective areas due to final feedwater temperature reduction. This is the second time that some pre-outage work was done in normally high radiation areas. Aaron Kelly can be contacted for more information.
- Riverbend is training their QC inspectors to perform UT.

Power Uprates.

- Nine Mile Point saw little change to wear rates after a 7% uprate.
- Dresden and Quad Cities did a 15% uprate. Some lines saw increases to wear rates of up to 30%. Temperature changes are believed to be responsible.
- Perry did a pre-power uprate analysis on the effects to FAC. They used the results to justify line replacements as part of the planning process.
- LaSalle found no changes to their susceptible-not-modeled rankings as a result of their uprate.

Life Extension.

- General comment was that the NRC has emphasized compliance with NSAC-202L-R2 and brought up main steam susceptibility as part of their approval process.
- At Nine Mile Point, the NRC brought up service water issues.
- Southern Nuclear is taking credit for other programs in response to the NRC questions on valves.

- In parallel with the BWR session, Jeff Horowitz led the PWR Breakout Session. The session was broken down into three parts:

  - A description of the very high levels of iron transport experienced at San Onofre. This presentation included details of the investigation into the phenomenon, a description of the deposits found, several possible explanations for the deposits, and what the effects of the deposit were on plant performance.
  - A status report on the EdF hydrazine testing program. Unfortunately, no progress has been made since the last report in June due to a number of problems. The latest problem, inadequate water quality, has been resolved and testing resumed earlier this month. The testing program is expected to take all year to complete. Details of the test program have been presented at previous CHUG meetings.
  - There was also a brief discussion of feedwater oxygen and FAC. Several PWRs are now allowing the entry of small amounts of oxygen into the condensate system in hopes of reducing the iron transport. The potential for change to the PWR Water Chemistry Guidelines in this area was discussed.

- Tina Gaudreau discussed several EPRI chemistry projects that have FAC implications. The first was the EdF testing for the effects of hydrazine and oxygen on FAC as summarized by Jeff Horowitz in the PWR breakout session. The second project was the next revision to the PWR Secondary Chemistry Guidelines, that will begin this spring. The third project is an investigation into the influence of dissolved iron, electrochemistry, and chemical parameters on

CHROUD FILE COPY.

Entergy

**Vermont Yankee Nuclear Power Station**
**Design Engineering Department - Mechanical/Structural**

**To** S.D.Goodwin **Date** March 27,2003

**From** J.C. Fitzpatrick **File #** VYM 2003/009

**Subject** Piping FAC Inspection Scope for the 2004 Refueling Outage

## REFERENCES

(a) PP 7028 Piping Flow Accelerated Corrosion Inspection Program, LPC 1 12/06/01.
(b) V.Y. Piping F.A.C. Inspection Program - 1996 Refueling Outage Inspection Report, March 23,1999.
(c) V.Y. Piping F.A.C. Inspection Program - 1998 Refueling Outage Inspection Report, April 2,1999.
(d) V.Y. Piping F.A.C. Inspection Program - 1999 Refueling Outage Inspection Report, February 11, 2000.
(e) V.Y. Piping F.A.C. Inspection Program - 2001 Refueling Outage Inspection Report, August 11,2001.
(f) V.Y. Piping F.A.C. Inspection Program - 2002 Refueling Outage Inspection Report, January 20,2003.

## DISCUSSION

Attached please find the Piping FAC Inspection Scope for the 2004 Refueling Outage. The scope includes locations identified using: previous inspection results, the CHECWORKS models, industry and plant operating experience, input from the Turbine Performance Monitoring System, the CHECWORKS study performed to postulate affects of Hydrogen Water Chemistry operation on FAC wear rates in plant piping, postulated power uprate effects, and engineering judgment.

The planned 2004 RFO inspection scope consists of 26 large bore components at 11 locations, internal inspection of 6 of the 8 lines of the turbine cross around piping, and 11 sections of small bore piping. Given that it's a full year from the start of the outage, any industry or plant events that occur in the interim or new information may necessitate an increase in the planned scope.

I am available to support planning and inspections as necessary. If you have any questions or need additional information please contact me.

James C. Fitzpatrick
VY FAC Program Coordinator

**ATTACHMENT:** 2004 RFO FAC Inspection Scope ( 4 Pgs.)

CC D.Girroir (Code Programs Supervisor)
D.King (ISI Program Engineer)
T.M.O'Connor (Design Engineering)
M.LeFrancois (Systems Engineering)

2D

## VERMONT YANKEE PIPING FAC INSPECTION PROGRAM 2004 INSPECTION SCOPE (3/27/03)



### LARGE BORE PIPING: External UT Inspections

| Point No. | Component ID | Location Sketch | Location | Previous Inspections | Reason / Comments / Notes |
|---|---|---|---|---|---|
| 2004-01 | FD01RD01 | 001 | T.B. FPR. Elev. 232. | 2001 | 2001 recommendation for repeat inspection of FD01TE05. |
| 2004-02 | FD01EL01 | 001 | " " " | 2001 | |
| 2004-03 | FD01TE05 | 001 | " " " | 2001 | |
| | | | | | |
| 2004-04 | FD01EL04 | 001 | T.B. FPR Elev. 241. | 1996 | 1996 recommendation for repeat inspection of FD01SP04. |
| 2004-05 | FD01SP04 | 001 | " " " | 1996 | |
| | | | | | |
| 2004-06 | FD02RD01 | 002 | T.B. FPR. Elev. 232. | 1999 | 1999 recommendation for repeat inspection of FD02TE01. |
| 2004-07 | FD02EL01 | 002 | " " " | 1999 | |
| 2004-08 | FD02TE01 | 002 | " " " | 1999 | |
| | | | | | |
| 2004-09 | FD03SP01 | 003 | T.B. FPR. Elev. 232. | NO | Ranked high by CHECWORKS. |
| | | | | | |
| 2004-10 | FD07SP02DS | 005 | T.B. FPR. Elev. 232. | NO | Ranked high by CHECWORKS include minimum of 36 inch of vertical run upstream of elbow. |
| 2004-11 | FD07EL03 | 005 | " " " | NO | |
| | | | | | |
| 2004-12 | FD14SP08DS | 009 | Stm Tunnel Elev. 266 | NO | Ranked high by CHECWORKS include minimum of 32 inch of vertical run upstream of elbow. |
| 2004-13 | FD14EL07 | 009 | " " " | NO | |
| | | | | | |
| 2004-14 | FD19TE01 | 010 | Rx Drywell Elev. 270 | 1999 | Required Inspections per ASME Section XI ISI Program FAC inspections per ASME Code Case N-560. |
| 2004-15 | FD19RD01 | 010 | " " " | 1999 | |
| 2004-16 | FD19SP04 | 010 | " " " | 1999 | |
| 2004-17 | FD21SP01 | 010 | " " " | 1999 | |
| | | | | | |

## VERMONT YANKEE PIPING FAC INSPECTION PROGRAM 2004 INSPECTION SCOPE (3/27/03) 

**LARGE BORE PIPING: External UT Inspections - continued**

| Point No. | Component ID | Location Sketch | Location | Previous Inspections | Reason / Comments / Notes |
|---|---|---|---|---|---|
| | | | | | |
| 2004-18 | CD30TE02 | 036 | T.B. FPR Elev. 243. | NO | Ranked high by CHECWORKS include 12 inch long stub between CD32LE01 & CD32EL02. |
| 2004-19 | CD30SP04 | 036 | " " " | NO | |
| 2004-20 | CD32EL01 | 039 | " " " | NO | |
| 2004-21 | CD32EL02 | 039 | " " " | NO | |
| | | | | | |
| 2004-22 | ES1ASP01 | 063 | T.B. HB Elev. 255. | 1998 | Highly susceptible to FAC damage. This is the only remaining carbon steel section in Extraction Steam system. Baseline data for power uprate. |
| | | | | | |
| 2004-23 | MSD9TE01 thru MSD9TE08 | 097 | T.B. HB Elev. 249. | NO | Industry Experience with numerous through wall leaks in drain collector headers. Scan as much of header below drains from LCV 38A to 38D and ST-60-2A to 2D as accessible. See Note 3. |
| | | | | | |
| 2004-24 | MSD9EL05 | 097 | T.B. HB Elev. 237. | NO | Industry Experience with numerous through wall leaks in drain collector headers. Inspect a minimum of 16 inch length on MSD9SP06US. See Note 3. |
| 2004-25 | MSD9EL06 | 097 | " " " | NO | |
| 2004-26 | MSD9SP06US | 097 | " " " | NO | |
| | | | | | |
| | | | | | |

LARGE BORE UT NOTES:

1. Coordinate minimum extent of insulation to be removed with J.Fitzpatrick or T.M. O'Connor from DE-M/S.
2. A "No" in the previous inspection column indicates asbestos abatement may be required.
3. Piping is part of the proposed ALT Boundary for Power Uprate AST.

T to

ATTACHMENT to VYM 2003/009



**LARGE BORE PIPING: Internal Visual Inspections (with supplemental UT as required)**

| Inspection Point No. | Description |
|---|---|
| 2004-27 | "A" 36 inch diameter Turbine Cross Around line (CAR). |
| 2004-28 | "B" 36 inch diameter Turbine Cross Around line (CAR). |
| 2004-29 | "C" 36 inch diameter Turbine Cross Around line (CAR). |
| 2004-30 | "D" 36 inch diameter Turbine Cross Around line (CAR). |
| 2004-31 | "C" 30 inch diameter Turbine Cross Around line (CAR). |
| 2004-32 | "D" 30 inch diameter Turbine Cross Around line (CAR). |

Note: Internal visual inspections of open ends at all large bore connections to the new High Pressure feedwater heaters will be performed during installation of the new heaters during the 2004 RFO. (This includes Feedwater, Extraction Steam, Moisture Separator Drains, and Heater Drain piping.)

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# Vermont Yankee

# Piping F.A.C. Inspection Program

# Small Bore Piping

# Component Selection Review

Prepared By YAEC Vermont Yankee Project

Revision 0 January 27,1995

Prepared By: ______________________ Date: 2/27/95

James C. Fitzpatrick
Mechanical Engineering Group
Vermont Yankee Project

Reviewed By: ______________________ Date: 2/27/95

Thomas M. O'Connor
Mechanical Engineering Group
Vermont Yankee Project

## Introduction / Purpose

The purpose of this paper is to document and to formalize the process used in the selection of small bore piping components to be considered as susceptible to wall thinning due to flow accelerated corrosion (FAC).

Small bore piping locations identified as susceptible to FAC are comprised of either single piping components or groups of components (straight pipes, elbows, reducers, & tees, etc.). The susceptible locations are identified using the Vermont Yankee Piping &Instrumentation Diagrams (P&IDs) and screening criteria listed in this paper.

The locations identified on the P&IDs will be included in a data base of susceptible piping components. These will be considered for inspection under the Vermont Yankee Piping Flow Accelerated Corrosion (FAC) Inspection Program.

Most small bore piping is original plant equipment and has been in service since 1972. The majority of this piping is carbon steel. Given approx. 22 years of service, high wear locations should have made themselves evident. However, some sections of small bore piping have been replaced during equipment replacement and/or repairs.

Inspection data for small bore components prior to 1992 may be available, but there has been no dedicated data base which documents and trends small bore replacements. A detailed search of Maintenance work orders records will be required to obtain this information. Inspections of small bore components performed under the Piping FAC Program began in 1992. A limited number of small bore piping components were inspected during the 1992 refueling outage. An increased number of small bore components were inspected during the 1993 refueling outage. Small bore inspections of the data base locations will continue until all locations are either inspected or judged as not susceptible to FAC damage.

For the Piping FAC Inspection Program, long term tracking of wear in small bore piping will not generally be performed. CHECMATE / CHECWORKS modeling and evaluations will not typically be performed for small bore piping. Given the cost of performing inspections, components and attached piping which exhibit FAC damage will preferably be replaced with FAC resistant materials.

**Small Bore Piping: Susceptible System Selection:**

Small bore lines, 2-1/2 inch nominal diameter and smaller are included in the program based on industry and plant experience, possible effects on personnel safety, consequences to plant availability, and possible negative effects to the plant licensing basis.

( Example: a small steam leak in the Reactor Building may adversely effect the fire protection systems and/or electrical equipment in the EQ program).

Criteria for inclusion:

1. Piping diameter 2-1/2" nominal or less. (Note: some 3" segments are included).
2. Design Pressure >275Psi. and/or Design Temperature >200F
3. Piping Material Chrome Content < 5%.
4. Steam Quality < 99%
5. System in use > 2% of Plant Operating Hours (Note: systems in use < 2% of plant operating hours are not automatically excluded).
6. Consequences of leak or failure on personnel safety and plant operation.

Results:

A review of the VY P&ID's using the criteria above, shows portions of the following systems may be susceptible to FAC:

| System | Symbol | P&ID's |
|---|---|---|
| Auxiliary Steam | AS | G191156, 33600-A217( AOG by Suntac) |
| Main Steam Drains | MSD | G191156, G191157, G191169, G191174 |
| Extraction Steam | ES | G191156 |
| Condensate | C | G191157 |
| Heater Vents | HV | G191158 |
| Control Rod Drive | CRD | G191170 |
| Reactor Water Cleanup | CUW | G191178 |
| Heating Steam | HS | G191254 |
| Turbine Steam Seal & Leakoff Lines | (various) | 5920-224( by GE) |

## Small Bore Piping: Identification of Susceptible Piping Components

The following criteria are used to identify Small bore piping components or groups of components susceptible to FAC.

1. The implications of a failure of the line or component on personnel safety, plant availability, and possible negative effects to the plant licensing basis. Priority should be given to sections of piping that cannot be readily isolated.
2. Observed fluid leakage through normally closed valves or blow by in steam traps during operation as indicated in plant work orders and/or the turbine performance monitoring system.
3. Data from previous inspections and continued monitoring of components which have been replaced with either carbon or low alloy steels.
4. Generic Industry Experience Components which are locations in plant piping systems that have experienced failures and/or have been found to exhibit wall thinning due to FAC. Industry Experience Components include but are not limited to:

- Downstream of flow control valves.
- Downstream of orifices and/or flow meters.
- Upstream and downstream of steam traps.
- Drain and vent connections to large bore piping or components with two-phase flow.
- Last two changes in direction prior to entering the condenser. (i.e. 90 & 45 degree elbows, reducers, orifices, or globe valves).
- Events at other plants such as piping failures.
- Inspection experience from other plant inspection programs, available through the CHECMATE Users Group (CHUG).

**Identification of Small bore components**

Not all small bore piping will be included in the program, only the specific small bore locations identified in the Small Bore Data Base. Each location identified has been given a unique point number. The data base is a master list of all small bore locations to be included in the Piping FAC Inspection Program. Locations include the components (valves, steam traps, orifices, etc.) and the adjacent piping and fittings upstream and/or downstream of the components. Additional locations will be included into the database as warranted.

Over time multiple inspections may be performed at the same location (data point). The convention established in 1992 will be used to identify previous inspection data and will be included in the data base.

During each refueling outage the small bore locations inspected will be identified as follows: Each location will be given a unique identifier in the form of:

**"YR-SBxx"**

where:
YR is the year the location is first inspected.
SB denotes small bore piping ( less than 2-1/2" diameter).
xx a number assigned to the location by the YNSD CE

Example: **93-SB04**

Small Bore Inspection Location Sketches identifying the location in the plant and the components included at each location will be included in the UT inspection report. Details of any grids used, and other data required to identify and/or interpret the inspection data will also be included in each inspection report.

## References

(a) V.Y. Piping Erosion – Corrosion Inspection Program, Revision 1, dated 2/12/92.

(b) Draft of EPRI Report NSAC-202L, "Recommendations for an Effective Flow-Accelerated Corrosion Program."

## Documentation

Original marked up P&IDs, Isometrics and piping dwgs, used in the review are in the possession of the CE.

Small Bore Component Location Sketches: (Currently located with UT inspection reports in ISI records. The sketches will eventual be included in the Program Manual after more inspections are performed.)

VY Piping FAC Inspection Program: Small Bore Data Base - (attached)

# VY PIPING FAC INSPECTION PROGRAM:  SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 93-SB01 | MSD | 1" Pipe & Fittings D.S.of valve M-33 | Rx. Bldg. Torus Area | MS-33(N.C.)labeled as orifaced valve. | 1" | 160 | .250 | .053 |
| 2 | 93-SB02 | MSD | 1" Pipe & Fittings D.S. of steam trap ST60-3. | Rx. Bldg. Torus Area | Normal flow to condenser is thru ST60-3. (dp=965psi) | 1" | 160 | .250 | .053 |
| 3 | 93-SB03 | MSD | 1" piping D.S. of LCV-2-143 | Rx. Bldg. Torus Area | Mn Steam strainer ST60-3 blow down . (dp=965psi) | 1" | 160 | .250 | .053 |
| 4 | 93-SB04 | MSD | 3" & 2½" MSD D. S. of valve MS-79 | Rx. Bldg. Torus Area | N.C. valve (dp=965psi) | 3"<br>2½" | 160<br>160 | .438<br>.375 | 0.141<br>0.116 |
| 5 | 93-SB05 | MSD | 3" MSD-4 U.S. of Condenser A. | T. B. - Heater Bay | Industry Experience (IE) point | 3" | 160<br>STD | .438<br>.216 | 0.141<br>0.141 |
| 6 | 93-SB06 | MSD | 1" & 2½" MS-7A D.S. of steam trap, ST-60-2A | T. B. - Heater Bay | (I.E.) | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 7 | 93-SB07 | MSD | 1" & 2½" MSD-8A @ LCV-38A. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 8 | | MSD | 1" & 2½" MSD-7B D.S. of steam trap, ST-60-2B. | T. B. - Heater Bay | (I.E.) | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 9 | | MSD | 1" & 2½". MSD-8B @ LCV-38B. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 10 | 93-SB09 | MSD | 1"&2½" MSD-7C D.S. of steam trap ST60-2C. | T. B. - Heater Bay | (I.E.) | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 11 | 93-SB10 | MSD | 1" & 2½" MSD-8C @ LCV-38C. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 12 | | MSD | 1" & 2½" MSD-7D D.S. of steam trap; ST-60-2D. | T. B. - Heater Bay | (I.E.) | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 13 | | MSD | 1" & 2½" MSD-8D @ LCV-38D. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| | 93-SB08 | MSD | 8" MSD-9 Hdr. @ 2½" conn. (See L.B. Sketch 097) | T. B. - Heater Bay | (I.E.) | 8" | 80 | .500 | .347 |
| 14 | 93-SB12 | MSD | 1"&2½" Piping @ valve MS-2A. | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 15 | | MSD | 1"&2½" Piping @ valve MS-2B. | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 16 | 93-SB13 | MSD | 1"&2½" Piping @ valve MS-2C. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 17 | | MSD | 1"&2½" Piping @ valve MS-2D. | T. B. - Heater Bay | (I.E.) | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |

# VY PIPING FAC INSPECTION PROGRAM:  SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 18 | 93-SB14 | MSD | D.S.of valve MS-4 on 2½" MSD-6. | T. B. - Heater Bay | (I.E.) | 2½" | 160 | .375 | .116 |
| 19 | 93-SB15 | MSD | 2½" MSD-6 @ Fittings U. S. of Condenser A. | T. B. - Heater Bay | (I.E.) | 2½" | 160 | .375 | .116 |
| 20 | | MSD | 2½" MSD-6. ( 2 ft. length at Connect. to Condenser A | T. B. - Heater Bay | (I.E.) | 2½" | 160 | .375 | .116 |
| 21 | 93-SB16 | MSD | 1" MSD U.S. & D.S.of valve MS-5A. , | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 22 | 93-SB55 | MSD | 1" MSD U.S. & D.S.of valve MS-5B. | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 23 | 93-SB17 | MSD | 1" MSD U.S. & D.S.of valve MS-5C. | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 24 | 93-SB56 | MSD | 1" MSD U.S. & D.S.of valve MS-5D. | T. B. - Heater Bay | (I.E.) | 1" | 160 | .250 | .053 |
| 25 | 93-SB18 | MSD | 2" MSD hdr. under 5A & 5C valves. | T. B. - Heater Bay | (I.E.) | 2" | 160 | .344 | .096 |
| 26 | 93-SB19 | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D.. | T. B. - Heater Bay | (I.E.) | 2" | 160 | .344 | .096 |
| 27 | | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D. at Connect to Condenser. A | T. B. - Heater Bay | (I.E.) | 2" | 160 | .344 | .096 |
| 28 | 92-SB10/11 | MSD | 2" pipe & fittings D.S. of valve MS-12 up to tee conn. | T. B. - Heater Bay | Leak @ MS-12 valve in 1992 Replaced in 1992 | 2" | 80 | .218 | .096 |
| 29 | 92-SB13 to 92-SB15 | MSD | 1" pipe & fittings U.S. & D.S. of R.O. 60-1 up to tee conn. | T. B. - Heater Bay | Replaced in 1992. | 1" | 80 | .179 | .053 |
| 30 | 92-SB12 | MSD | 2" piping D.S of tee conn. D.S. of R.O.60-1. | T. B. - Heater Bay | Leak @MS-12 valve in 1992 | 2" | 80 | .218 | .096 |
| 31 | | MSD (HPCI) | 1" pipe & fittings D.S. of valve HPCI FCV -43 | RX. - HPCI Room. | Replaced in 1990, w/ A335-P11 | 1" | 80 | .179 | .053 |
| 32 | | MSD (RCIC) | 2" pipe & fittings D.S. of valve RCIC FCV-35 | RX. - RCIC Room | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |
| 33 | | MSD (HPCI/ RCIC) | 2" pipe & fittings U.S. of connect. to Condenser B. | T.B. - Heater Bay | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |

# VY PIPING FAC INSPECTION PROGRAM: SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 34 | 93-SB20 | HV | 1"-HV-1A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 35 | 93-SB21 | HV | 1"HV -1A, pipe & fittings D.S. of R.O.-1A | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 36 | 93-SB22 | HV | 1"HV-1A, pipe & fittings @ valve HV-1A | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 37 | | HV | 1"-HV-1B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 38 | | HV | 1"- HV-1B, pipe & fittings D.S. of R.O.-1B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 39 | | HV | 1"-HV-1B, pipe & fittings @ valve HV-1B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 40 | | HV | 1"-HV-2A, pipe & fittings @ valve HV- 4B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 41 | | HV | 1"-HV-2A, pipe & fittings @ R.O.-2A. | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 42 | | HV | 1"-HV-2A, pipe & fittings @ Condenser A. | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 43 | 93-SB23 | HV | 1"-HV-2B, pipe & fittings @ valve HV- 4B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 44 | 93-SB24 | HV | 1"-HV-2B, pipe & fittings @ R.O.-2B. | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 45 | 93-SB25 | HV | 1"-HV-2B, pipe & fittings @ | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .007 |
| 46 | | HV | 1½"-HV-3A, pipe & fittings @ valve HV- 7A | T. B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 47 | | HV | 1½"-HV-3A, pipe & fittings @ Condenser A. | T. B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 48 | | HV | 2"-HV-9A, pipe & fittings.@ R.O.-3A. | T. B. - Heater Bay | Industry Experience Point | 2" | 80 | .218 | .008 |
| 49 | | HV | 2"-HV-9A, pipe & fittings D.S. of valve HV- 15A | T. B. - Heater Bay | (I.E) | 2" | 80 | .218 | .008 |
| 50 | | HV | 2"-HV-9A, pipe & fittings.@ Condenser A. | T. B. - Heater Bay | (I.E) | 2" | 80 | .218 | .008 |
| 51 | | HV | 1½"-HV-3B, pipe & fittings @ valve HV- 7B | T. B. - Heater Bay | (I.E) | 1½" | 80 | .200 | .007 |
| 52 | | HV | 1½"-HV-3B, pipe & fittings @ Condenser A. | T. B. - Heater Bay | (I.E) | 1½" | 80 | .200 | .007 |

# VY PIPING FAC INSPECTION PROGRAM: SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 53 | | HV | 2"-HV-9B, pipe & fittings.@ R.O.-3B. | T. B. - Heater Bay | (I.E) | 2" | 80 | .218 | .008 |
| 54 | | HV | 2"-HV-9B, pipe & fittings D.S. of valve HV- 15B | T. B. - Heater Bay | (I.E) | 2" | 80 | .218 | .008 |
| 55 | | HV | 2"-HV-9B, pipe & fittings.@ Condenser A. | T. B. - Heater Bay | (I.E) | 2" | 80 | .218 | .008 |
| 56 | | HV | 2½"-HV-4A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 57 | | HV | 2½"-HV -4A, pipe & fittings D.S. of R.O.-4A | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 58 | | HV | 2½"-HV-4A, pipe & fittings @ valve HV-9A | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 59 | | HV | 2½"-HV-4B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 60 | | HV | 2½"- HV-4B, pipe & fittings D.S. of R.O.-4B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 61 | | HV | 2½"-HV-4B, pipe & fittings @ valve HV-9B | T. B. - Heater Bay | Industry Experience Point | 1" | 80 | .179 | .011 |
| 62 | | ES | 2"-ES-12A piping US & DS of LCV-2A near Condenser A | T. B. - Heater Bay | Industry Experience Point | 2" | 80 | .218 | .012 |
| 63 | | ES | 2"-ES-10A piping US & DS of LCV-3A near Condenser A | T. B. - Heater Bay | Industry Experience Point | 2" | 80 | .218 | .012 |
| 64 | 93-SB26 | ES | 2"-ES-12B piping US & DS of LCV-2B near Condenser B. | T. B. - Heater Bay | Industry Experience Point | 2" | 80 | .218 | .012 |
| 65 | 93-SB27 | ES | 2"-ES-10B piping US &DS of LCV-3B near Condenser B | T. B. - Heater Bay | Industry Experience Point | 2" | 80 | .218 | .012 |
| 66 | 93-SB28 | AS | 1" piping US &DS of valve LCV-101-39 | T.B. - SJAE Room. | Industry Experience Point | 1" | 160 | .250 | .053 |
| 67 | 93-SB29 | AS | 1" & 2" piping US &DS of steam trap ST 62-1. | T.B. - SJAE Room. | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 68 | 93-SB30 | AS | 2"-MSD-465 pipe & fittings @ connect. to Condenser B | T.B. - Heater Bay | Industry Experience Point | 2" | 160 | .344 | .096 |
| 69 | | AS | 2"-MSD-465 pipe & fittings DS of valve V-62-2 | T.B. - SJAE Room. | Industry Experience Point | 1" | 160 | .250 | .053 |
| 70 | | AS | 1" piping US &DS of valve LCV-101-40 | T.B. - SJAE Room. | Industry Experience Point | 1" | 160 | .250 | .053 |

# VY PIPING FAC INSPECTION PROGRAM: SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 71 | | AS | 1" & 1½" piping US &DS of steam trap ST 62-2. | T.B. - SJAE Room. | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 72 | | AS | 1½" -MSD-464 pipe & fittings @ connect. to Condenser B | T.B. - Heater Bay | Industry Experience Point | 2" | 160 | .344 | .096 |
| 73 | | AS(AOG) | 2" piping of DS of valve OG PRV -834A | T.B. - Heater Bay El.248. | Industry Experience Point | 1" | 160 | .250 | .053 |
| 74 | | AS(AOG) | 3/4" piping US &DS of steam trap MS-113-1A. | T.B. - Heater Bay El.248. | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 75 | | AS(AOG) | 3/4" piping US &DS of steam trap MS115-1A | T.B. - Heater Bay El.248. | Industry Experience Point | 2" | 160 | .344 | .096 |
| 76 | | AS(AOG) | 3/4"MS-189-D3 AS drain from OG @ connect. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4". | Industry Experience Point | 2" | 160 | .344 | .096 |
| 77 | | AS(AOG) | 3/4"HCN-188-H1 AS drain from OG @ conn. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4" | I. E. Point, Replaced prior to 1990 | 2" | 160 | .344 | .096 |
| 78 | 93-SB31 | SSL | 1½" & 3" Header for 1SLMSV off Turbine Stop Valves | T.B. - Heater Bay. | Industry Experience Point | 1½"<br>3" | 80<br>40 | .200<br>.216 | .077<br>.141 |
| 79 | 93-SB32 | SSL | 1½"-1SLMSV - Stop Valve A | T.B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 80 | 93-SB33 | SSL | 1½"-1SLMSV - Stop Valve B | T.B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 81 | 93-SB34 | SSL | 1½"-1SLMSV - Stop Valve C | T.B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 82 | 93-SB35 | SSL | 1½"-1SLMSV - Stop Valve D | T.B. - Heater Bay | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 83 | 93-SB36 | SSL | 1½" Header for 1SCVL off Turbine Control Valves | T.B. - Heater Bay | | 1½" | 80 | .200 | .067 |
| 83 | 93-SB38 | SSL | ½"-1SCVL - Control Valve A. | T.B. - Heater Bay | | ½" | 80 | .147 | .033 |
| 85 | 93-SB39/40 | SSL | ½"-1SCVL - Control Valve B. | T.B. - Heater Bay | | ½" | 80 | .147 | .033 |
| 86 | 93-SB41/42 | SSL | ½"-1SCVL - Control Valve C. | T.B. - Heater Bay | | ½" | 80 | .147 | .033 |
| 87 | 93-SB37 | SSL | ½"-1SCVL - Control Valve D. | T.B. - Heater Bay | | ½" | 80 | .147 | .033 |
| 88 | 93-SB43 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valves A & B | T.B. - Heater Bay | | 2-1/2"<br>1" | 40<br>80 | .203<br>.179 | .116<br>.053 |
| 89 | 93-SB44 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valve C | T.B. - Heater Bay | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 90 | 93-SB45 | SSL | 1" - 2SLMSV off Turbine Stop Valve D | T.B. - Heater Bay | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 91 | 93-SB58 | SSL | 2½" - Header for 2SCVL off Turbine Control Valves | T.B. - Heater Bay | | 1" | 80 | .179 | .053 |
| 92 | 93-SB61 | SSL | 1" - 2SCVL off Control Valve A | T.B. - Heater Bay | | 2½" | 40 | .203 | .116 |
| 93 | 93-SB60 | SSL | 1" - 2SCVL off Control Valve B | T.B. - Heater Bay | | 1" | 80 | .179 | .053 |

# VY PIPING FAC INSPECTION PROGRAM: SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 94 | 93-SB59 | SSL | 1" - 2SCVL off Control Valve C | T.B. - Heater Bay | | 1" | 80 | .179 | .053 |
| 95 | 93-SB57 | SSL | 1" - 2SCVL off Control Valve D | T.B. - Heater Bay | | 1" | 80 | .179 | .053 |
| 96 | 92-(SB-info only ) | SSL | Turbine Bypass Valve Chest 1st Seal Leakoff 1/2"-1SLBPV | T.B. - Heater Bay | 1/2' pipes of f BPV chest | 1/2" | 80 | .147 | .034 |
| 97 | 92-SB01 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 98 | 92-SB02 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 99 | 92-SB03 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 100 | 92-SB04 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 101 | 92-SB05 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 102 | 92-SB06 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | Not Inspected in 1992 | 2" | 80 | .218 | .099 |
| 103 | 92-SB07 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 104 | 92-SB08 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | | 2" | 80 | .218 | .099 |
| 105 | 92-SB 09 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | Vertical section replaced in 1992. | 2" | 80 | .218 | .099 |
| 106 | 92-SB 10 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | Location of 1992 leak, replaced in 1992. | 2" | 80 | .218 | .099 |
| 107 | 93-SB46 | SSL | TBV Chest 2nd Seal Leakoff 2½" - 2SLBPV | T.B. - Heater Bay | Continuation of 1992 inspections | 2½" | 40 | .203 | .116 |
| 108 | 93-SB47 | SSL | TBV Chest 2nd Seal Leakoff 2½" - 2SLBPV | T.B. - Heater Bay | “ “ | 2½" | 40 | .203 | .116 |
| 109 | 93-SB48A 93-SB48B | SSL | TBV Chest 2nd Seal Leakoff 2½" - 2SLBPV | T.B. - Heater Bay | “ “ | 2½" | 40 | .203 | .116 |
| 110 | 93-SB49 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | Significant Wear @ Duane Arnold | 2½" | 40 | .203 | .023 |
| 111 | 93-SB50 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | “ “ | 2½" | 40 | .203 | .023 |
| 112 | 93-SB51 | SSL | 2½" - 1SPL2 H.P Turbine Pocket Drain | T.B. - Heater Bay | “ “ | 2½" | 40 | .203 | .023 |

# VY PIPING FAC INSPECTION PROGRAM: SMALL BORE DATA BASE

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 93-SB52 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | " " | 2½" | 40 | .203 | .023 |
| 114 | 93-SB53 | SSL | 2½" - 1SPL2 H.P.Turbine Pocket 90 deg elbow | T.B. - Heater Bay | " " | 2½" | 40 | .203 | .023 |
| 115 | 93-SB54 | SSL | 1SPL2 2½" x 2" reducer at 36" CAR pipe. | T.B. - Heater Bay | " " | 2½"<br>2" | 40<br>40 | .203<br>.154 | .023<br>.019 |
| 116 | | C | 1½" & 2½" piping US & DS of LCV 1A-3 | T.B. - Heater Bay | (I.E) | 1½"<br>2½" | 80<br>80 | .200<br>.276 | .038<br>.057 |
| | | | | | | | | | |
| | | | | | | | | | |

NOTES:

I.E. Denotes Industry Experience Point

# Vermont Yankee

# Piping F.A.C. Inspection Program

# Small Bore Piping

# Component Selection Review

Prepared By Vermont Yankee Design Engineering, Mechanical/Structural Group

Revision 1, December 6, 1999

Prepared By: [signature] Date: 12/6/99
Joseph Fortier
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## Introduction / Purpose

The purpose of this paper is to document and to formalize the process used in the selection of small bore piping components to be considered as susceptible to wall thinning due to flow accelerated corrosion (FAC).

Small bore piping locations identified as susceptible to FAC are comprised of either single piping components or groups of components (straight pipes, elbows, reducers, & tees, etc.). The susceptible locations are identified using the Vermont Yankee Piping &Instrumentation Diagrams (P&IDs) and screening criteria listed in this paper.

The locations identified on the P&IDs will be included in a data base of susceptible piping components. These will be considered for inspection under the Vermont Yankee Piping Flow Accelerated Corrosion (FAC) Inspection Program.

Most small bore piping is original plant equipment and has been in service since 1972. The majority of this piping is carbon steel. Given approx. 27 years of service, high wear locations should have made themselves evident. However, some sections of small bore piping have been replaced during equipment replacement and/or repairs.

Inspection data for small bore components prior to 1992 may be available, but there has been no dedicated data base which documents and trends small bore replacements. A detailed search of Maintenance work orders records will be required to obtain this information. Inspections of small bore components performed under the Piping FAC Program began in 1992. Since then approximately 83% of the small bore lines identified as susceptible to FAC have been inspected. Some have multiple inspections. Small bore inspections of the data base locations will continue until all locations are either inspected or judged as not susceptible to FAC damage.

For the Piping FAC Inspection Program, long term tracking of wear in small bore piping will not generally be performed. CHECWORKS modeling and evaluations will not typically be performed for small bore piping. Given the cost of performing inspections, components and attached piping which exhibit FAC damage will preferably be replaced with FAC resistant materials.

## Small Bore Piping: Susceptible System Selection:

Small bore lines, 2-1/2 inch nominal diameter and smaller are included in the program based on industry and plant experience, possible effects on personnel safety, consequences to plant availability, and possible negative effects to the plant licensing basis.

( Example: a small steam leak in the Reactor Building may adversely effect the fire protection systems and/or electrical equipment in the EQ program).

Criteria for inclusion:

1. Piping diameter 2-1/2" nominal or less. (Note: some 3" segments are included).
2. Design Pressure > 275Psi. and/or Design Temperature > 200°F
3. Piping Material Chrome Content < 5%.
4. Steam Quality < 99%
5. System in use > 2% of Plant Operating Hours (Note: systems in use < 2% of plant operating hours are not automatically excluded).
6. Consequences of leak or failure on personnel safety and plant operation.

Results:

A review of the VY P&ID's using the criteria above, shows portions of the following systems may be susceptible to FAC:

| System | Symbol | P&ID's |
|---|---|---|
| Auxiliary Steam | AS | G191156, 33600-A217( AOG by Suntac) |
| Main Steam Drains | MSD | G191156, G191157, G191169, G191174 |
| Extraction Steam | ES | G191156 |
| Condensate | C | G191157 |
| Heater Vents | HV | G191158 |
| Control Rod Drive | CRD | G191170 |
| Reactor Water Cleanup | CUW | G191178 |
| Heating Steam | HS | G191254 |
| Turbine Steam Seal & Leakoff Lines | (various) | 5920-224( by GE) |

## Small Bore Piping: Identification of Susceptible Piping Components

The following criteria are used to identify Small bore piping components or groups of components susceptible to FAC.

1. The implications of a failure of the line or component on personnel safety, plant availability, and possible negative effects to the plant licensing basis. Priority should be given to sections of piping that cannot be readily isolated.

2. Observed fluid leakage through normally closed valves or blow by in steam traps during operation as indicated in plant work orders and/or the turbine performance monitoring system.

3. Data from previous inspections and continued monitoring of components which have been replaced with either carbon or low alloy steels.

4. Generic Industry Experience (IE) Components which are locations in plant piping systems that have experienced failures and/or have been found to exhibit wall thinning due to FAC. Industry Experience Components include but are not limited to:

   - Downstream of flow control valves.
   - Downstream of orifices and/or flow meters.
   - Upstream and downstream of steam traps.
   - Drain and vent connections to large bore piping or components with two-phase flow.
   - Last two changes in direction prior to entering the condenser. (i.e. 90 & 45 degree elbows, reducers, orifices, or globe valves).
   - Events at other plants such as piping failures.
   - Inspection experience from other plant inspection programs, available through the CHECWORKS Users Group (CHUG).

## Identification of Small bore components

Not all small bore piping will be inspected under the program, only the specific small bore locations identified in the Small Bore Data Base. Each location identified has been given a unique point number. The data base is a master list of all small bore locations to be included in the Piping FAC Inspection Program. Locations include the components (valves, steam traps, orifices, etc.) and the adjacent piping and fittings upstream and/or downstream of the components. Additional locations will be included into the database as warranted.

Over time multiple inspections may be performed at the same location (data point). The convention established in 1992 will be used to identify previous inspection data and will be included in the data base.

During each refueling outage the small bore locations inspected will be identified as follows: Each location will be given a unique identifier in the form of:

**"YR-SBxx"**

where: **YR** - is the year the location is inspected.

**SB** - denotes small bore piping ( less than 2-1/2" diameter).

**xx** - a number assigned to the location by the FAC Program Coordinator

Example: **93-SB04**

Small Bore Inspection Location Sketches identifying the location in the plant and the components inspected at each location will be included in the UT inspection report. Details of any grids used, and other data required to identify and/or interpret the inspection data will also be included in each inspection report.

## References

(a) V.Y. Piping Flow Accelerated Corrosion Inspection Program, Revision 2, dated 3/7/95.

(b) EPRI Report NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program."

## Documentation

Original marked up P&IDs, Isometrics and piping dwgs, used in the review are in the possession of the FAC Program Coordinator.

Small Bore Component Location Sketches: are located with the UT inspection reports permanently stored with the ISI records.

VY Piping FAC Inspection Program: Small Bore Data Base - (attached pages 7 to 15)

## Drawing List:

1. G191167, Flow Diagram – Nuclear Boiler, Revision 62
2. G191156, Flow Diagram – Main, Extraction and Auxiliary Steam Systems, Revision 29
3. G191169 Sheets 1 & 2, High Pressure Coolant Injection System, Revisions 40 & 36
4. G191174 Sheets 1 & 2, Reactor Core Isolation Cooling System, Revision 36 & 23
5. G191158, Flow Diagram – Heater Drain and Vent system, Revision 23
6. 33600-A217, Flow Diagram – Turbine Building Area, AOG, Revision 17
7. 5920-224, Diagram of Steam Seal Piping, Revision 9

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 93-SB01 | MSD | 1" Pipe & Fittings D.S.of valve M-33 | Rx. Bldg. Torus Area | G191167 | MS-33(N.C.)labeled as orifaced valve. | 1" | 160 | .250 | .053 |
| 2 | 93-SB02<br>95-SB01 | MSD | 1" Pipe & Fittings D.S. of steam trap ST60-3. | Rx. Bldg. Torus Area | G191167 | Normal flow to condenser is thru ST60-3. (dp=965psi) | 1" | 160 | .250 | .053 |
| 3 | 93-SB03 | MSD | 1" piping D.S. of LCV-2-143 | Rx. Bldg. Torus Area | G191167 | Mn Steam strainer ST60-3 blow down . (dp=965psi) | 1" | 160 | .250 | .053 |
| 4 | 93-SB04 | MSD | 3" & 2½" MSD D. S. of valve MS-79 (3"-MSD-4) | Rx. Bldg. Torus Area | G191167 | N.C. valve (dp=965psi) | 3"<br>2½" | 160<br>160 | .438<br>.375 | 0.141<br>0.116 |
| 5 | 93-SB05 | MSD | 3" MSD-4 U.S. of Condenser A. Nozzle 67 | T. B. - Heater Bay | G191156 | IE | 3" | 160<br>STD | .438<br>.216 | 0.141<br>0.141 |
| 6 | 93-SB06 | MSD | 1" & 2½" MSD-7A D.S. of steam trap, ST-60-2A | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 7 | 93-SB07 | MSD | 1" & 2½" MSD-8A @ LCV-38A. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 8 | 95-SB03 | MSD | 1" & 2½" MSD-7B D.S. of steam trap, ST-60-2B. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 9 | 95-SB04 | MSD | 1" & 2½". MSD-8B @ LCV-38B. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 10 | 93-SB09 | MSD | 1"&2½" MSD-7C D.S. of steam trap ST60-2C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 11 | 93-SB10<br>95-SB02 | MSD | 1" & 2½" MSD-8C @ LCV-38C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 12 | 95-SB05 | MSD | 1" & 2½" MSD-7D D.S. of steam trap, ST-60-2D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2-1/2" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 13 | 95-SB-06 | MSD | 1" & 2½" MSD-8D @ LCV-38D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
|  | 93-SB08 | MSD | 8" MSD-9 Hdr. @ 2½" conn. (See L.B. Sketch 097) | T. B. - Heater Bay | G191156 | (IE) Portions of LB component inspected with SB pipe. | 8" | 80 | .500 | .347 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 93-SB12 | MSD | 1"&2½" Piping @ valve MS-2A. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 15 | 95-SB-07 | MSD | 1"&2½" Piping @ valve MS-2B. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 16 | 93-SB13 | MSD | 1"&2½" Piping @ valve MS-2C. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 17 | 95-SB08 | MSD | 1"&2½" Piping @ valve MS-2D. | T. B. - Heater Bay | G191156 | IE | 1"<br>2½" | 160<br>160 | .250<br>.375 | .053<br>.116 |
| 18 | 93-SB14 | MSD | D.S.of valve MS-4 on 2½" MSD-6. | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 19 | 93-SB15 | MSD | 2½" MSD-6 @ Fittings U. S. of Condenser A. | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 20 | 95-SB09<br>96-SB01 | MSD | 2½" MSD-6. ( 2 ft. length at Connect. to Conden. A -Noz.33 | T. B. - Heater Bay | G191156 | IE | 2½" | 160 | .375 | .116 |
| 21 | 93-SB16 | MSD | 1" MSD U.S. & D.S.of valve MS-5A. , | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 22 | 93-SB55 | MSD | 1" MSD U.S. & D.S.of valve MS-5B. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 23 | 93-SB17 | MSD | 1" MSD U.S. & D.S.of valve MS-5C. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 24 | 93-SB56 | MSD | 1" MSD U.S. & D.S.of valve MS-5D. | T. B. - Heater Bay | G191156 | IE | 1" | 160 | .250 | .053 |
| 25 | 93-SB18 | MSD | 2" MSD hdr. Under 5A & 5C valves. | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 26 | 93-SB19 | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D.. | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 27 | 95-SB10 | MSD | 2" pipe & fittings D.S. of valves MS-5A to 5D. at Connect to Condenser. A Noz.34 | T. B. - Heater Bay | G191156 | IE | 2" | 160 | .344 | .096 |
| 28 | 92-SB10<br>92-SB11<br>95-SB38 | MSD | 2" pipe & fittings D.S. of valve MS-12 up to tee conn. | T. B. - Heater Bay | G191156 | Leak @ MS-12 valve in 1992 Replaced in 1992 | 2" | 80 | .218 | .096 |

## VY PIPING FAC INSPECTION PROGRAM SMALL BORE INSPECTION LOCATIONS
Revision 1, 12/6/1999

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 92-SB13 to 92-SB15 95-SB11 | MSD | 1" pipe & fittings U.S. & D.S. of R.O. 60-1 up to tee conn. | T. B. - Heater Bay | G191156 | Replaced in 1992. | 1" | 80 | .179 | .053 |
| 30A | 92-SB12 95-SB12 | MSD | 2" piping D.S of tee conn. D.S. of R.O.60-1. | T. B. - Heater Bay | G191156 | Leak @MS-12 valve in 1992 Replaced in 96 W/ A335 P11 | 2" | 80 | .218 | .096 |
| 30B | 95-SB12 | MSD | 2" piping D.S of tee conn. D.S. of R.O. 60-1. at condenser | T. B. - Heater Bay | G191156 | Replaced in 96 W/ A335 P11 | | | | |
| 31 | 96-SB03 | MSD (HPCI) | 1" pipe & fittings D.S. of valve HPCI FCV - 43 | RX. - HPCI Room. | G191169 VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 1" | 80 | .179 | .053 |
| 32 | 96-SB04 | MSD (RCIC) | 1" pipe & fittings D.S. of valve RCIC FCV-35 | RX. - RCIC Room | G191174 VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |
| 33 | | MSD (HPCI/ RCIC) | 2" pipe & fittings U.S. of connect. to Condenser B. | T.B. - Heater Bay | G191156 VYI-HPCI/RCIC-DRAIN | Replaced in 1990, w/ A335-P11 | 2" | 80 | .218 | .096 |
| 34 | 93-SB20 | HV | 1"-HV-1A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 35 | 93-SB21 | HV | 1"HV -1A, pipe & fittings D.S. of R.O.-1A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 36 | 93-SB22 | HV | 1"HV-1A, pipe & fittings @ valve HV-1A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 37 | 95-SB17 | HV | 1"-HV-1B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 38 | 95-SB16 | HV | 1"- HV-1B, pipe & fittings D.S. of R.O.-1B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 39 | 95-SB18 | HV | 1"-HV-1B, pipe & fittings @ valve HV-1B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 40 | 95-SB19 98-SB01 | HV | 1"-HV-2A, pipe & fittings @ valve HV-4A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 95-SB20 98-SB02 | HV | 1"-HV-2A, pipe & fittings @ R.O.-2A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 42 | 95-SB21 98-SB03 | HV | 1"-HV-2A, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 43 | 93-SB23 | HV | 1"-HV-2B, pipe & fittings @ valve HV-4B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 44 | 93-SB24 | HV | 1"-HV-2B, pipe & fittings @ R.O.-2B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 45 | 93-SB25 | HV | 1"-HV-2B, pipe & fittings @ condenser A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .007 |
| 46 | | HV | 1½"-HV-3A, pipe & fittings @ valve HV-7A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 47 | 95-SB22 | HV | 1½"-HV-3A, pipe & fittings @ Condenser A. Nozzle 23 | T. B. - Heater Bay | G191158 | Industry Experience Point | 1½" | 80 | .200 | .007 |
| 48 | | HV | 2"-HV-9A, pipe & fittings.@ R.O.-3A. | T. B. - Heater Bay | G191158 | Industry Experience Point | 2" | 80 | .218 | .008 |
| 49 | | HV | 2"-HV-9A, pipe & fittings D.S. of valve HV- 15A | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 50 | | HV | 2"-HV-9A, pipe & fittings.@ Condenser A. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 51 | | HV | 1½"-HV-3B, pipe & fittings @ valve HV-7B | T. B. - Heater Bay | G191158 | IE | 1½" | 80 | .200 | .007 |
| 52 | 95-SB23 | HV | 1½"-HV-3B, pipe & fittings @ Condenser A. | T. B. - Heater Bay | G191158 | IE | 1½" | 80 | .200 | .007 |
| 53 | | HV | 2"-HV-9B, pipe & fittings.@ R.O.-3B. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 54 | | HV | 2"-HV-9B, pipe & fittings D.S. of valve HV- 15B | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |

# VY PIPING FAC INSPECTION PROGRAM - SMALL BORE INSPECTION LOCATIONS
## Revision 1, 12/6/1999

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 55 | | HV | 2"-HV-9B, pipe & fittings.@ Condenser A. | T. B. - Heater Bay | G191158 | IE | 2" | 80 | .218 | .008 |
| 56 | | HV | 2½"-HV-4A, pipe & fittings U.S. of connect. to Cond. B. | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 57 | | HV | 2½"-HV -4A, pipe & fittings D.S. of R.O.-4A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 58 | | HV | 2½"-HV-4A, pipe & fittings @ valve HV-9A | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 59 | | HV | 2½"-HV-4B. pipe & fittings U.S. of connect. to Cond. B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 60 | | HV | 2½"- HV-4B, pipe & fittings D.S. of R.O.-4B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 61 | | HV | 2½"-HV-4B, pipe & fittings @ valve HV-9B | T. B. - Heater Bay | G191158 | Industry Experience Point | 1" | 80 | .179 | .011 |
| 62 | 95-SB24<br>98-SB08 | ES | 2"-ES-12A piping US & DS of LCV-2A near Condenser A | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 63 | 95-SB25 | ES | 2"-ES-10A piping US & DS of LCV-3A near Condenser A | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 64 | 93-SB26 | ES | 2"-ES-12B piping US & DS of LCV-2B near Condenser B. | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 65 | 93-SB27<br>98-SB09 | ES | 2"-ES-10B piping US &DS of LCV-3B near Condenser B | T. B. - Heater Bay | G191156 | Industry Experience Point | 2" | 80 | .218 | .012 |
| 66 | 93-SB28 | AS | 1" piping US &DS of valve LCV-101-39 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 67 | 93-SB29<br>98-SB04 | AS | 1" & 2" piping US &DS of steam trap ST 62-1. | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 93-SB30<br>98-SB03 | AS | 2"-MSD-465 pipe & fittings @ connect. to Condenser B Nozzle 68 | T.B. - Heater Bay | G191156 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 69 | 95-SB26 | AS | 2"-MSD-465 pipe & fittings DS of valve V-62-2 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 70 | 95-SB27 | AS | 1" piping US &DS of valve LCV-101-40 | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 71 | 95-SB28<br>98-SB06 | AS | 1" & 1½" piping US &DS of steam trap ST 62-2. | T.B. - SJAE Room. | G191156 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 72 | 95-SB29<br>98-SB07 | AS | 1½" -MSD-464 pipe & fittings @ connect. to Condenser B Nozzle 69 | T.B. - Heater Bay | G191156 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 73 | 95-SB30 | AS(AOG) | 2" piping of DS of valve OG PRV -834A | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 1" | 160 | .250 | .053 |
| 74 | 95-SB31 | AS(AOG) | 3/4" piping US &DS of steam trap MS-113-1A. | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 1"<br>2" | 160<br>160 | .250<br>.344 | .053<br>.096 |
| 75 | 95-SB32 | AS(AOG) | 3/4" piping US &DS of steam trap MS115-1A | T.B. - Heater Bay El.248. | 33600-A217 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 76 | 95-SB33 | AS(AOG) | 3/4"MS-189-D3 AS drain from OG @ conn. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4". | 33600-A217 | Industry Experience Point | 2" | 160 | .344 | .096 |
| 77 | 95-SB34 | AS(AOG) | 3/4"HCN-188-H1 AS drain from OG @ conn. to 3"-MSD-4. | T.B. - Heater Bay El 233'-4" | 33600-A217 | I. E. Point, Replaced prior to 1990 | 2" | 160 | .344 | .096 |
| 78 | 93-SB31 | SSL | 1½" & 3" Header for 1SLMSV off Turbine Stop Valves | T.B. - Heater Bay. | 5920-224 | Industry Experience Point | 1½"<br>3" | 80<br>40 | .200<br>.216 | .077<br>.141 |
| 79 | 93-SB32 | SSL | 1½"-1SLMSV - Stop Valve A | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 80 | 93-SB33 | SSL | 1½"-1SLMSV - Stop Valve B | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 81 | 93-SB34 | SSL | 1½"-1SLMSV - Stop Valve C | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 82 | 93-SB35 | SSL | 1½"-1SLMSV - Stop Valve D | T.B. - Heater Bay | 5920-224 | Industry Experience Point | 1½" | 80 | .200 | .077 |
| 83 | 93-SB36 | SSL | 1½" Header for 1SCVL off Turbine Control Valves | T.B. - Heater Bay | 5920-224 | | 1½" | 80 | .200 | .067 |
| 84 | 93-SB38 | SSL | ½"-1SCVL - Control Valve A. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 85 | 93-SB39/40 | SSL | ½"-1SCVL - Control Valve B. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 86 | 93-SB41/42 | SSL | ½"-1SCVL - Control Valve C. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 87 | 93-SB37 | SSL | ½"-1SCVL - Control Valve D. | T.B. - Heater Bay | 5920-224 | | ½" | 80 | .147 | .033 |
| 88 | 93-SB43 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valves A & B | T.B. - Heater Bay | 5920-224 | | 2-1/2"<br>1" | 40<br>80 | .203<br>.179 | .116<br>.053 |
| 89 | 93-SB44 | SSL | 1" & 3" Header for 2SLMSV off Turbine Stop Valve C | T.B. - Heater Bay | 5920-224 | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 90 | 93-SB45 | SSL | 1" - 2SLMSV off Turbine Stop Valve D | T.B. - Heater Bay | 5920-224 | | 3"<br>1" | 40<br>80 | .216<br>.179 | .141<br>.053 |
| 91 | 93-SB58 | SSL | 2½" - Header for 2SCVL off Turbine Control Valves | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 92 | 93-SB61 | SSL | 1" - 2SCVL off Control Valve A | T.B. - Heater Bay | 5920-224 | | 2½" | 40 | .203 | .116 |
| 93 | 93-SB60 | SSL | 1" - 2SCVL off Control Valve B | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 94 | 93-SB59 | SSL | 1" - 2SCVL off Control Valve C | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 95 | 93-SB57 | SSL | 1" - 2SCVL off Control Valve D | T.B. - Heater Bay | 5920-224 | | 1" | 80 | .179 | .053 |
| 96 | 92-(SB-info only) | SSL | Turbine Bypass Valve Chest 1st Seal Leakoff 1/2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 1/2" | 80 | .147 | .034 |
| 97 | 92-SB01 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 98 | 92-SB02 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 92-SB03 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 100 | 92-SB04 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 101 | 92-SB05 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 102 | | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Not Inspected in 1992 | 2" | 80 | .218 | .099 |
| 103 | 92-SB07 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 104 | 92-SB08 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | | 2" | 80 | .218 | .099 |
| 105 | 92-SB09 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Vertical section replaced in 1992. | 2" | 80 | .218 | .099 |
| 106 | 92-SB10 | SSL | TBV Chest 1st Seal Leakoff 2"-1SLBPV | T.B. - Heater Bay | 5920-224 | Loc, of 1992 leak, replaced in 1992. | 2" | 80 | .218 | .099 |
| 107 | 93-SB46 | SSL | TBV Chest 2nd Seal Leakoff 2½" - 2SLBPV | T.B. - Heater Bay | 5920-224 | Continuation of 1992 inspections | 2½" | 40 | .203 | .116 |
| 108 | 93-SB47 95-SB35 | SSL | TBV Chest 2nd Seal Leakoff 2½" – 2SLBPV | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .116 |
| 109 | 93-SB48A 93-SB48B 95-SB36A 95-SB36B | SSL | TBV Chest 2nd Seal Leakoff 2½" – 2SLBPV | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .116 |
| 110 | 93-SB49 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | Significant Wear @ Duane Arnold | 2½" | 40 | .203 | .023 |
| 111 | 93-SB50 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 112 | 93-SB51 | SSL | 2½" - 1SPL2 H.P Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 113 | 93-SB52 | SSL | 2½" - 1SPL2 H.P. Turbine Pocket Drain | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 114 | 93-SB53 | SSL | 2½" - 1SPL2 H.P.Turbine Pocket 90 deg elbow | T.B. - Heater Bay | 5920-224 | " " | 2½" | 40 | .203 | .023 |
| 115 | 93-SB54 | SSL | 1SPL2 2½" x 2" reducer at 36" CAR pipe. | T.B. - Heater Bay | 5920-224 | " " | 2½" 2" | 40 40 | .203 .154 | .023 .019 |

| PT. | PREV. INSPECT. No. | SYSTEM | DESCRIPTION | LOCATION | DRAWINGS | COMMENTS | SIZE | SCH. | Tnom inch | T min inch |
|---|---|---|---|---|---|---|---|---|---|---|
| 116 | 95-SB37 | C | 1½" & 2½" piping US & DS of LCV 1A-3 | T.B. - Heater Bay | G191157 Sht.1 | IE | 1½"<br>2½" | 80<br>80 | .200<br>.276 | .038<br>.057 |
| 117 | | MSD | Steam Seal Regulator to Steam Seal Piping low point drain | | G191156<br>5920-224 | IE | 1" | | | |
| 118 | | HV | 4"-HV-8A @ Condenser A No.4 continuous vent. | T.B. - Heater Bay | G191158 | IE | | | | |
| 119 | | C | 1" Piping D.S of R.O. 64-2 | T.B. - Heater Bay | G191157 Sht.1 | IE | | | | |
| 120 | | ES | 3"-ES-8A D.S.of LCV-4A | T.B. - Heater Bay | G191156 | IE | | | | |
| 121 | | ES | 3"-ES-8B D.S.of LCV-4B | T.B. - Heater Bay | G191156 | IE | | | | |
| 122 | 99-SB01 | MSD | 1" piping US & DS valve HPCI-LCV-53 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 123 | 99-SB02 | MSD | 1" piping US & DS of Steam Trap ST-3 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 124 | 99-SB03 | MSD | 1" piping US & DS valve HPCI-FCV-42 | Rx. Bldg. HPCI Rm. | G191169 Sht.1 VYI-HPCI-Pt.3A St.2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 125 | 99-SB04 | MSD | 1" piping US & DS valve RCIC LCV-32 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 126 | 99-SB05 | MSD | 1" piping US & DS of Steam Trap ST-6 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |
| 127 | 99-SB06 | MSD | 1" piping US & DS valve RCIC FCV-34 | Rx. Bldg. RCIC Rm. | G191174 Sht.1 VYI-RCIC-Pt.3A Shts.1/2 & 2/2 | (I.E.) Dreseden 3 LER 3/96 | 1" | 160 | .250 | .053 |