RASH-211

NEC-JH_43

PP 7028 FAC INSPECTIONS 2004 REFUELING OUTAGE

TABLE OF CONTENTS

Template Secy-028

DS-03

Engineering Department
Work Management Handbook

2003-2004 Program Scope Memo
Vermont Yankee -Engineering Department

WBS Element:	6098 Pro"ect Number: 6098
Title:	Piping Flow Accelerated Corrosion (FAG) Inspection Program 2003 & 2004 Efforts
De artmenl:	Des! n En ineerln - Mechanical I Structural
Owner:	James Fltz trick
Backu :	Thomas O'Connor
Procedure No. & Title:	pp 7028, Piping Flow Accelerated Corrosion Inspection Program

Detailed Scope of Prolect (explanation): Engineering activities to support ongoing Inspection Program to provide a systematic approach to insure thai Flow Accelerated Corrosion (FAC) does not lead to degradationofplanl piping systems. Program Procedure PP 7028 controls engineering and Inspection activities to predict, detect, monitor, and evaluate pipe wall thinning .due to FAC. Activities include modeling of plant piping using the EPRI CHEGWORKS code to predict susceptibility to FAG damage, selection of components for inspection, UT inspections of piping components, evaluation of data, trending, monitoring of industry events and best practices, and recommending future repairs and for replacements prior to component failure.

Expected Benefits (Justification): VY committed to have an effective piping FAG inspection program in response to GL 89-08.

Consequences of Deferral: Possible hazards to plant personnel, Loss of plant availability, unscheduled repairs, and deviation from previous regulatory commitments.

Duration of Program: Life of plant

Key Deliverables or Milestones:	Completion Estimate
Issue 2002 Outage Inspection Report Issue 2004 RFO Outage Inspection Scope per Entergy template (14 months before outage). Including Scoping worksheets.	1/22/03 3f27/03
Update Piping FAG susceptibility screening to account for piping and drawing updates. Include consideration of power uprate &life extension.	611/03
Update piping Small bore piping database and FAG screening to account for piping and drawing updates. Include consideration of power uprate &life extension.	7/1/03
Update GHECWORKS mOdels with 2001& 2002 RFO Inspection data (Note ideally results are to be used in detennining the 2004 inspection scope, however schedule mllestonas override program logic.)	9/1/03

Key Deliverables or Milestones: - continued	Completion Estimate
Updates to Program Procedures as identified in Self Assessments.	6/1/03
Develop FAC Program Health Report Template (Format and Performance Indicators) .	7/1/03
Perform Program Self Assessment (minimum once per cycle).	*10/1f03*
Ongoing Program Maintenance. Includes: procedure revisions. program Improvements, benchmarking, attendance at industry meatinns & evaluation of Indusl events for effects on VY.	*12f31/03*
RFO 24 support	*5/1f04*
Issue 2004 Outage Inspection Report	*7f15f04*
Update CHECWORKS mOdels with 2004 RFO InspecUon data.	*8115104*
Issue 2005 RFO Outage Inspection IScope per Entergy template (Approx. 14 months before outage) Including Scoping worksheets.	*8115104*
Perform Program Self Assessment (minimum once per cycle).	*1011104*
Ongoing Program Maintenance. Includes: procedure revisions, program improvements, benchmarking, attendance at industry meetinos & evaluation of industry events for effects on VY	12/31/04

Estimated Bud et or Ex enses: Ca lured in DE MechJStruclural Base Bud et		Amount NfA	
Others Impacted By Project:	Support Required? Yes/No	Estimated Hours	Review
2120 - S tern En ineerin	YES	40	
2130 E ineeri Su ort			
2160 Fluid S stems En ineerin	YES	40	
2160 Electrical/I&C En ineerin			
2160 Mechanical/ Structural Des' n			
others:			

Level 3 Fra net: Attached

Performance Indicator (as applicable) Performance Indicators for FAC Program wilt be developed in new Program Health Reports Task as defined above.

Engineering Department
Work Management Handbook

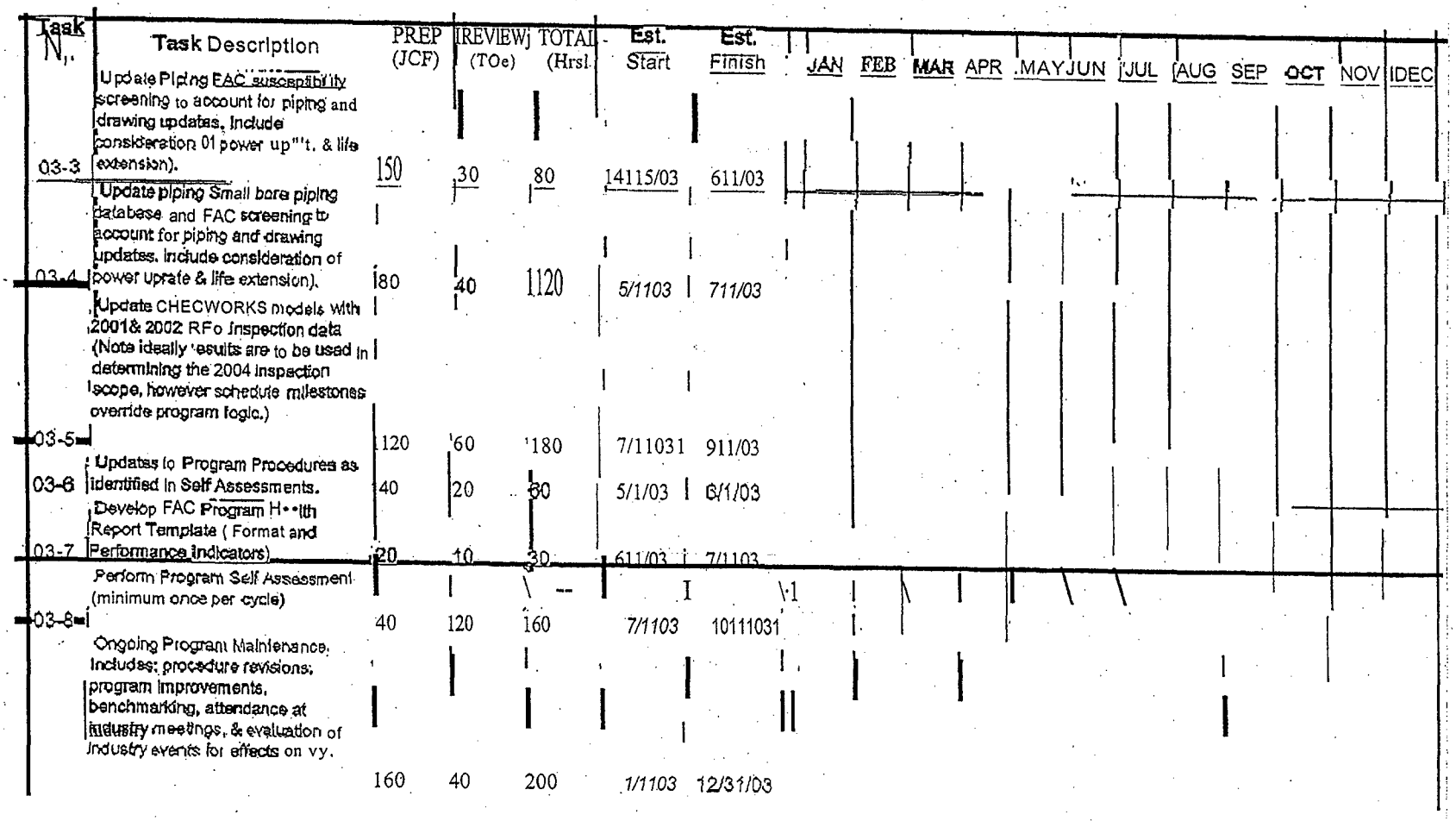
YEAR 2004

Task No.	Task Description	Preparer (HRSJ Estimated	Reviewer (HRS) Estimated.	TOTAL (HRS) Estimated.	Est. Start	Est. Delivery f Completion Date
04-1	RFO 24 support	160	80	240	*3/15/04*	5/1/04
04-2	Issue 2004 Outage Inspection Report. Required within 90 days of startup from 2004 outage	50	30	90	6/1104	*7/15104*
04-3	Update CHECWORKS models with 2004 RFO Inspection data.	120	50	160	*6/1/04*	*8/15/04*
04-4	Issue 2005 RFO Outage Inspection Scope per Entergy template (14 months before outage) Including Seoping worksheets.	40	20	50	*8f1/04*	*8115f04*
04-5	Perform Program Self Assessment {minimum once per cycle).	40	20	50	*9f1f04*	*1011/04*
04-'	Ongoing Program Maintenance. Includes: procedure revisions, program improvements, benchmarkJng, attendance at industry meetings, evaluation of industry events for effects on VY.	200	50	250	1/01/04	12131104
2004			Total Hrs	880		

NEC020182

Piping FAC Inspection Program
Level 3 Fragnet

Task No.	Task Description	PREP (JCF)	REVIEW (TOe)	TOTAL (Hrs)	Est. Start	Est. Finish
03-3	Update Piping FAC susceptibility screening to account for piping and drawing updates. Include consideration 01 power up"t. & life extension).	150	30	80	14115/03	611/03
03-4	Update piping Small bore piping database and FAC screening to account for piping and drawing updates. Include consideration of power uprate & life extension).	180	40	1120	5/1103	711/03
03-5	Update CHECWORKS models with 2001& 2002 RFo Inspection data (Note ideally results are to be used in determining the 2004 inspection scope, however schedule milestones override program logic.)	120	60	180	7/11031	911/03
03-6	Updates to Program Procedures as identified in Self Assessments.	40	20	80	5/1/03	6/1/03
03-7	Develop FAC Program H••lth Report Template (Format and Performance Indicators)	20	10	30	611/03	7/1103
03-8	Perform Program Self Assessment (minimum once per cycle)	40	120	160	7/1103	10111031
	Ongoing Program Maintenance. Includes: procedure revisions; program improvements, benchmarking, attendance at industry meetings, & evaluation of industry events for effects on vy.	160	40	200	1/1103	12/31/03



NEC020189

Erosion Corrosion Program

Activity ID	Activity Description	Current Start	Current Finish	Rem	Bud Qty	Total Float	Predecessors
6098033	Update Piping FAC Susceptibility Screening -Drwg	15APR03A	02JUN03	34* ME-FITZP, IN	80.00	0	6098803
9*036	Updat* to Program Pr *du as identified in SA	01MAY0**	*2JU 3	22* ME-FITZP, ME-OCONN	60.0*	2,450	
	Upd Piping Small * Pi*ng Database d FAC	03JUN03	01AUG03	43 ME-FITZP, ME-OCONN	20.00	0	
6098037	Develop FAC Program Health R* rt Template	02JUN03*	01JUL0*	22* ME-FITZP, ME-OCONN	30.00	0	
*09*03*	Update CHECKWORKS Model w/ 2001/2002 RFO ct	01JUL03*	*2SEP03	44* ME-FITZP, ME-OCONN	180.00	49	
609*038	Perform P ram Self Assessment	01JUL03*	01OCT0*	65* ME-FITZP, ME-OCONN	60.00	59	2003END
23P6098	Erosion Corrosion P ram Maintenance	*N*1A	31DEC03	2	200.0*	0	2003END
6 *042	Issu* 2004 Outag* Inspection port (90 Day Req)	01JU 4*		32* ME-FITZP, ME-OCONN	90.00	-29	6098043* RF24-20
609*	Updat* CHECKWORKS model w/ 2004 RFO Inspect Data	1*JUL04	2 EP04	54 ME-FITZP, ME-OCONN	80.0*	-29	6098044*
44	Issu* 2005 RFO Outag* nspect *cope E ry Temp	30SEP04	4OCT04	1 ME-FITZP, ME-OCONN	60.00	-29	
60 045	Perform gram Self ssm*nt	01SEP04*	01OCT04	23* ME-FITZP, ME-OCONN	60.00	62	2004END
24P60	Erosion Corro n P ram Ma nance	*2J*N04		2*7 ME-OCONN, ME-FITZP	250.00		

SI-Cycle Ba

7230A05	Cu and V&V	15JUL03*	27AUG*3	22 ME-FITZP	0.00		
7230A06	SI/VY Historical Baselining	2**UG0*	1*OCT02	** ME-FITZP	0.00	39	
7230A08	VY Dev p Fatigu* nitoring	1*JUL**	28*CT03	75 ME-FITZP	0.00	40	2003END
7230A07	SI Installation * Training	1*OCT03	OCT03	11 ME-FITZP	0.00	39	2003END
723008	VY - Fatigu* Project Support	*2JAN03A	*1DEC0*	0* ME-FITZP	000.00	0	2003END

Start Date 01JAN03
Finish Date 31MAY07
Data Date 12MAY03
Run Date 1*MAY03 14:00

John Dougherty
EX 3098
VY Engineering Work Control

VY Piping FAC Inspection Program PP 7028 - 2004 Refueling Outage

Inspection Location Worksheets / Methods and Reasons for Component Selection

By: [signature] 3/27/03 Reviewed [signature] 3/27/03

Piping components are selected for inspection during the 2004 refueling oUlage 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.

Le: Components identified by indusIryeventslexperience via the Nuclear Network or through the EPRI CHUG.

LD: Components selected to calibrate the CHECWQRKS mOdels.

LE: Components subjected to off normal flow conditions. Primarily isolated tines to the condenser In which leakage is indicated from the lurbine perfonnance monitoring system. (through the Systems Engineering Group).

LF: Engineering jUdgment / Other

LG: Piping identified from EMPAC Work Orders {malfunctioning equip., leaking valves, etc.I

Small Bore Piping

SA: Susceptible piping locations (groups of components) contained tn Ihe Small Bore Piping data base which have nol received an initial inspection.

SB: Components selected from measured or apparent wear fOUnd in previous inspection resuits.

sc: Components Identified by industry events/experience via the Nudear Network or through the EPRI CHUG.

so: Components subjected to *cff* normal ftowconditions. 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: P"lp'lng identified from EMPAC Work Orders (malfunctioning equip., leaking valves, etc,)

Feedwater Heater Shells

NO feedwater heater shell inspections will be performed dur'lngthe 2004 RFO. Previcus plans were to complete the IIT grids on the No,1 & 2 heaters have been made moot by the decision to replace all 4 HPfeedwater 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 19951199611998119991200112.002. Refuelin9 Outage Inspections (Large Bore Piping) these components were identified as requiring future monitoring. Ttle following components have either yet to be inspected as recommended, or the recommended inspection is in a future outage

Inspect. No.	Loc. SK	ComponemID	Notes/Comments / Conclusions
96-13 96-14	001	FD01EL04 FD01SP04	1996 report recommended inclusion of FD01SP04 into 2001 RFO Scope (lower readings at U.S. counterbore). UT Inspect elbow and downstream i e In 2004
99-03 99-04	002	FD02.EL01 FD02.TE01	1999 Recommendation to inspect tee in 2002. Component is downstream of pump 18. "B· Pump 'IS used a standby pump, based on usage, inspection was deferred until 2004. UT inspect elbow and downstream tee in 2004.
99-25 99-26	00.	FD14EL03 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. Defer re-inspection olthe elbow FD14EL03 & pipe FD14SP03 unlll the 2005 RFO.
101-03 01-04	001	FD01EL01 FD01TE05	2001 recommendation to inspectthe tee In 2.004. UT Inspect elbow and downstream tee in 2004 (1998 RFO results recommended inspection in 2001) Also add inspection of the reducer upstream olthe elbow.
02-08 0:2-09	016	FD18EL01 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 eelected (identified) from previous Inspection Results - continued

Turbine Cross-around Piping:

Previous Intemal Visual UT & Repair History:

Line	Mat.	Year Replaced	Internal Visual =V Internal Thickness UT, Re irs Performed =R RF016 81992	RFOt7 F1993	RF018 81995	RF019 F1996	RF020 S1998	RF021 F1999	RF022 82001	RF023 F200:2
36"-A	GE**	1983		V	V	V	V			
36"-B	GE**	1981	V	V	V	V	V	V		
36"-e	GE"	1981	V	V	V		V			
36"-D	GE**	1983		V	V		V			
30"-A	P-22'	1985	V		V		V			
30"-B	CS.	Or inal	VIUT/R	VIUTIR-	VIUTIR	V/UT _	V	V		V
30"-C	P-22"	1993	VIUT/R							
30"-0	P-22'	1985			V					

" 36' stalghtpipesactions raplacad With GE B50A24E, elbowson theB&Clnes are 0tiginal GE pecification D50A67D, elbows on A &0 lines are 050A67E (Tnom =0,625 inch).
'30" A,B,C replaced with A691 CL22 (2_114Cr), Fittings A234 WP22. (Tnom. = 0.625 inch)
30' B remains GE B50A2420, fittings and GE 050A670 carbon steel (Tnom = 0.50 inch),

_NOTE: Reference Dwg. No. 5920-6841 Sh.1 of2 needs to be updated with correct information. This will be !perfonned 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 materiais.

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 Compon&nla Ranked High for Susceptibility from CHECWORKS Evaluation

The current CHECWORKS wear rate calculations contain Inspection data up to the 1999 RFO and wear rale predictions are current to the 2001 RFO. The 2001 and 2002 RFO inspection data has been entered into the CHECWORKS database, However, updaled 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 Ihe Feedwater, Condensale, and Heatar Drain Systems, the CHECWORKS models still appear to over-predict actual wear, Nothing newar unanticipated was observed in 2002.

Feedwater System

Listed below are components wh',ch meet Ihe follow'lng 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 paralliel 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 orthe other train component In 2004. This component will be Inspected In 2004.
'FD07TE01 'FD07EL11	006	T.B Healer 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 ine ections In 2005 RFO.
FD07EL12	006	T.B Heater Bay Bev, 248	Feedwater healer replacement to occur in 2004 RFO. Perform Internal visual Inspection at open end on this comnonenl.
FD14EL07	009	RX Steam Tunnel El. 266	Internal visual of elbow performed In 1996 during Check valve replacement. no indication ofwaliloss at that time. Inspect this or the other train component in 2004. Inspect this com nent 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. FD07EI03 will be Inspect&d In 2004.
FD08TE01 FD08EL07	012	r,B Heater Bay Elevs 228 &248	Intermediate components FD08EL06 & FD08SP06 were inspected in 1998. Resulls 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 healer replacement to occur in 2004 RFO. Perform internal visual Inspection at open end on this component.
FD15EL08	01	RX Steam Tunnel EL 266	Internal visual of elbow performed in 1998 during check valve replacement. no Indication of wall loss at that lime. After updating CHECWORKs model with new&rdata, assess need for inspecting this component in 2005 RFO

10

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 smatt 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 witt be input to CHECWORKS to better calibrate the model.

To inspect the components with the highest susceptibility as ranked byCHECWORKS 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 prains & Heater Drain System.

No components identified as haVing negative times to Tmln. No components wera 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. ES4ATEOI & ES4ATE02, 30inch diameter tees Inside the condenser have negative prediction (-3426Hrs.) for lime to min wall. The negative times to Imin 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 exlernallaggIng 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 parfOIITI 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 Experianee (OEI and/or piping failures reported since January 2001

Date	Plant Type	Deseri tion & Recommended Actions at *VY*
4/7101	Callaway - PWR	*Unexpected extent of thinning in feedwater piping* (NRC IN 2001-009 & INPO OE12342)Add'rtionai components were Inspected 'In the feedwaler system in the 0 ll durin. the 2002 RFO in res onse 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 atVY «2% of time). A review of *VY* drawings VYI-RHR-Part 14 Sht111 and VYI-RHR Part 15 Sht111 show elbows downstream of restriction orifices. Additional research into this event is warranted. Inspections oan be performed with the plant operatino. Don't include in the scope of 2004 RFO.
11120/01	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.
9124102	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.
112102	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 dama e.
1115102 CHUG Meeting	Surry 1-PWR	Leak in 8 inch Condenser drain headerfor 3 *14* 'pt. FDW Heatervents. Also thinning in Gland steam Piping Inside the condenser and the12" Condenser Drain header from MS Drain trap lines. The only large bore drain collecIora! 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 offLP turbine for extraction steam piping. *(VY* has replaced all LP turbine stub pieces upstream of the exoansian bellows with P-11 malerial. 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 teedwater heaters. Bypass valve discharge directly into condenser. TPM monitors possible leakage past the Bypass valves.
6/24102	Prairie Island 1 - PWR	Preliminary notice of possible extraction steam line piping/bellows failure inside condenser. (See 1/2102 Point Le reau notice above).
8129102	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, DE 14866. & Info al1103 CHUG Meeting), Location is similar to millstone 2 & 3 events in 1991/92. Piping on HD system at *VY* OS of normal level control valves is constructed from FAG resistant materials or planned for replacement with new Feedwatar Heaters. No actions are re uired for this OE.
1019102	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 aU-tube Hx. RWCU pit ino in this area is stainless steel. Therefore not an immediate concern.

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 oflowwear in the Condensate System. Additional components selected for inspection in 2004 in Section LB above will bs used to calibrate the CHECWORKS model.

Prior to the 2002 there was limited Inspection data for the Heater Drain system. The current CHECVIIORKS 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 nonnal flow conditions identified by turbine perfonnance monitoring system (Systems Engineering Group).

The Systems Engineering Production Variance Reports for 2002 & since startup from 2002 (RF023) 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, addttions to the outage scope may be reqUired.

LF: Engineering Judgment / Other

Nine ASME Seelion 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 'D	Description	FAC Program Components
Spring 2004 (RF024) Interval 4 Period 1, Outage 1.	FW19-F3B FW19-F3C FW19-F4 FW21-F1	upstream pipe to tee tee to reducer reducer to pipe tee to pipe	"A" Feedwater on Sketch 010 FD19TE01 FD19RD01 FD19SP04 FD21SP01
Fall 2011 (RF029) Interval 4 Period 3, OutageS,	FW18-3A FW20-3A FW20-F1 FW20-F1B FW18-F4	upstream pipe to tee tee to reducer reducer to pipe horizontal pipe to pipe tee to oioe'	"B" Feedwater on Sketch 016 FD18TE01 FD20RD01 FD20SP01 FD18SP04

LF: Engineering Judgment I Other – continued

All Extraction Steam piping is A335-P11, a 1-114 chrome material, except for a short calbon steel stub plece in line 12"-ES-1A at the connection to the 36" A cross arournlline. 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 sleam of all extraction lines which indicates a relatively lower wear rala. 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. Porfonn external UT Inspection of ES1ASP01 in RF024.

Extraction Steam piping in the condenser has eXlernallagging which requires significant effort for removal when performing external Vr inspections (pius there are significant staging costs). The piping is A335-P11. However an opportunity to perform an internal visual inspecUon of all the Extraction Steam lines inside the condenser during planed LP turbine work in the 2005 RFO *may* present itself.

LG; Piping identifled from EMPAC Work Orders (malfunctioning equip., leaking valves, etc.)

Word searches 01 opan work orders on EMPAG ware performed for the following keywords: trap, leak, valve, replace, repair, erosion, corrosion, steam. FAG, 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 vant 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. 2-112" 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 abnormaiflow. 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 inspectlrepairireplaceiline. The line should be completely replaced with chrome-moly piping. (Dresden has already done this) Given the amount ofwork already scheduled forthe heater bay during the 2004 RFO a complete replaoement will be deferred. A local code repa'if 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.

S tem	Deserl tion	Ins ection No.
2" 1SLBPV	2 inch header off the turbine bypass valve chest first seal leak-off connections. Inspect five locations on !his line. include the ½ line at the No.2 valve. It has the next hi hest usa e from the no.I valve.	2004 5B01 to 5805
2-112" ISPL2	HP Turbine pocket drains. inspect first two elbows and connecting piping under turbine based on readinll from 1993linspections 93-5849 to 93-SB52)	20045B06 & 5807

Small Bore Piping

se: Components identified by industry eventslexperience via the Nuclear Network or through the EPRI CHUG.

Date	Plant – T e	Descri tion & Recommended Actions at vY
1123198	Calvert Cliffs 2 -PWR	Rupture of a moisture separator re-heater (MSR) 2 inch vent line (INPO Event 318-980123-1) No MSRs at VY, therefore no ea'uivalent line at VY,
11103198	Hamoka 2 'WR	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 condensats side of HHS piping. Lower energy/consequence of leak. ConSider durin next update of the Small bore data base.
5101199	Darlington 4- PHWR	Leak On HP Feedwater Heater Vent Line downstream of orifice (INPO Event 934-990507-1). At VY ins ctions have rformed OS of orifices on HV lines.
6114/99	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.
10101/99	Darlington 2 - PHWR	Leak on Feedwater HeaterVent Line downstream of orifice (INPO Event 932-991007:1): At VY inspections have performed OS of orifices on HV lines.
10/1100	Ocone3_PWR	From 1/2001 CHUG Meeting. MSR Scavenging steam line Pinhole leak In I" i e downstream offlow control valve. No enulvalent s stem VY.
1/8/01	Oyster Creek - 'WR	Rupture of 2 inch line connecting controller/transmitter level column to re-heater drain tank. No MSRs at VY, therefore no uivalent Hne at VY.
9/1101	Peach Boltom 3 -BWR	(From *1/14102* 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 database.
6/22/01	Pilgrim -BWR	Leak on 2 inch feedwater heater venlline (OE discussed at 1/02 CHUG Meelinn). Equivalent lines at VY h been inspected.
10122101	st, Lucie 1 - PWR	(From *1/14102* CHUG Meeting), Leak on 1 inch Sch. 80 normally Isolated drain line remote from process system. TPM used to determine leaks from N.C. vaives.
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 uired.
11151/02 CHUG Mig.	Halch1/2 -BWR	Condenser in leakage due to through wall erosion (exlernal?) of 1-112 inch "slop' drains lines inside the condenser. Lines In each unit were cut and capped Similar events at Byron Unl11 (OE 12609) and Coiumbla (OE12145). Limerick & Dresden. VY slop drain lines do not show u on VY P&IOs.
1/15102 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 10 base line condition crior to HP turbine rotor replacement.
1/15/02 CHUG Mt	Columbia - 'WR	Leak in 2 inch drain line from bleed steam trap to condenser. At VY SB piping OS of steam traps Is included in the small bore dala base.
1/15/02 CHUG Mtg.	Peach Bottom2 . BWR	Pin Hole leaks in I" schedUle 160 HPCI Steam Supply drains {Plant thought piping was replaced with P-1 1 ; However field conditions showed that is was not. Pi in at VY ins cted in 1999 (99-SB01 to 99-SB03)

continued

Small Bore Piping

SC: Components identified by industry events/experience via the Nuclear Network or through the EPRI CHUG - continued.

Date	Plant T e	Descri tion & Recommended Actions at VY
1115102 CHUG Mtg.	Dresden 2 'WR	Thinning found in Bypass valve leak-off line to the 7 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 2M41nspect locally, then long tenn replacement with A335-P11.
6102 CHUG Mtg.	AN01 &ANO 2 PWR	Leaks in Gland seal steam to No.3 bearing 1-114 vendor supplied line, Leak in 1" Sch.SO drain from Reheat 2nd stage drain tank to condenser. Additional review of GE supplied steam seal & drains is required. Consider during next u date of the Small bore data base.
6102 CHUG Mtg.	Brunswick 1 - 'WR	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 healers atVYwil1 be chrome–moly.
6102 CHUG Mtg.	Calvert Cliffs 1 PWR	Pin hole leakin ¾ inch Sch. 80 drain line off MS supply to stream generator feed ouma iustdownstream of orifice. No steam driven feed oumps at ¥Y.
6102 CHUG Mtg	Fenni 2 - BWR	Leak in first elbow downstream of AOV in 1/112" continuous vent from Turbine Bypass Valve seat dra',n to condenser. Vawe 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 incIUded in the SB program. Thaonly continuous opening to the condenser at VY is the steam leads drains through RO 60-1. This -oi inc has been reolaced with chrome-rnolv ai inc.
1/03CHUG Meeting.	JAF -BWR	Through wall leaks in 2" Soh. SO C.S. lines from 5 /6 extractiCn drain lines immediately downstream of restricting orifices. At VY the only drain lines on the action steam piping are upstream of the reverse cUJTenl valves. There are no restriction orifices at VY. The piping is chrome-molv.
1/03 CHUG Meeling.	TUrkey PtA- PWR	Leak in HP turbine bowl drain, 1" sch 60 C.S. pipe. OEM recommended replacement with SS pipe in 19S2, did not occur. Equivalent line al VYwIII be inspected In 2004 to baseline thickness prior to HP turbine rotor repiacement.

SD:Components subjected to off nonnal 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,)

ISG: 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.

(17)

- 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 / T downstream of the valve.

LaSalle is experiencing impingement damage in an 8" common drain header to condenser that collects six 10 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 healer drains after applying HWe.

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 #1 2004 SCOPING WORKSHOPS (PWR)

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 nonnally high radiation areas. Aaron Kelly can be contacted for more information.
Riverbend is training their QC inspectors to perform *VT*.

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%. Tem rature chan s are believed to be responsib
Perry did a pre-power uprate an ysis 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 NRe has emphasized compliance with NSAG202L-RI 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.

[redacted] with the BWR session, Jeff Horowitz led the PWR Breakout Session. The session was broken down into three parts:

A descrip e very high levels of iron transport experience an Onofre. This presentation inelude ils of the investigation into the ph <mon, a description of the deposits found, several p ible explanations for sits, and what the effects of the deposit were on plant p
A status report on the EdF hydrazine testing program. Unfortunately, no progress has been made since the last report in J to n ber of problems. The latest problem, inadequate water quality, has resolved and tes resumed earlier this month. The testing program is take all year to complete. etails of lbe test program have been presented at ous CHUG meetings.
There was al riefdiscussion of feedwater oxygen and FA. veral PWRs are now aUowin entry of small amounts of oxygen into the condensate system in hopes of red g the iron transport. The potential for change to the PWR Water Chemistry ..idelines in this area was discussed.

- Tina Gaudreau discussed several EPRI chemistry projects that have FAC implications. The first was the EdF testing {or 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

19

CHRONO FILE COPY.

Entergy

Vermont Yankee Nuclear Power Station
oesign Engineering Department" Mechanical/Structural

To S.D. Goodwin Date March 27.2003

From J.e. Fitzpatrick File # VYM 2003/009

Subject Piping FAC Inspection Scope forthe 2004 Refueling Outage

REFERENCES

(a) PP 7028 Piping Flow Accelerated Corrosion Inspection Program, LPG 1 12/06/01.
(b) V.Y. Piping F.A.C. Inspection Program - 1996 Refueling Outage Inspection Report, March 23,1999.
(o) V.Y. Piping FAC.Inspectlon Program -1998 Refueling Outage Inspection Report, April 2,1999.
(d) V.Y. Piping FAG. Inspection Program - 1999 Relueling Outage Inspection Report, February 11, 2000.
(e) V.Y. Piping FAG, Inspection Program - 2001 Refueling Outage Inspection Report, August 11,2001.
(I) V.Y. Piping FAC.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 Blines 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 infonnation 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 conlsct 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 Progmm Engineer)
T.MO'Connor (Design Engineering)
M.LeFrancois (Systems Engineering)

NEC020198

LARGE BORE PIPING: External UT Inspections

Point No.	Component 10	Location Sketch	Location	Previous Inspections	Reason / Comments / Notes
2004-01	FD01RDOl	001	T.B. FPR. Elav. 232.	2001	2001 recommendation for repeat inspection of FD01TE05.
2004-02	FOOl EL01	001	" " "	2001	
2004-03	FDQ1TEOS	001	" " "	2001	
2004-04	FD01EL04	001	T.B. FPR Elev.241.	1996	1996 recommendation for repeat inspection of FDQ1SP04.
2004-05	FD01SP04	001	" " "	1996	
2004-06	FD02RDOl	002	T.B. FPR. Elev. 232.	1999	1999 recommendation for repeat inspection of FDOZTE01,
2004-07	FD02EL01	002	" " "	1999	
2004-08	FD02TEOl	002	" " "	1999	
2004-09	FD03SP01	003	T.B. FPR. Elev. 232.	NO	Ranked hi h b CHECWORKS.
2004-10	FD07SP02DS	005	T.B. FPR. El v. 232.	NO	Ranked high by CHECWORKS include minimum
2004-11	FD07EL03	005	" " "	NO	of 36 Inch of vertical run upstream of elbow.
2004-12	FD14SP08DS	009	Stm Tunnel Elev. 266	NO	Ranked high by CHECWORKS include minimum
2004-13	FD14EL07	009	" " "	NO	of 32 inch of vertical run upstream of elbow.
2004-14	FD19TE01	010	Rx Drywell Elev. 270	1999	Required Inspections per ASME Section XI ISI
2004-15	FD19RD01	010	" " "	1999	Program FAC inspections per ASME Code
2004-16	FD19SP04	010	" " "	1999	Case N-560.
2004-17	FD21SPOI	010	" " "	1999	

NEC020199

12

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 EI v.243.	NO	Ranked high by CHECWORKS include 12 inch long stub between CD32LE01 & CD32EL02.
2004-19	CD30SP04	036	" " "	NO	
2004-20	CD32EIO1	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 sleel section in Extraction Steam system. Baseline data for ower urate.
2004-23	MSD9TE01 thru MSD9TE08	097	T.B. HB Elev. 249.	NO	Industry Experience with numerous through waJlleaks in drain collector headers. Scan as much of header below drains from LeV 38A to 380 and ST·6D-2A to 20 as accessible. See Nole 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 01 insulation to be removed with J.Fitzpatrick or T.M. O'Connor from DE·MIS.
2. A "No" in the previous inspection column Indicates asbestos abatement may be required.
3. Piping is part of the proposed ALT Boundary/or Power Uprate AST.

NEC020200

22

LARGE BORE PIPING: Internal Visual Inspections **(with supplements! UT as required)**

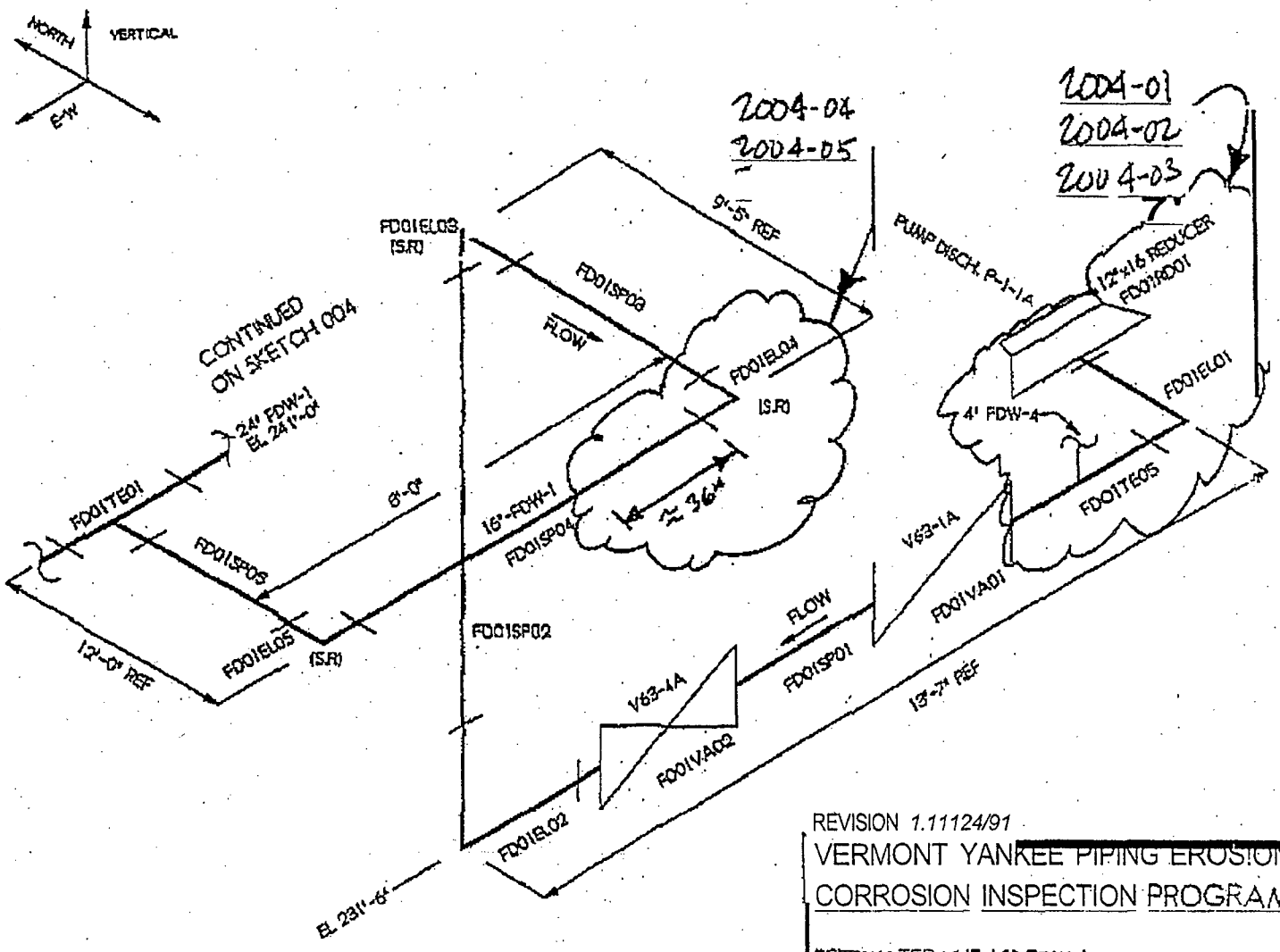
Ins action Point No.	Oeser! lion
2004-27	'A" 36 inch diameter Turbine Cross Around line (CAR).
2004-28	"6" 36 inch diameter Turbine Cross Around line (CAR).
2004-29	"C" 36 inch diameter Turbine Cross Around line (CAR).
2004-30	"D" 36 inch diameter Turbine Cross Around line (CAR).
2004-31	"C" 30 inch diameter Turbine Cross Around line (CAR).
2004-32	"0" 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 healers will be performed during installation of the new heaters during the 2004 RFO. (This includes Feedwatar, Extractlon Steam, Moisture Separator Drains, and Heater Drain piping.)

NEC020201

13

NEC020202



REVISION *1.11124/91*

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 16" FDW-1

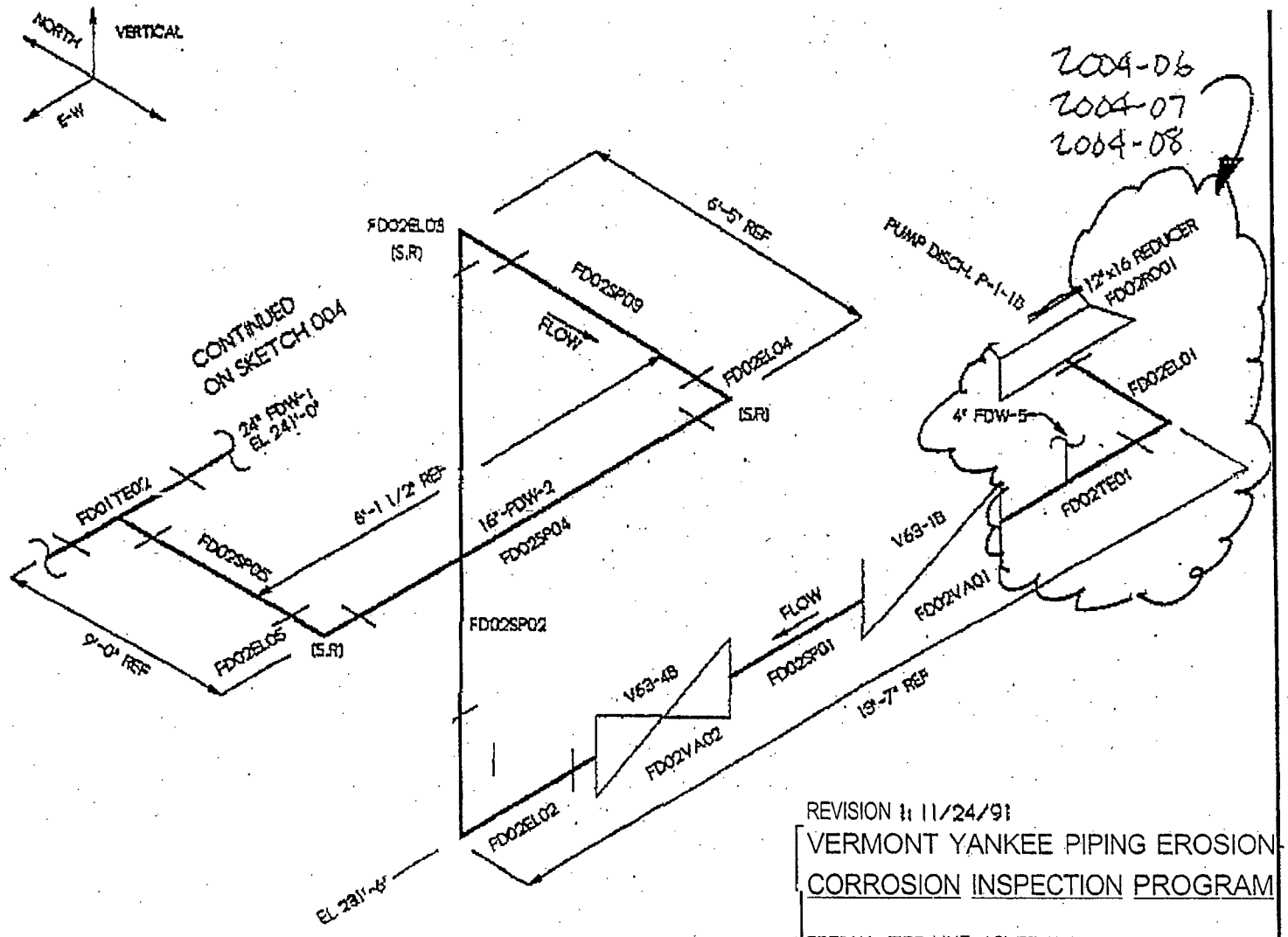
COMPONENT LOCATION SKETCH No.001

TURBINE BUILDING-FEEDWATER PUMP ROOM.

REFERENCES: G191157,G191182,G191183,5920-FS-124

42

NEC02020≥



REVISION 1: 11/24/91

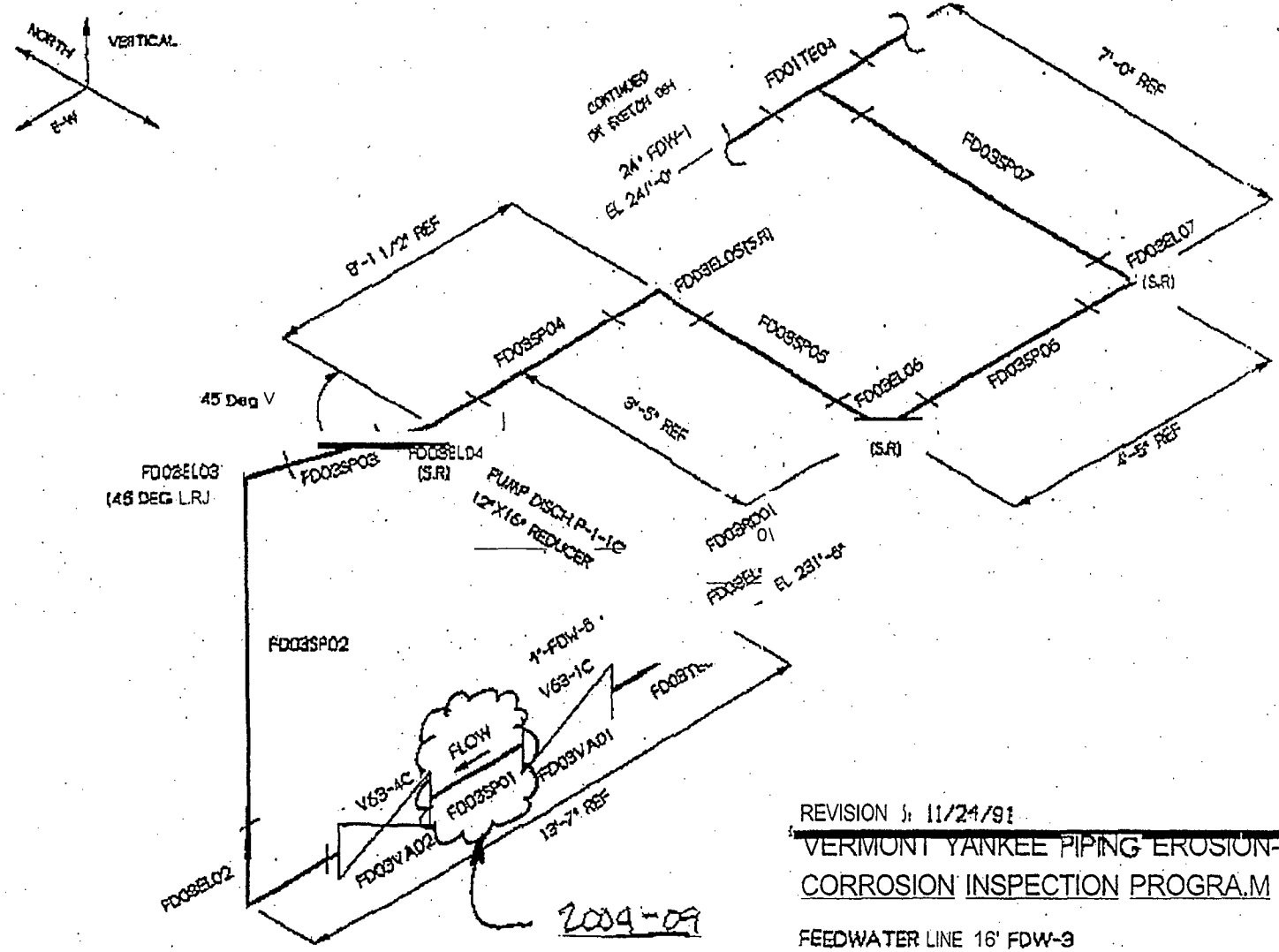
VERMONT YANKEE PIPING EROSION CORROSION INSPECTION PROGRAM

FEEDWATER LINE 16" FDW-2

COMPONENT LOCATION SKETCH No.002

TURBINE aUIIDINC-FEEOWATER PUMP ROOM.
REFERENCES: G t9t t57,G 19! t82,G191!83,5920-FS-124

NEC020204



REVISION 1: 11/24/91

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

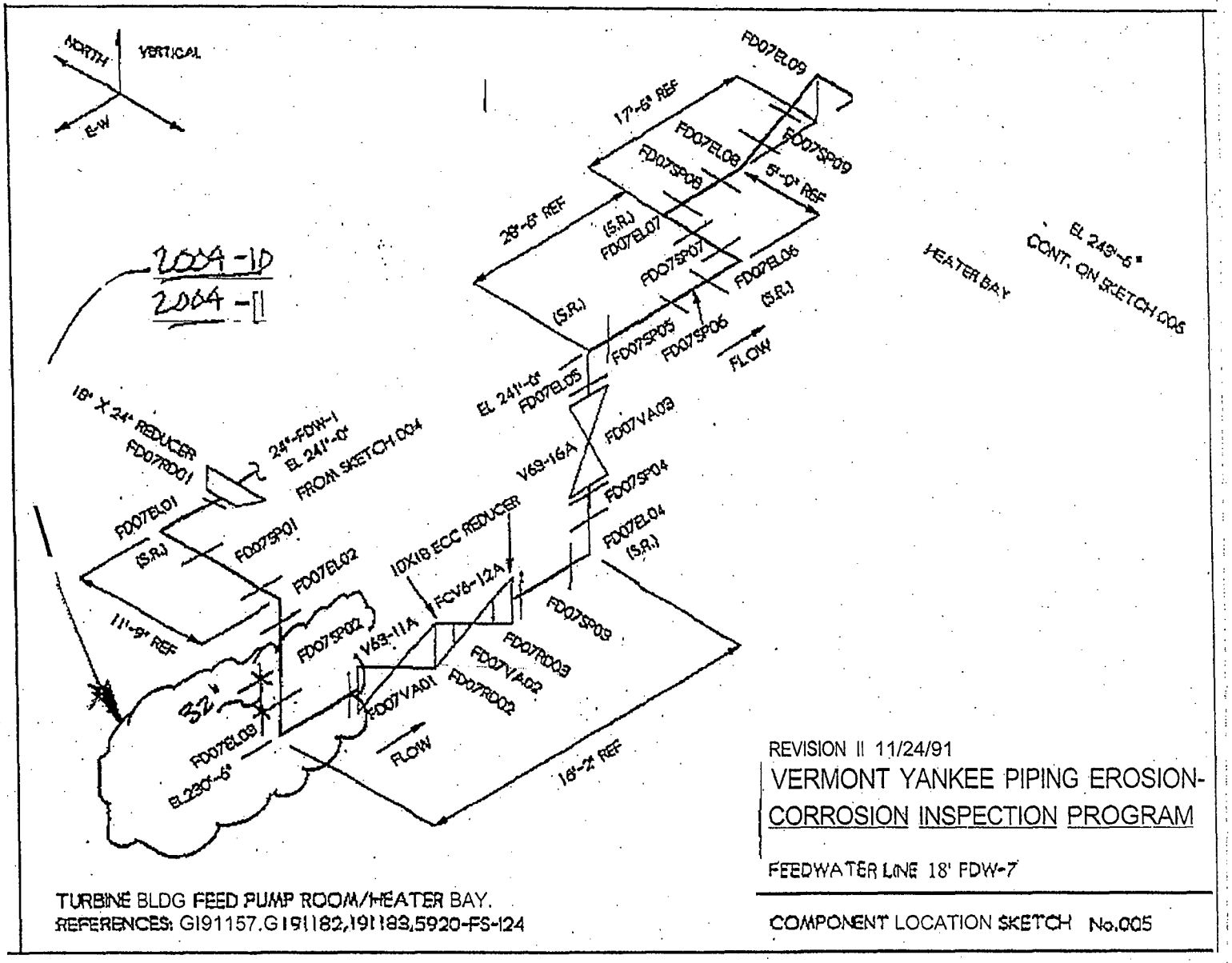
FEEDWATER LINE 16" FDW-3

TURBINE BUILDING-FEEDWATER PUMP ROOM

REFERENCES: G 191157, G 191182, G191183, 5920-FS-124

COMPONENT LOCATION SKETCH No.003

NEC020205



TURBINE BLDG FEED PUMP ROOM/HEATER BAY.
REFERENCES: GI91157.GI91182,191183,5920-FS-124

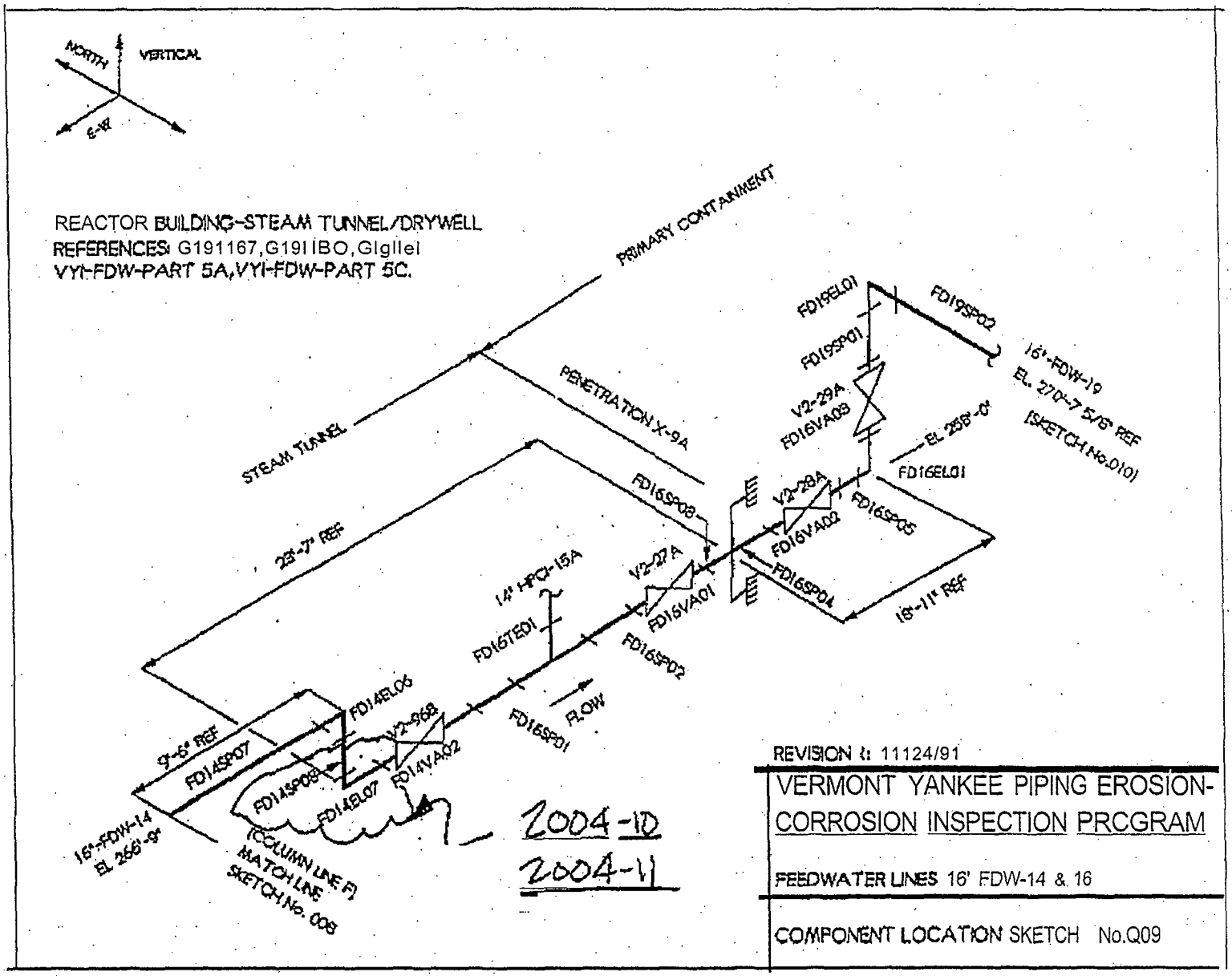
REVISION II 11/24/91

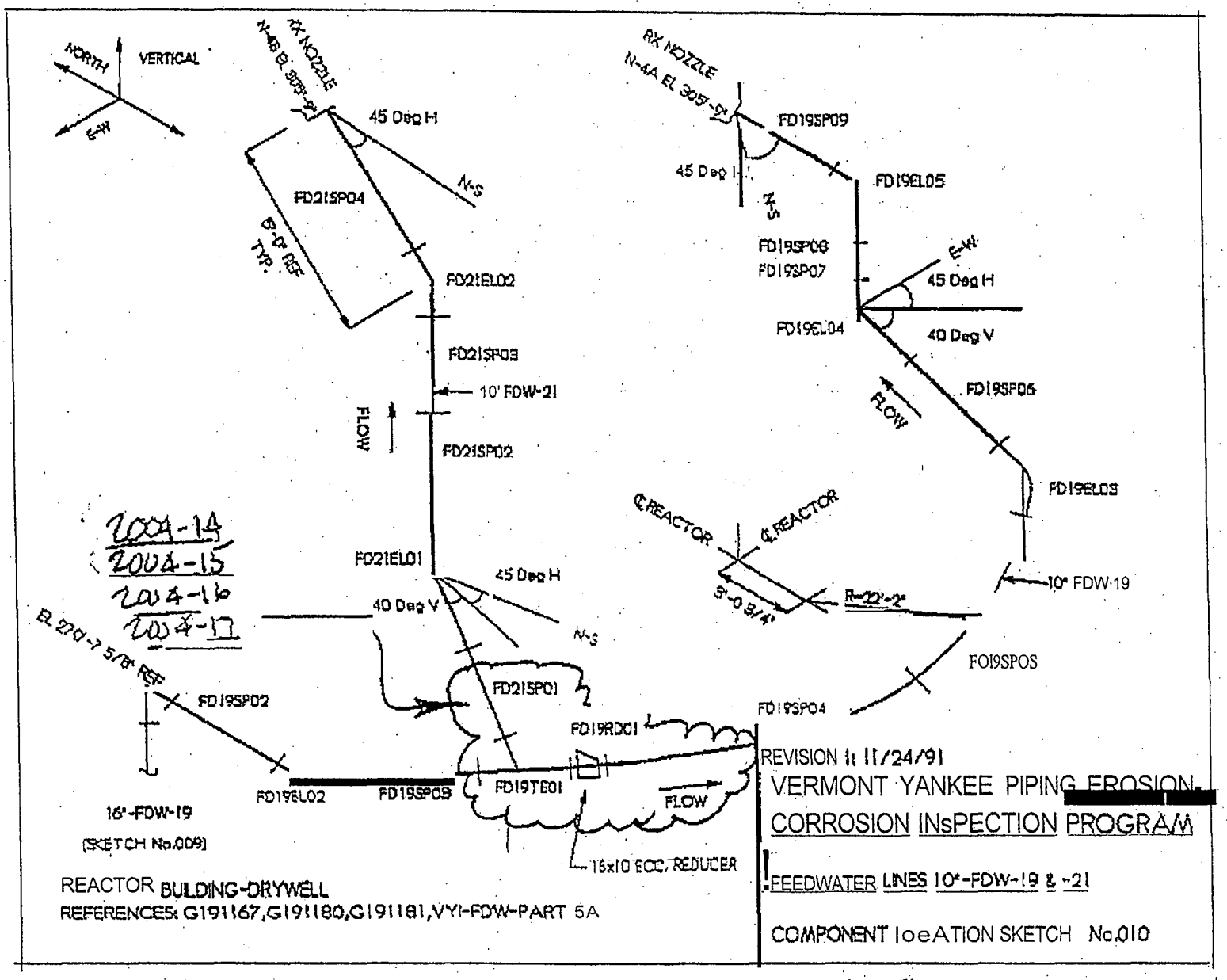
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

FEEDWATER LINE 18" FDW-7

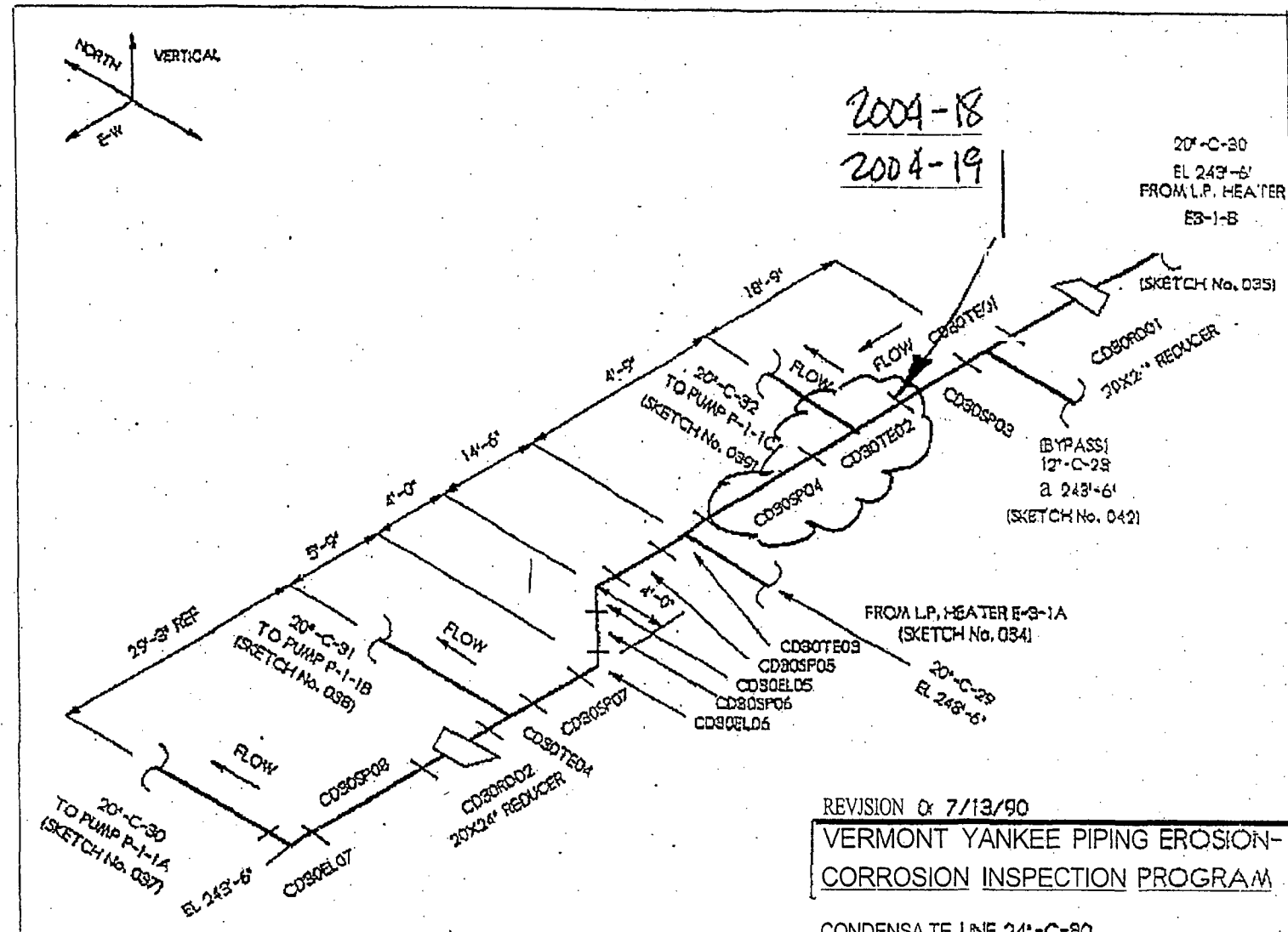
COMPONENT LOCATION SKETCH No.005

NEC020206


NORTH
VERTICAL
E-W
REACTOR BUILDING-STEAM TUNNEL/DRYWELL
REFERENCES: G191167, G191180, G191181
VYI-FDW-PART 5A, VYI-FDW-PART 5C.
PRIMARY CONTAINMENT
PENETRATION X-9A
STEAM TUNNEL
23'-7" REF
FD19EL01
FD19SP02
FD19SP01
16"-FDW-19
EL. 270'-7 5/8" REF
(SKETCH No.0101)
V2-29A
FD16VA03
EL. 256'-0"
FD16EL01
V2-28A
FD16VA02
FD16SP05
FD16SP08
V2-27A
FD16VA01
FD16SP04
18'-11" REF
14" HPCI-15A
FD16TE01
FD16SP02
FLOW
FD16SP01
FD14EL06
V2-96B
FD14VA02
FD14SP07
9'-6" REF
FD14SP08
FD14EL07
16"-FDW-14
EL 256'-9"
(COLUMN LINE F)
MATCH LINE
SKETCH No. 008
2004-10
2004-11
REVISION 1: 11124/91
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PRCGRAM
FEEDWATER LINES 16' FDW-14 & 16
COMPONENT LOCATION SKETCH No.Q09


NORTH
VERTICAL
EAST
RX NOZZLE
N-4B EL 305'-9"
45 Deg H
N-S
FD21SP04
6'-0" REF TYP.
FD21EL02
FD21SP03
10" FDW-21
FLOW
FD21SP02
FD21EL01
45 Deg H
40 Deg V
N-S
EL 270'-7 5/16" REF
FD19SP02
FD21SP01
FD19RD01
FD19EL02
FD19SP05
FD19TE01
FLOW
16" FDW-19
16x10 ECC. REDUCER
RX NOZZLE
N-4A EL 305'-9"
FD19SP09
45 Deg H
FD19EL05
N-S
FD19SP08
FD19SP07
E-W
45 Deg H
FD19EL04
40 Deg V
FD19SP06
FLOW
FD19EL03
10" FDW-19
℄ REACTOR
℄ REACTOR
3'-0 3/4"
R=22'-2"
FD19SP05
FD19SP04
2004-14
2004-15
2004-16
2004-17
(SKETCH No.009)
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-19 & -21
COMPONENT LOCATION SKETCH No.010

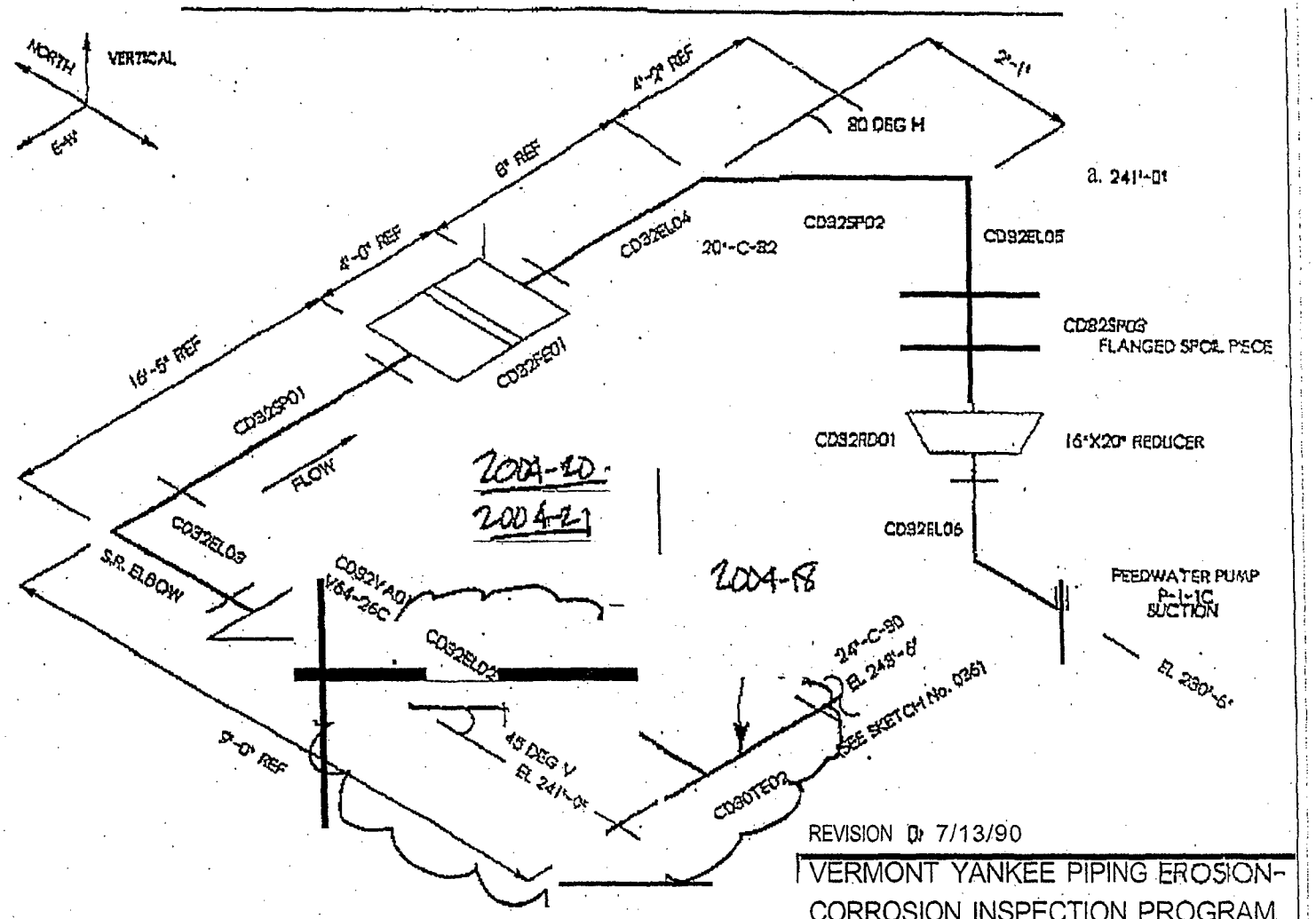
NEC020207



NEC020208

30

NEC020209



REVISION 0: 7/13/90

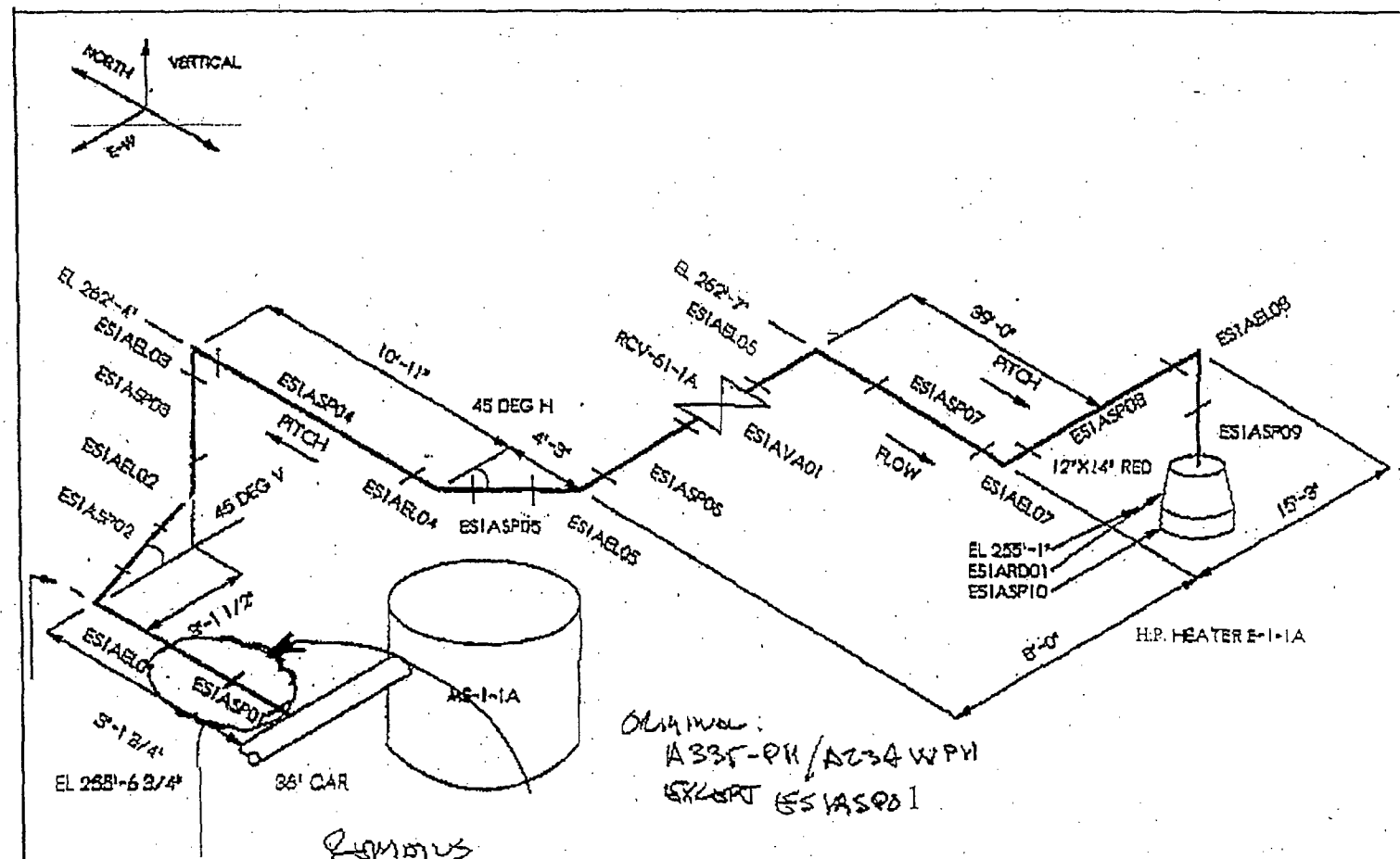
VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

CONDENSATE LINE 20"-C-32

COMPONENT LOCATION SKETCH No. 039

TURBINE BULDING-FEEDWATER PUMP ROOM

REFERENCES: GI91157,GI91188,GI91187,5928-FS-116



REVISION 1: 2/7/92

VERMONT YANKEE PIPING EROSION-CORROSION INSPECTION PROGRAM

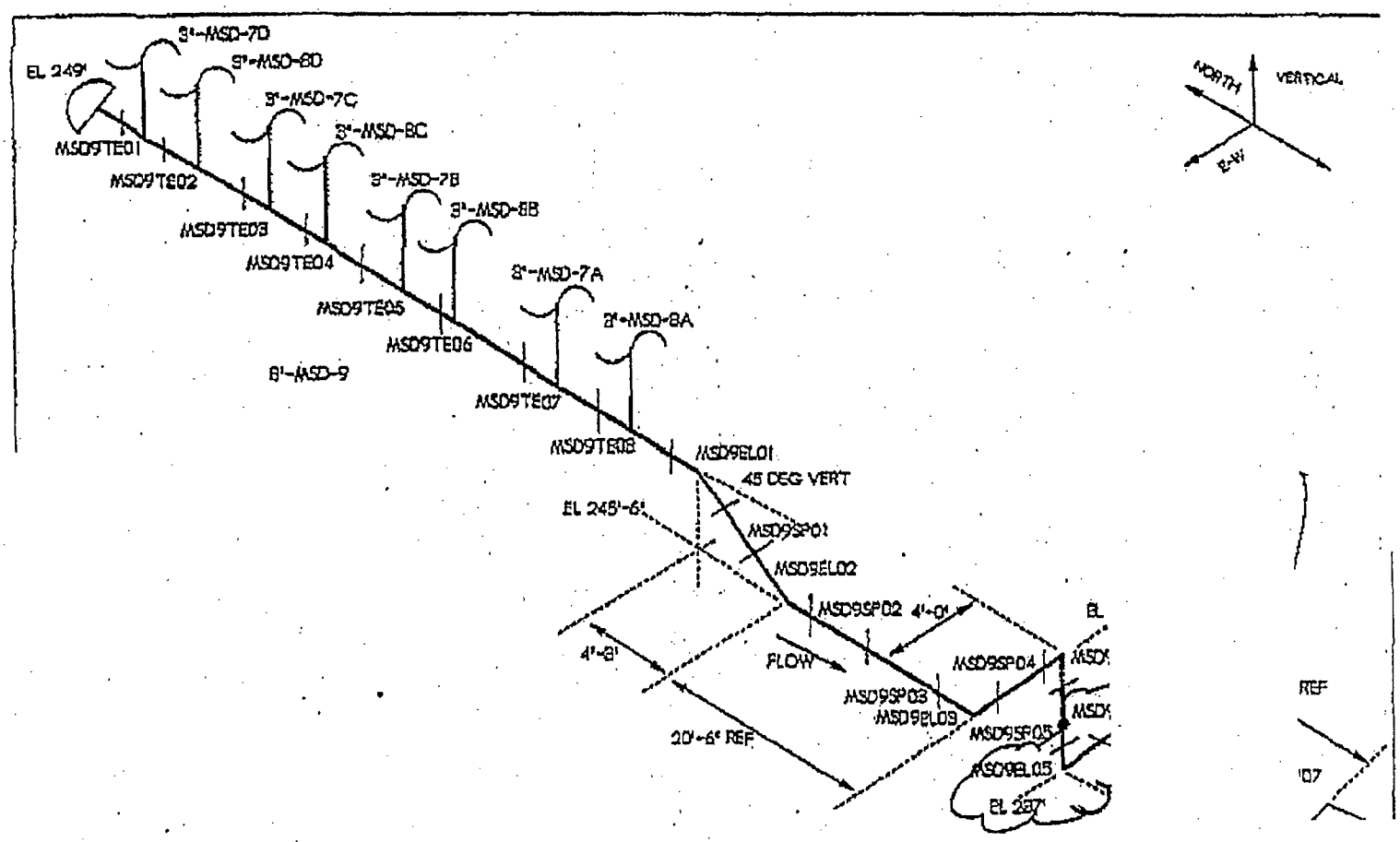
EXTRACTION STEAM LINE 12"-ES-1A

COMPONENT LOCATION SKETCH No. 063

TURBINE BUILDING-HEATER BAY

REFERENCES: C191156,C191184,C191185,5928-FS-1-8

NEC020210



TURBINE BUILDING-HEATER BAY
REFERENCES: G191156,G191182,G191183,5928-FS-1-16

NEC020211

REF DWG 5920-1819

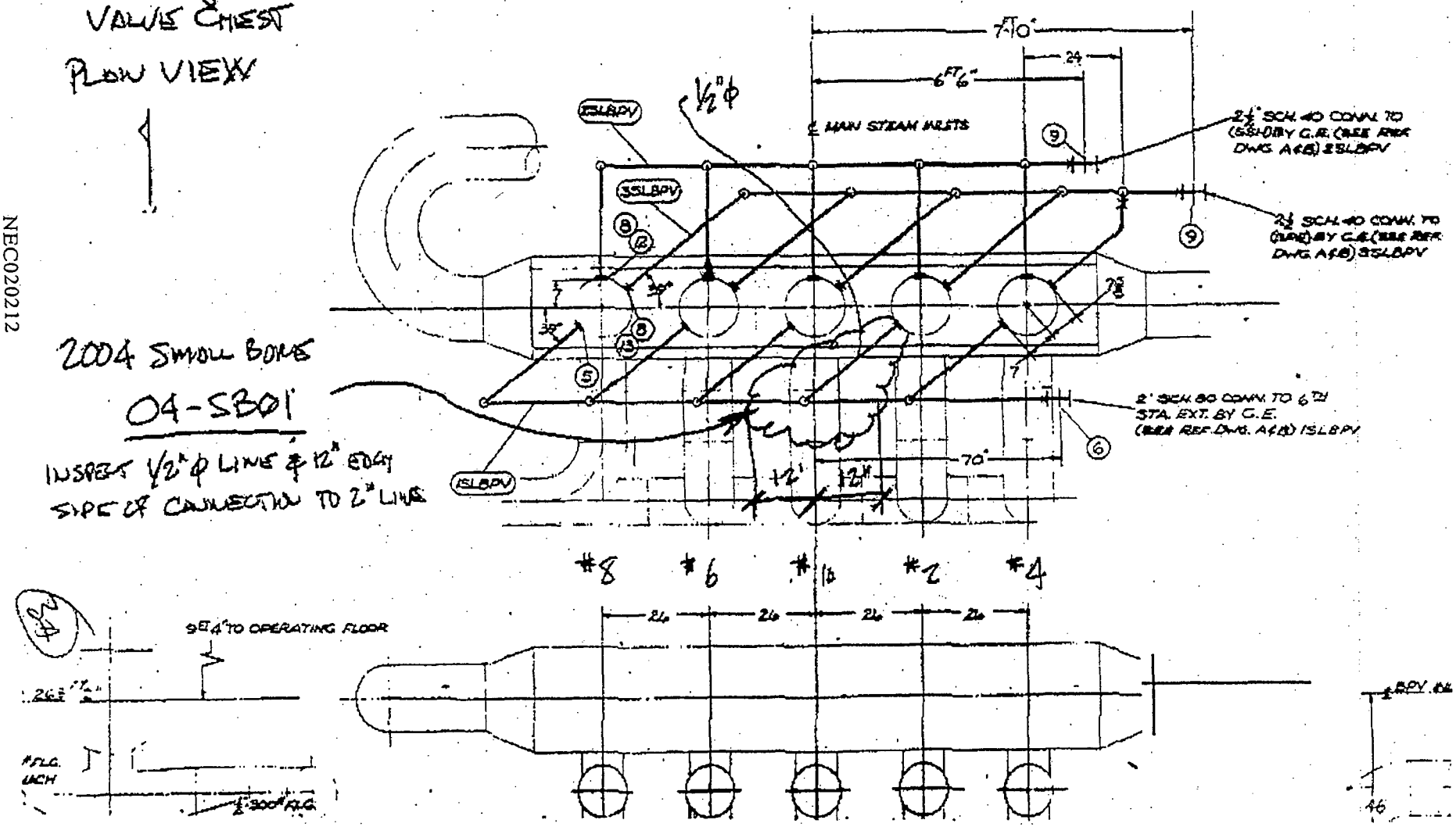
NORTH BYPASS
VALVE CHEST

PLAN VIEW

2004 SMALL BORE

04-5801

INSPECT ½" ϕ LINE @ 12" EDGE
SIDE OF CONNECTION TO 2" LINE



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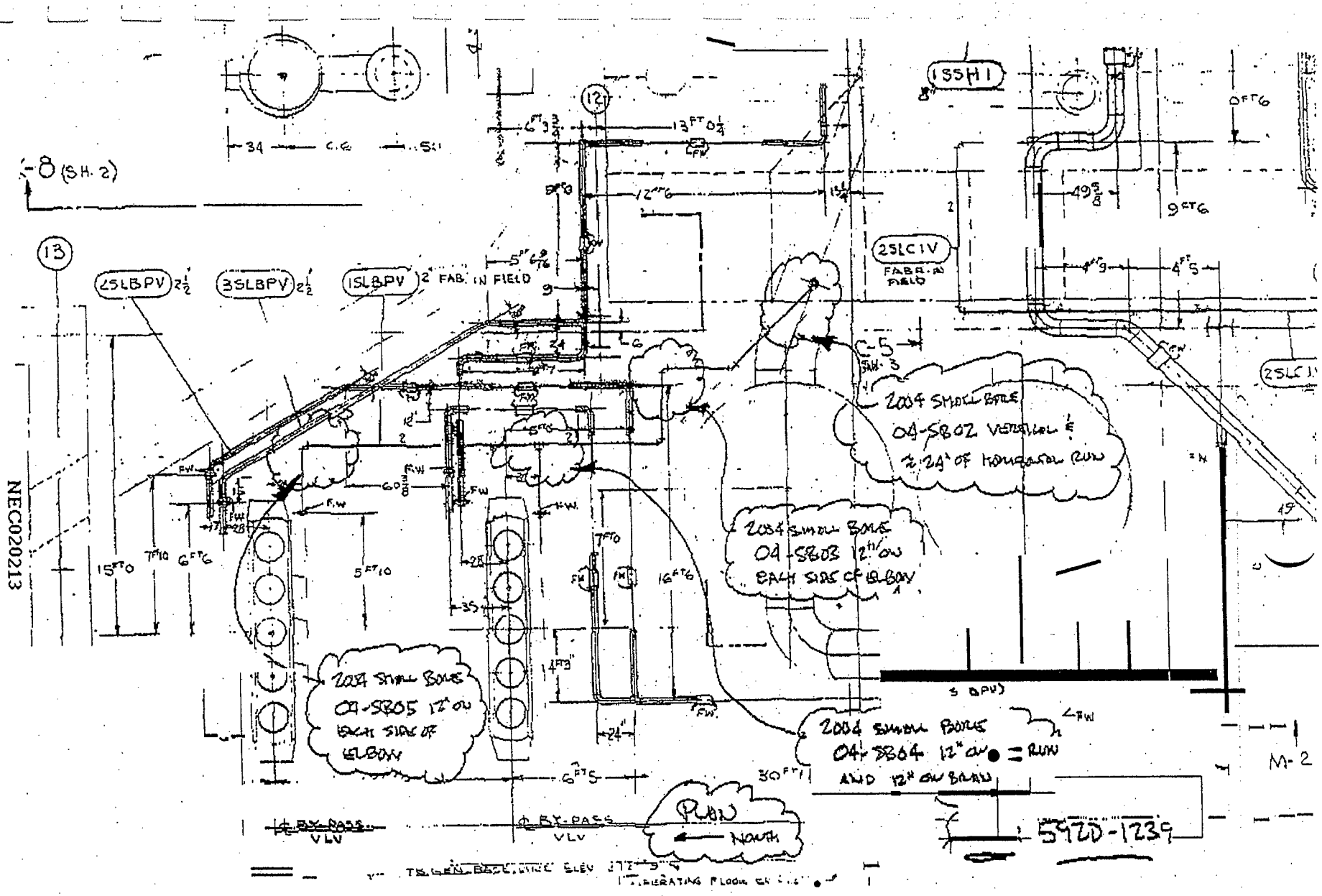
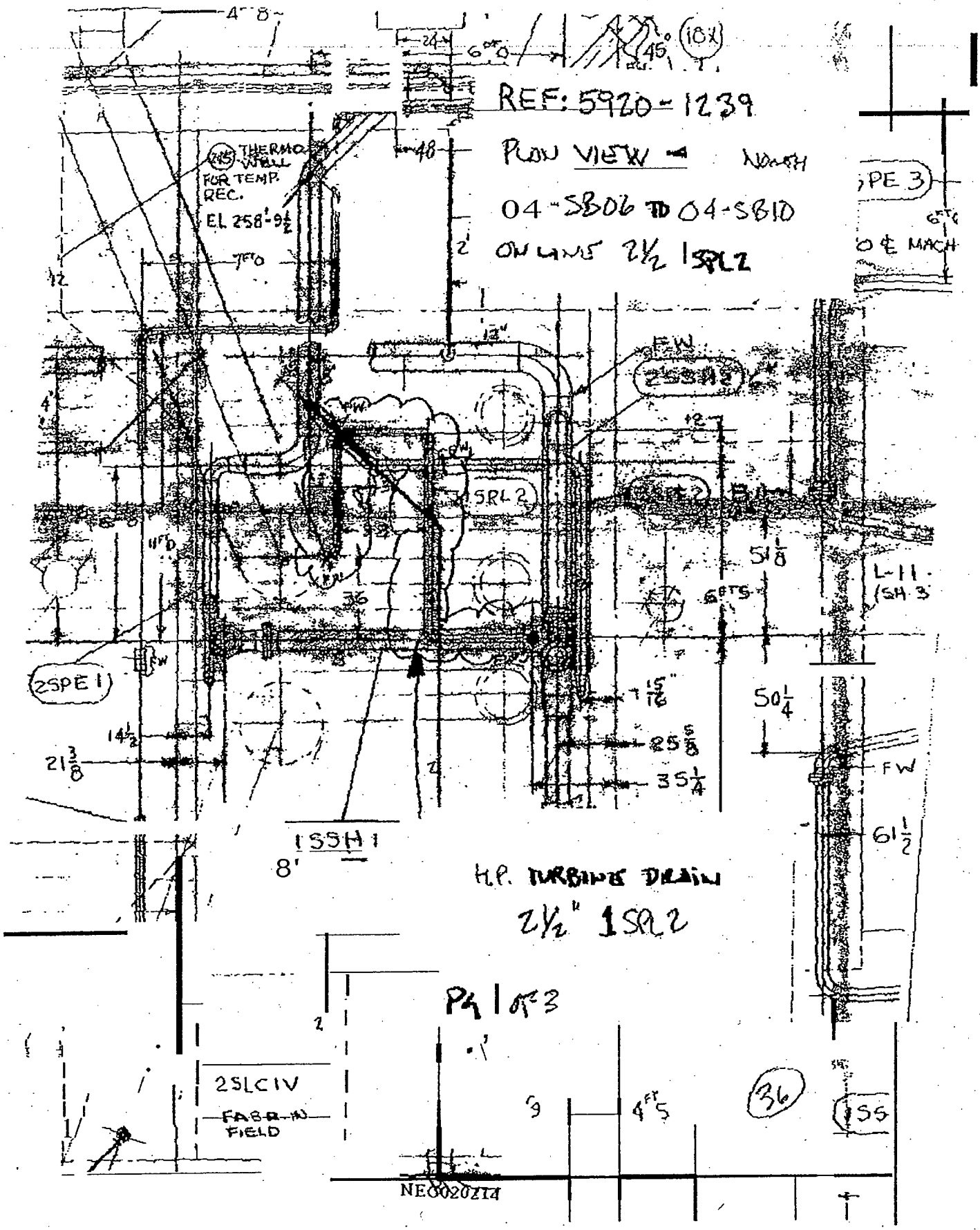
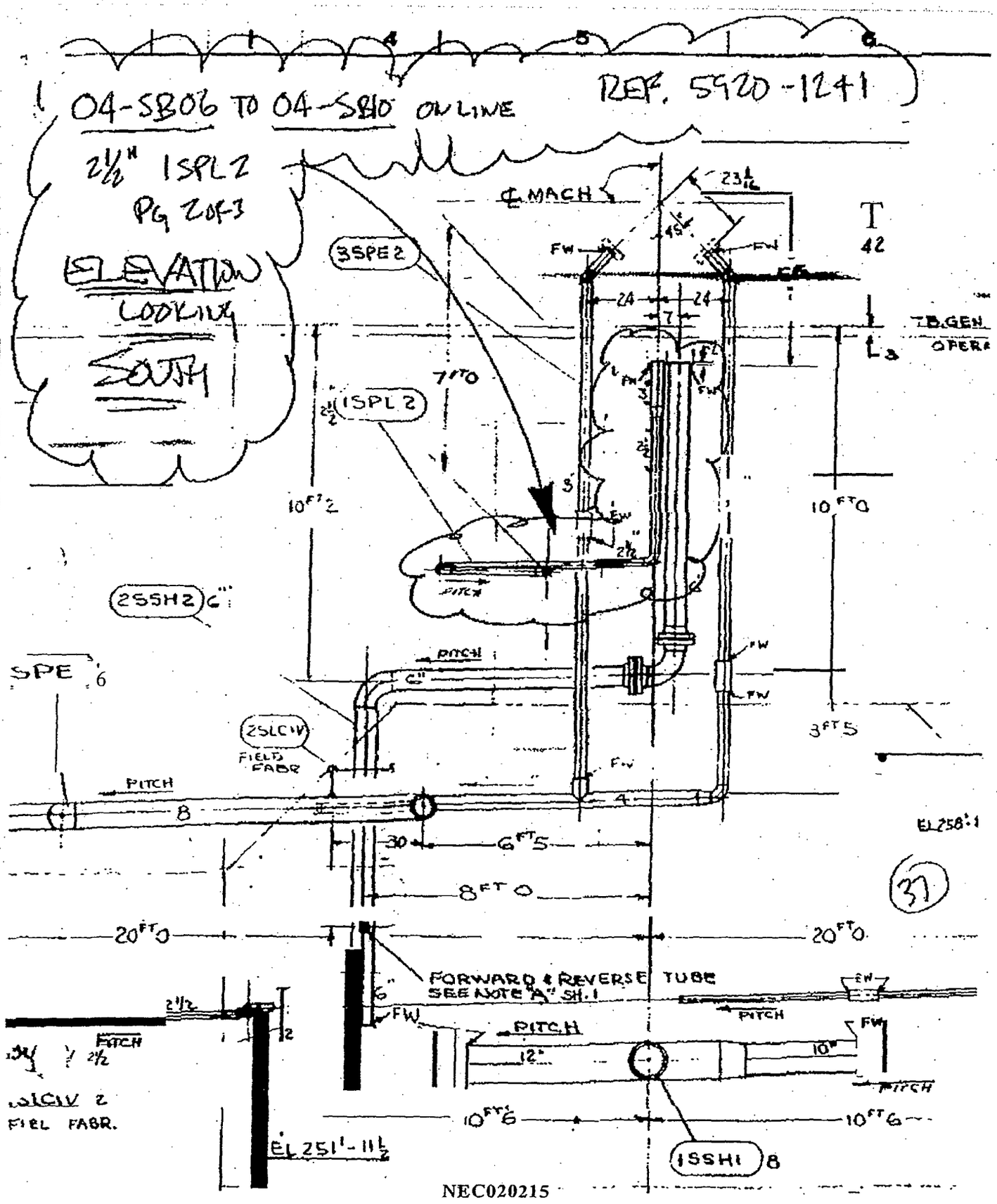

8 (SH. 2)
13
12
25LBPV 2½
3SLBPV 2½
1SLBPV 2" FAB. IN FIELD
1SSH1
25LC1V
FABR. IN FIELD
C-5
SH. 3
2004 SMALL BORE
04-5802 VERTICAL & ½ 24" OF HORIZONTAL RUN
2004 SMALL BORE
04-5803 12" ON EACH SIDE OF ELBOW
2004 SMALL BORE
04-5805 12" ON EACH SIDE OF ELBOW
2004 SMALL BORE
04-5804 12" ON ● = RUN AND 12" ON BACK
RUN
NORTH
Φ BY-PASS VLV
Φ BY-PASS VLV
5920-1239
M-2
NEC020213


REF: 5920-1239
PLAN VIEW
NORTH
04-SB06 TO 04-SB10
ON LINE 2½ 1SRL2
THERMO WELL FOR TEMP. REC.
EL 258'-9½
1SRL2
1SSH1
8'
H.P. TURBINE DRAIN
2½" 1SRL2
2SLC1V
FABRN FIELD
2SPE1
2SPE3
L-11 (SH 3)
36
1SS
NE0020214

Pg 1 of 3


04-5806 TO 04-5810 ON LINE
REF. 5920-1241
2½" ISPL2
PG 2 OF 3
ELEVATION
LOOKING
SOUTH
3SPE2
ISPL2
2SSH2
2SLCIV
FIELD FABR
SPE 6
PITCH
FW
T
42
T.B.GEN
OPER
10FT 2
10FT 0
3FT 5
6FT 5
8FT 0
20FT 0
20FT 0
FORWARD & REVERSE TUBE
SEE NOTE "A" SH. 1
EL 251'-11½
10FT 6
10FT 6
1SSH1
8
EL 258'-1
37

Page 1 of 3

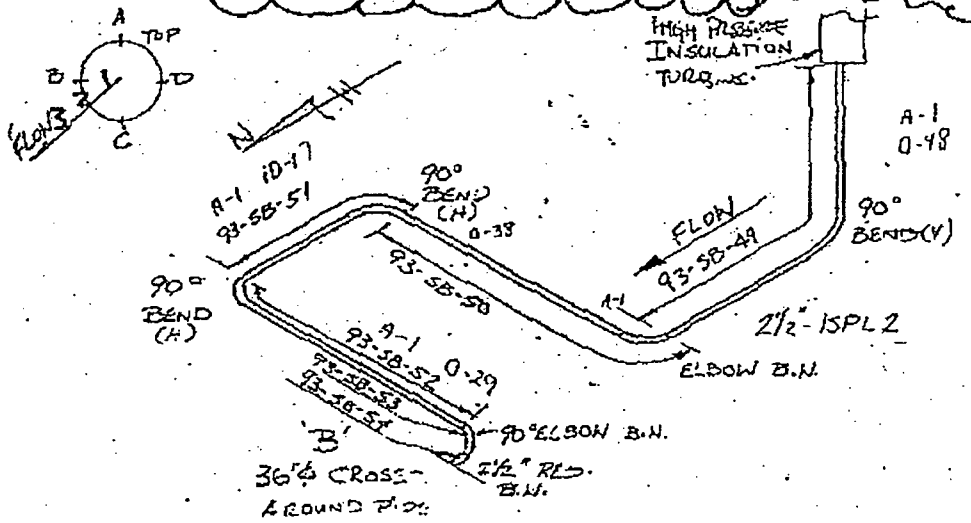
THICKNESS DATA SHEET — DATA SHEET NO. UT-112-SB-021

PLANT VERMONT YANKEE OUTAGE Fall 1993 DRAWING 9920-1239 REV. N/A
SYSTEM RHR Torus Drain COMPONENT/WELD NO. 93-SB-52 EN N/A
LOCATION TB 2F

MATERIAL: CS PRODUCT FORM: Pipe APPROX. THICK.: .25"
INSTRUMENT: MAKE: Panametrics 0-791-RM MODEL: 36 DL Plus SERIAL NO.: 93129207
CRT ☐ DIGITAL ☒ HORIZONTAL LINEARITY PERFORMED ☐

TRANSDUCER MAKE/MODEL: Panametrics MODE: ☒ PITCH/CATCH ☐ PULSE/ECHO FREQUENCY: 5.0 MHz SIZE: .312
CAL. BLOCK MATERIAL: CS /SN 93-6448 PRODUCT FORM: wrought THICKNESSES: .1"; .5"
CALIBRATION TIMES: INITIAL: 0900 CHECK: 1030 CHECK: N/A CHECK: N/A FINAL: 1200

SKETCH WITH RESULTS: 04-SB06 TO 04-SB10 P4 3 of 3



EXAMINER Jerry Maney DATE 9-19-93
EXAM AGENCY/COGNIZANT ENGINEER M. Hewett DATE 9/21/93
ISI COORDINATOR (Optional) DATE 9/27/93
QA (Optional) DATE
ANII (Optional) DATE

R65\7

PREVIOUS INSPECTION DATA

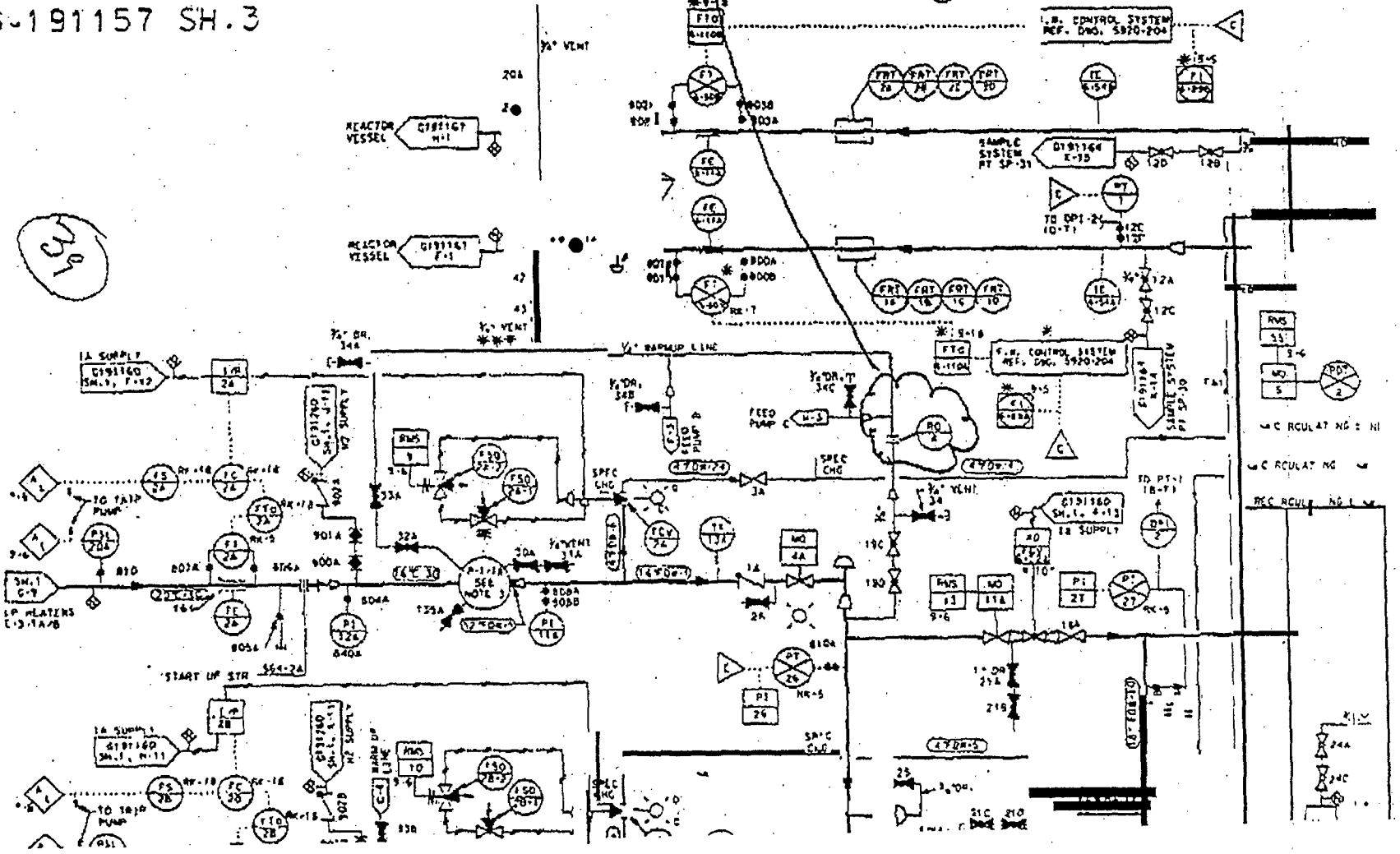
REVIEWED: 9/29/93

(38)

SMALL BORE 1 ═══ 2

04-SB11 P4

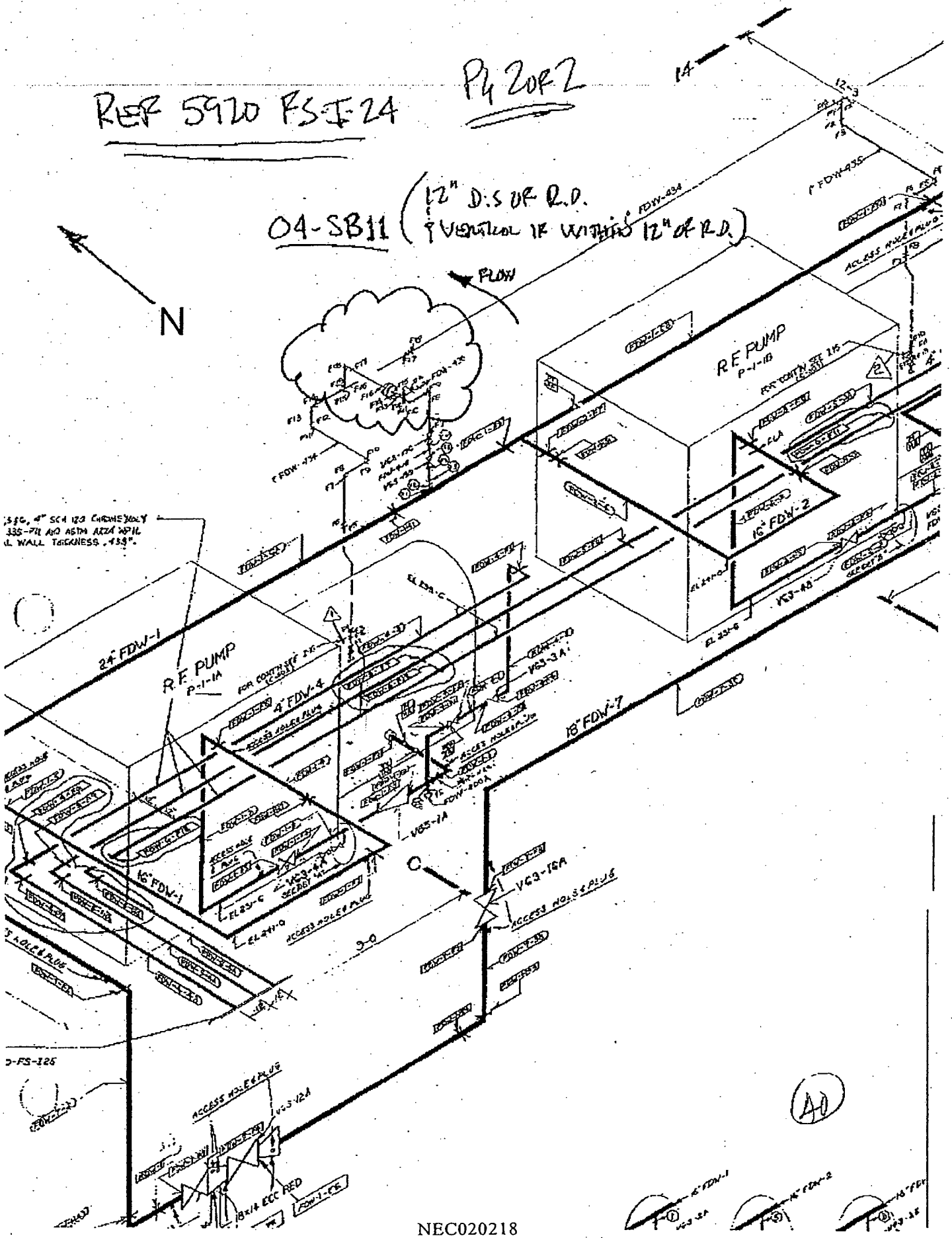
G-191157 SH.3



REF 5920 FS-F-24

Pg 2 of 2

04-SB11 (12" D.S OF R.D. & VERTICAL IF WITHIN 12" OF R.D.)



PP 7028 VY PIPING FLOW ACCELERATED CORROSION (FAC) INSPECTION PROGRAM

RFO 24 - SPRING 2004

PRE SCOPE CHALLENGE MEETING 3/28/03

PLANNED SCOPE

- External Ultrasonic Thickness (UT) Inspection of 26 large bore components at 11 locations. Includes some new locations, some repeat inspections for trending, and for a baseline prior to power uprate.
- External Ultrasonic Thickness (UT) Inspection of 11 sections of small bore piping. Includes 5 sections on the turbine bypass valve 1st sealleakoff line if the line is not replaced during the outage.
- Internal Visual Inspection of 6 of the 8 Turbine Cross Around Lines (36A to 360, 30C, & 300).
- WO 02-4906 FAG Inspections -restraint removed with VYM *2003/009*

BASIS *1* COMMENTS

- Component selection based on previous inspection results, the CHECWORKS models, industry and plant operating experience, the FAC HWC study, postulated power uprate effects, and engineering judgment.
- Similar numbers of components to be inspected as in previous outages. VY inspects less than the industry average due to a simpler design (no reheat) and Chrome-Moly Extraction Steam piping.
- For Large Bore Piping: The combination of previous inspections and the proposed 2004 inspections should provide a solid basis for a high degree of confidence against unexpected piping wall loss. We will have sufficient base line data to evaluate any negative trends from Power Uprate and HWC.
- Recent Small Bore leaks at VY and numerous ones at other plants require an increased and more intelligent focus on 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.

A1