NATIONAL POWER CORPORATION
MALAYA THERMAL PLANT
CORRECTIVE MAINTENANCE WORK ORDER

CMWO NO. 9 4 - 0 6 1 7

RESPONSIBLE MAINT. GROUP
ME | EE | IC | RE | TS | CM

LOCATION CODE:

ORIGINATOR

PLANT ID: MTPP - 2 | SYSTEM: | EQPT. SPIN: | INITIATING DOCUMENT:

EQUIPMENT DESCRIPTION: T-2 FP.

DESCRIPTION OF WORK/TROUBLE NOTED: HAV UNUSUAL SOUND, PLS. TAKE VIBRATION TEST.

ORIGINATOR: LINDO | DATE REPORTED: 9-4-94 | CONTACT MAN: MAINTENANCE

OPERATIONS

PLANT EQUIPMENT
☐ 1 - Emergency ☑ 2 - Urgent ☐ 3 - Expedite ☐ 4 - Routine ☐ 5 - Start-up
NON-PLANT EQUIPMENT
☐ 3 - Immediate ☐ 4 - General Services

EQUIPMENT ISOLATION STATUS:
☑ EIS - In-Service ☐ ESD - Out-of-Service

SPECIAL INSTRUCTION

CLEARANCE REQUIRED? ☐ YES ☐ NO
CW / HP REQUIRED? ☐ YES ☐ NO
OPERATIONAL TEST REQUIRED ☐ YES ☐ NO

VERIFIED/APPROVED BY: A.V. CAMPOS, OPTN/CHEM. SUPERINTENDENT | DATE ISSUED: 9-4-94

P&S SECTION

NO.	ACTIVITY	CRAFT	NO.	M-HR	PARTS/MATLS.	NSN-P/N
	☐ CONT. SHEET					

EST. COMPL. DATE: | TOTAL M-HR (Est. Std.)

PREPARED BY: P & S ENGINEER | DATE

APPROVED BY: P & S SECTION CHIEF | DATE

OPTN/CHEM

APPROVED FOR EXECUTION:
ECO. NO. | CW / HP NO. | OPTN/CHEM. SUPT. | DATE

WORK PERFORMANCE AND CLOSE-OUT REPORT

WORK SUMMARY:
TURBINE SIDE (POINT #2 VERTICAL) IS SLIGHTLY ROUGH
V R 26.5 MICRON, 6.3 mm/SEC FILTER IN
32 MICRON, 7 mm/SEC FILTER OUT
☐ CONT. SHEET

SUPPORT GROUP
☐ ME ☐ EE ☐ PEC ☐ CHEM

INSTRUCTION:

REQUEST COMPLETED BY:
SIGNATURE/DATE

WORK STARTED MO.	DAY	YR.	HR.	WORK END MO.	DAY	YR.	HR.
9	5	94	10AM	9	5	94	10:30 AM

TAG REMOVED: YES ☐ NO ☐ N/A ☐ By:

DEFERRED BY: NAME | Date Deferred | Date Lifted

DEFERRAL DUE TO:
☐ V - Awaiting Vendor/Contractor
☐ E - Engineering Disposition Req'd.
☐ M - Unavailability of Materials
☐ O - Awaiting Plant Outage
☐ U - System / Eqpt. not available

CRAFT	NO.	M-HR	PARTS/MATERIALS	QTY.	UNIT COST	MIV NO.	NSN-P/N	EQUIPT./SPECIAL TOOLS

COST SUMMARY: Labor | Parts & Matls. | Equipt. Use | Total

INFORMED BY: WIC FOREMAN/SUPVR. 9/5/94 DATE

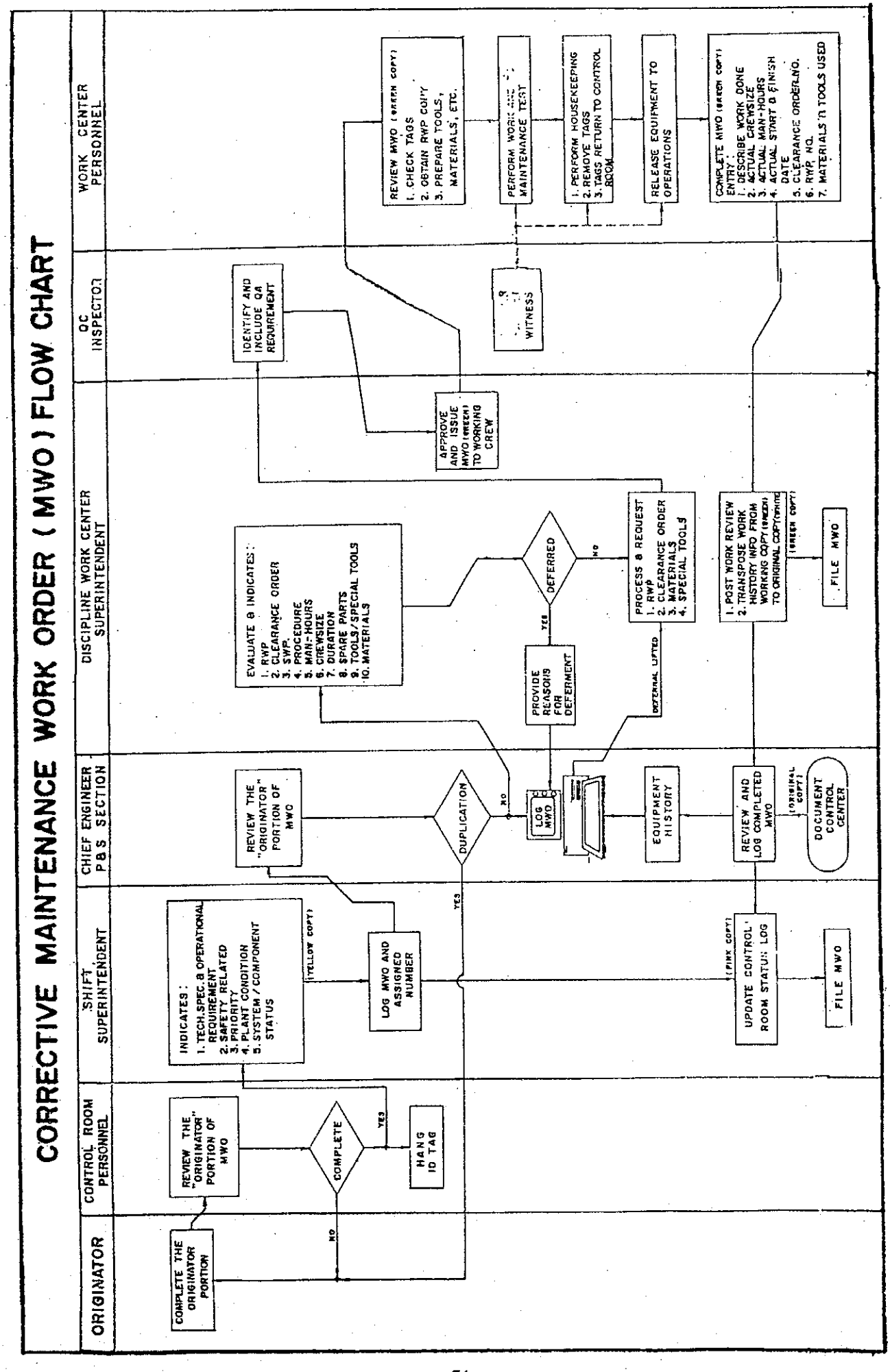
APPROVED BY: WIC SUPERINTENDENT 9/6/94 DATE

COMPLETE: WITNESSED BY 9/7/94 DATE

ACCEPTED BY: OPTN/CHEM/S SUPT. 9/6/94 DATE

REVIEWED/CLOSED BY: P&S SECTION CHIEF DATE

PRINT NAME AND SIGN. This form is quadruplicated, please WRITE HEAVILY.


CORRECTIVE MAINTENANCE WORK ORDER (MWO) FLOW CHART
ORIGINATOR
CONTROL ROOM PERSONNEL
SHIFT SUPERINTENDENT
CHIEF ENGINEER P&S SECTION
DISCIPLINE WORK CENTER SUPERINTENDENT
QC INSPECTOR
WORK CENTER PERSONNEL
COMPLETE THE ORIGINATOR PORTION
REVIEW THE "ORIGINATOR" PORTION OF MWO
COMPLETE
NO
YES
HANG ID TAG
INDICATES :
1. TECH.SPEC.& OPERATIONAL REQUIREMENT
2. SAFETY RELATED
3. PRIORITY
4. PLANT CONDITION
5. SYSTEM / COMPONENT STATUS
(YELLOW COPY)
LOG MWO AND ASSIGNED NUMBER
REVIEW THE "ORIGINATOR" PORTION OF MWO
DUPLICATION
NO
YES
LOG MWO
EVALUATE & INDICATES :
1. RWP
2. CLEARANCE ORDER
3. SWP.
4. PROCEDURE
5. MAN-HOURS
6. CREWSIZE
7. DURATION
8. SPARE PARTS
9. TOOLS/SPECIAL TOOLS
10. MATERIALS
DEFERRED
NO
YES
PROVIDE REASONS FOR DEFERMENT
DEFERRAL LIFTED
PROCESS & REQUEST
1. RWP
2. CLEARANCE ORDER
3. MATERIALS
4. SPECIAL TOOLS
EQUIPMENT HISTORY
IDENTIFY AND INCLUDE QA REQUIREMENT
APPROVE AND ISSUE MWO (GREEN) TO WORKING CREW
WITNESS
REVIEW MWO (GREEN COPY)
1. CHECK TAGS
2. OBTAIN RWP COPY
3. PREPARE TOOLS, MATERIALS, ETC.
PERFORM WORK AND MAINTENANCE TEST
1. PERFORM HOUSEKEEPING
2. REMOVE TAGS
3. TAGS RETURN TO CONTROL ROOM
RELEASE EQUIPMENT TO OPERATIONS
COMPLETE MWO (GREEN COPY) ENTRY :
1. DESCRIBE WORK DONE
2. ACTUAL CREWSIZE
3. ACTUAL MAN-HOURS
4. ACTUAL START & FINISH DATE
5. CLEARANCE ORDER NO.
6. RWP NO.
7. MATERIALS & TOOLS USED
1. POST WORK REVIEW
2. TRANSPOSE WORK HISTORY INFO FROM WORKING COPY (GREEN) TO ORIGINAL COPY (WHITE)
REVIEW AND LOG COMPLETED MWO
(ORIGINAL COPY)
(GREEN COPY)
FILE MWO
DOCUMENT CONTROL CENTER
UPDATE CONTROL ROOM STATUS LOG
(PINK COPY)
FILE MWO

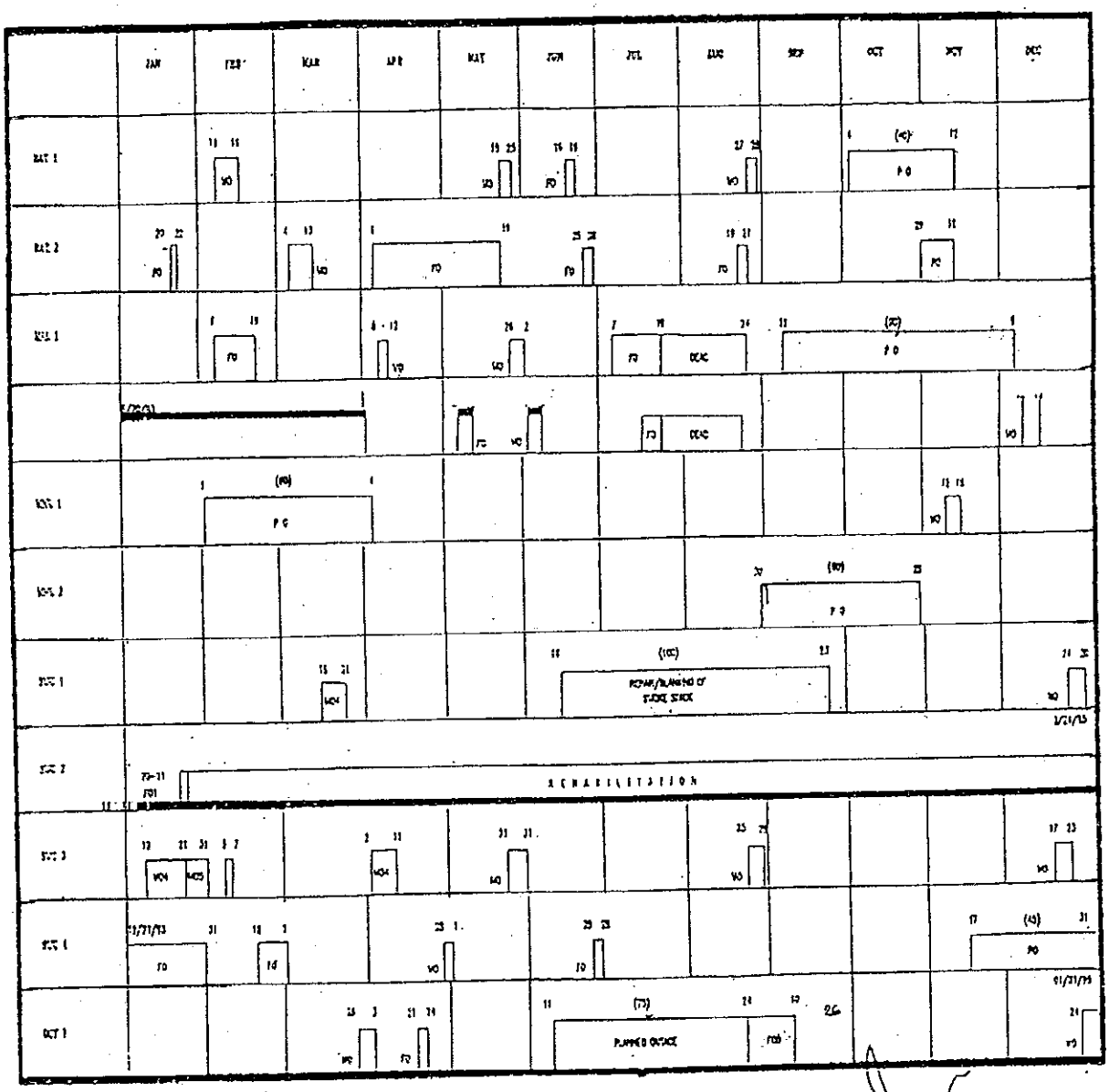
MAINTENANCE SCHEDULE

1994 – 08

RPD/OPPD/SO

DATE: AUGUST 23, 1994

THERMAL



Approved by :

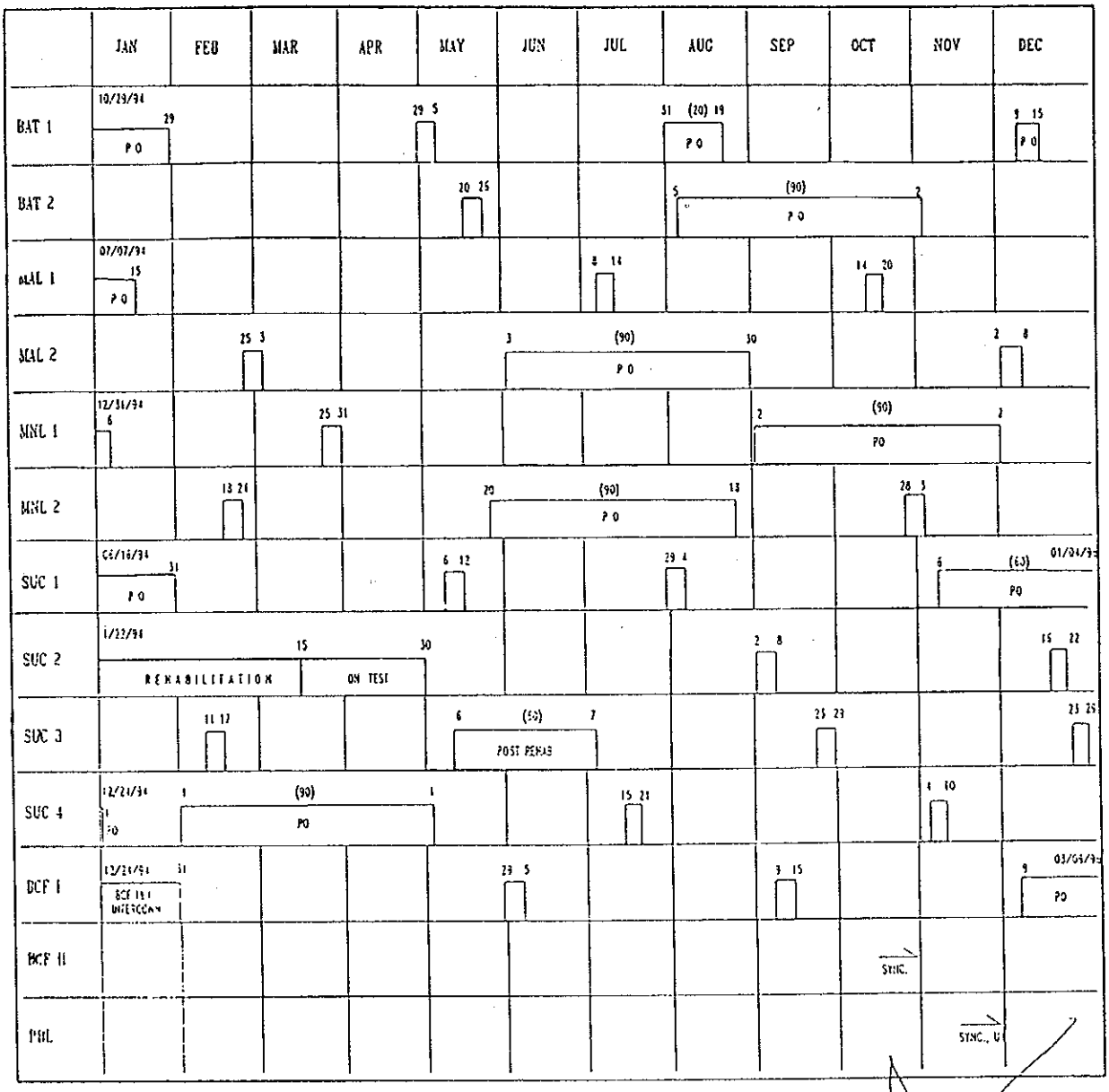
D. L. BULATAO
Vice President,
System Operations

MAINTENANCE SCHEDULE
1995 - CASE 01

PRPD/OPPD/SO

DATE : December 05, 1994

THERMAL



Approved by :

D. L. BULATAO
Vice President, System Operations

Long - Term Inspection Schedule for Unit NO. 1 (for Boiler)

Equipment		Year	Frequency Every ×× Year	Contents of Inspection '92	'93	'94	'95	'96	'97	'98	'99	'00	'01	Remarks
		Numbers of Periodic Inspection												
		Classification of Periodic Inspection		a	b	a	b	a	b	a	b	a	b	
Boiler Body	Drum	Inside Surface of Welding Portions of Steam Drum	1	P	P	P	P	P	P	P	P	P	P	PT or MT
		Outside Surface of Welding Portions of Steam Drum	8											ditto
		Nozzle Stub Welding Portions of steam Drum	8											ditto
		Steam Separator of Steam Drum	2	Q		Q		Q		Q		Q		at A Inspection, 1/4 detached
		Inside Surface of Welding Portions of Water Drum	1	P	P	P	P	P	P	P	P	P	P	PT or MT
		Outside Surface of Welding Portion of Water Drum	8											
		Nozzle Stub Welding Portion of Water Drum	8											
		Orifice Inner Diameter of Water Drum	2	R		R		R		R		R		at A Inspection, all is inspected
	Heat Exchanger Tube	Tube Thickness of Economizer	2	R		R		R		R		R		at A Inspection, 1/10 Sampling
		Generating Tube Thickness of Furnace	2	R		R		R		R		R		at A Inspection, all is inspected
		Sampling Tube Test of Generating Tube of Furnace	2	S		S		S		S		S		at A, B Inspections, four (4) are inspected
		Tube Thickness of Horizontal Superheater	2	R		R		R		R		R		at A Inspection, 1/10 Sampling
		Tube Thickness of Panel-Type Superheater	2	R		R		R		R		R		ditto
		Tube Thickness of Platen Superheater	2	R		R		R		R		R		
		Sampling Tube Test of Panel-Type Superheater	4	S				S				S		at A Inspection, 1/10 Sampling
		Tube Thickness of Pendant Superheater	2	R		R		R		R		R		
		Sampling Tube Test of Pendant Superheater	4			S				S				
		SUS Scale Test of Pendant Superheater	1	P	P	P	P	P	P	P	P	P	P	To be implemented if the case demands
		Tube Thickness of Horizontal Reheater	2	R		R		R		R		R		at A Inspection, 1/10 Sampling
		Tube Thickness of Pendant Reheater	2	R		R		R		R		R		ditto
	Header	Inlet of Economizer	Q											Open at Ministry Test(by Law)
		Outlet of Economizer		Q										ditto
		Upper Side of Furnace Front Wall			Q									ditto
		Upper Side of Furnace Back Wall				Q								ditto
		Upper Side of Furnace Side Wall(Right)					Q							ditto
		Upper Side of Furnace Side Wall(Left)						Q						ditto
		Upper Side of Back Wall of Rear Gas Duct							Q					ditto

Explanation of Symbols :

P : Non - Destructive Test (PT, MT, etc.)
Q : Visual Inspection
R : Measurement of Dimensions
S : Material Test

Notes :

Results shall be encircled by symbol of O (circle)

Long-Term Inspection Schedule for Unit NO. 1 (for Turbine)

Equipment		Year / Numbers of Periodic Inspection / Classification of Periodic Inspection	Frequency Every ×× Year	Contents of Inspection '92	'93	'94	'95	'96	'97	'98	'99	'00	'01	Remarks
				A	D	B	D	A	D	B	D	A	D	for Turbine
Steam Turbine Body	Casing	Outer Casings of High, Intermediate Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Inner Casings of High, Intermediate Pressure	4	F				F				F		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		First Low Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Second Low Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Cross Over Pipe	2	T		T		T		T		T		
		Atmosphere Relief Valve	2	T		T		T		T		T		
	Rotor	Rotors of High, Intermediate Pressure	4	F				F				F		Taking out Rotor
		ditto				T				T				Without taking out Rotor
		First Low Pressure Rotor	4	F				F				F		Taking out Rotor
		ditto				T				T				Without taking out Rotor
		Second Low Pressure Rotor	4	F				F				F		Taking out Rotor
		ditto				T				T				Without taking out Rotor
	Diaphragm • Nozzle	Nozzles of Governing stage	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Diaphragm•Nozzles of High, Intermediate Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Nozzles of First Low Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
		Nozzles of Second Low Pressure	4	T				T				T		Upper & Lower Halves
		ditto	4			T				T				Upper Half
	Main Bolts	Bolts for Outer Casings of High, Intermediate Pressure	2	P		P		P		P		P		
		Bolts for Inner Casings of High, Intermediate Pressure	2	P		P		P		P		P		
		Coupling Bolts	2	P		P		P		P		P		
		Bolts for Main Valves	2	P		P		P		P		P		

Explanation of Symbols :

P : Non-Destructive Test (PT, MT, etc.)
Q : Visual Inspection
T : Disassembly Inspection (Including P, Q)
F : Inspection after Taking out

Notes :

Results shall be encircled by symbol of O (circle)

Long – Term Inspection Schedule for Unit NO. 1 (for the Electrical)

Equipment		Year / Numbers of Periodic Inspection / Classification of Periodic Inspection	Frequency Every ×× Year	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	Remarks
				A	D	B	D	A	D	B	D	A	D	for Turbine
Generator and Auxiliary Equipment	Generator Body	Taking out Rotor and the Inspection	8					F						Detailed Inspection
		Opening Upper Half of End Bracket	2	A		A		A		A		A		
		Inspection after Opening Manhole	2		Q		Q		Q		Q		Q	
		Inspection of Seal Ring	2	T		T		T		T		T		
		Bearing	2	T		T		T		T		T		
		Collector Ring	1	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
		Lead Wire Terminal	1	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
		Shaft Current	1	D	D	D	D	D	D	D	D	D	D	
		Bushing Current Transformer	1	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
	Hydrogen Cooling Unit	Hydrogen Gas Cooler	1	B	B	B	B	B	B	B	B	B	B	4 sets
		Gas Dryer	1	T	T	T	T	T	T	T	T	T	T	
		Pressure, Temperature Regulator	1	C	C	C	C	C	C	C	C	C	C	
		Hydrogen Cylinder	5	B					B					Test designated by Law five(5)years' Cycle
		Carbon Dioxide Gas Cylinder	5	B					B					
	Stator Coil Cooling Equipment	Tower of Ion exchange Resin	1	T	T	T	T	T	T	T	T	T	T	Exchange Resin
		Cooling Water Pump for stator A	2	T		T		T		T		T		
		ditto B	2		T		T		T		T		T	
		Pressure, Temperature Regulator	1	C	C	C	C	C	C	C	C	C	C	
		Filter for Cooking Water	1	T	T	T	T	T	T	T	T	T	T	
		Cooling Water Cooler for Stator	1	B	B	B	B	B	B	B	B	B	B	
	Seal Oil Unit	Vacuum Pump A	2	T		T		T		T		T		Pump, Reducer
		Vacuum Pump B	2		T		T		T		T		T	ditto
		Seal Oil Pump	2	T		T		T		T		T		
		Emergency Seal Oil Pump	2		T		T		T		T		T	
		Seal Oil Processor	1	C	C	C	C	C	C	C	C	C	C	Pressure Regulating Valve, Reservoir, Filter

Explanation of Symbols :

Q : Visual Inspection
D : Measurement
B : Water Pressure (Leakage Test)
C : Confirmation of Function
T : Disassembly Inspection
A : Inspection after Opening
F : Inspection after Taking Out

Notes : Results shall be encircled by symbol of O (circle)

Long – Term Inspection Schedule for Unit NO. 1 (for Control)

Equipment				Number of Sets of Equipment	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	Remarks
			Year												
			Classification of Periodic Inspection for Boiler												
			Classification of Periodic Inspection for Turbine												
Instruments and Control Equipment of Boiler	Control Equipment	Automatic Control System for Boiler	Transmitter, Convertor												
			Module, Relay, etc.												
			Power Unit, Loader, Controller												
			Moter Driven Control Drive												Including Control Valve
			Pneumatic Control Drive												ditto
			Variable Pressure Operation Equipment												
		Burner Control System	Logic Relay Panel												
			Control Panel												
			Flame Scanner												
			Ignition Torch												
			Valve for Burner												
			Valve for Purge												
			Insert/Extract Device of Oil Gun												
		Control System for Fuel Auxiliary Air, Damper	Transmitter												
			Controller, Limiter of Upper, Lower Limit												
			Proportional Computing Relay E/P Converter												
			Pressure Switch												
			Electromagnetic Valve												
		Local Control System for Boiler	Controller												Pressure, Temperature, Water Level
			Control Valve												
			Transmitter for Line Blend Control												Flow Meter
			Module for Line Blend												
			Controller Transmitter for Line Blend												

Contents of Inspection : ①Inspection • Repair of Equipment
②Replacement of Defective Parts
③Unit Test
④Loop Test

Required Time for Start-up/Shutdown of Unit NO.1

1. Required Time for Start-up

Item \ Unit Start-UP Mode		Very Hot Start-up	Hot Start-up	Warm Start-up II	Warm Start-up I	Cold Start-up II	Cold Start-up I		
Metal Temp. of the First Stage		Over 450℃	350 ℃～450 ℃	240 ℃～350 ℃	150 ℃～240 ℃	100 ℃～150 ℃	under 100 ℃		
Start-UP Condition		Soon After Trip	DSS (8Hr)	WSS (30Hr)	WSS (60Hr)	Standby	Standby (Without changing Boiler Water)	Standby (With changing Boiter Water)	Long-Term shutdown
Preparation for Unit Start-up						4° -30′	4° -30′	9° -30′	47° -30′
Preparation for Boiler Light-off		15′	30′	30′	30′	30′	30′	30′	30′
Light-off ～ Parallel in	Boiler Light-off～Turbine start-up	5′	2° -00′	2° -30′	3° -00′	5° -00′	5° -00′	5° -00′	5° -00′
	Turbine Start-up～Parallel in	20′	25′	50′	(Notes 1) 60′	2° -00′	3° -00′	3° -00′	3° -00′
	(900rpm Heat Soak)					(1° -00′)	(2° -00′)	(2° -00′)	(2° -00′)
	(3,600rpm Heat Soak)			(25′)	(25′)	(25′)	(25′)	(25′)	(25′)
Parallel in～Full Load	Initial Load Heat Soak			30′	30′	30′	30′	30′	30′
	Initial Load～75MW	8′	19′	48′	48′	48′	48′	48′	48′
	Load Changing Rate	11.25MW/M	3.0MW/M	1.5MW/M	1.5MW/M	1.5MW/M	1.5MW/M	1.5MW/M	1.5MW/M
	Holding 75 MW (BFPT Automatic)	3′	10′	20′	20′	20′	20′	20′	20′
	75MW～170MW	8′	46′	52′	52′	52′	52′	52′	52′
	Load Changing Rate	11.25MW/M	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M
	Holding 170 MW (BFPT Automatic)	2′	10′	20′	20′	20′	20′	20′	20′
	170MW～375MW	19′	35′	1° -10′	1° -10′	1° -10′	1° -10′	1° -10′	1° -10′
	Load Changing Rate	11.25MW/M	6.0MW/M	3.0MW/M	3.0MW/M	3.0MW/M	3.0MW/M	3.0MW/M	3.0MW/M
Preparation for Unit Start-up						4° -30′	4° -30′	9° -30′	47° -30′
Preparation for Boiler Light-off		15′	30′	30′	30′	30′	30′	30′	30′
Light-off ～Parallel in		25′	2° -25′	3° -20′	4° -00′	7° -00′	8° -00′	8° -00′	8° -00′
Parallel in ～Full Load		40′	2° -00′	4° -00′	4° -00′	4° -00′	4° -00′	4° -00′	4° -00′
SUS Purge			2° -00′	2° -00′	2° -00′	2° -00′	2° -00′	2° -00′	2° -00′
Silica Purge			2° -00′	3° -00′	3° -00′	6° -00′	6° -00′	10° -00′	10° -00′
Total Required Time		80′	8° -55′	12° -50′	13° -30′	24° -00′	25° -00′	34° -00′	72° -00′

2. Required Time for Shutdown

Item \ Unit Shutdown Mode	Daily Shutdown	Weekend Shutdown		Long-Term Shutdown	
Boiler Shutdowon Condition	Banking	Banking	Forced Cooling	Banking	Forced Cooling
Shutdown Condition	DSS (8Hr)	WSS (30Hr,60Hr)	WSS (30Hr,60Hr)		
375MW～220MW/220MW～170MW	25′/15′	25′/15′	25′/15′	25′/15′	25′/15′
Load Changing Rate	6.0MW/M/3.0MW/M	6.0MV/M/3.0MV/M	6.0MW/M/3.0MW/M	6.0MW/M/3.0MW/M	6.0MW/M/3.0MW/M
BFPT Stop of the First set	10′	10′	10′	10′	10′
170MW ～75MW	50′	50′	50′	50′	50′
Load Changing Rate	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M	2.0MW/M
BFPT Stop of the Second Set (T→M Change-over)	10′	10′	10′	10′	10′
75MW～Parallel off	50′	50′	50′	50′	50′
Load Changing Rate	1.5MW/M	1.5MW/M	1.5MW/M	1.5MW/M	1.5MW/M
Banking	20′	20′		20′	
Parallel off～Completion of Cooling			12° -00′		12° -00′
Total Required Time	3° -00′	3° -00′	14° -40′	3° -00′	14° -40′

※The inside of ( ) means included time

(Notes 1)
In case that the metal temperature of the first stage in under 200℃ as to Warm Start-up I ,the time comes to be ten minutes longer due to turbine speed up rate and heat soak time of low speed.

Date : . . . . Unit No.1 Start-up Curve (Schedule)

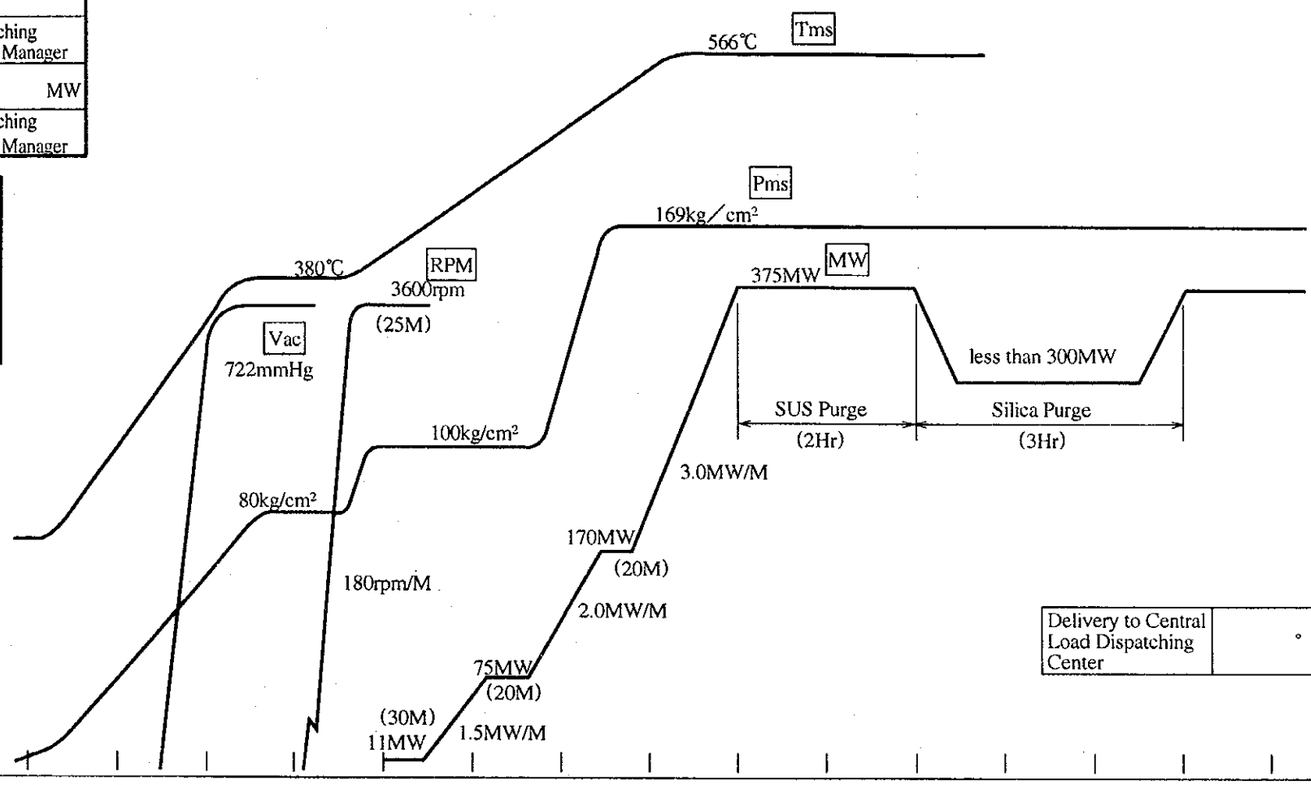
Sub Sec	Deputy Manager of Operation Sec	Manager of Operation Sec.	Deputy Plant Manager	Plant Manager

Prepared Date: . . .

℃	mmHg	rpm	kg/cm²	MW
600	1,200	6,000		600
500	1,000	5,000	200	500
400	800	4,000		400
300	600	3,000		300
			100	
200	400	2,000		200
100	200	1,000		100

Reason for Start-up		
Command of Start-up	Date : . . Time : ° ′	Central Load Dispatching Center, Deputy Sec. Manager
Scheduled Parallel in	Date : . . Time : ° ′	° ′ MW
Command of Parallel in	Date : . . Time : ° ′	Central Load Dispatching Center, Deputy Sec. Manager

Unit Start-up Mode	WSS (60Hr) Warm Start-up I
Boiler Shutdown Condition	Forced Cooling
TFSI	150℃～240℃
No.2 Unit Condition	Operation, Shutdown



Delivery to Central Load Dispatching Center	° ′

		-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11
Time																						
Major Schedule						Preparation for Boiler Light-off	Boiler Light-off		Vacuum up		Turbine Start-up	Parallel in	Switching to House Service	Reaching 75MW	Reaching 170MW	Reaching 375MW				Delivery to Central Load Dispatching Center		
Time	Schedule						(-)	(-)		(-)		(-)		(-)				(-)				
	Actual						(-)	(-)		(-)		(-)	(-)	(-)	(-)	(-)						

Commentaries

- ↑ Start-up Draft System
- ↑ Start-up Two Sets of BCP
- ↑ MFT Reset
- ↑ Light-off First Stage Light Oil Burner
- ↑ Start-up Third Set of BCP
- ↑ Supplying Auxiliary Steam
- ↑ Starting Ejector for start
- ↑ 20-110 ON
- ↑ GMF Start-up
- ↑ Changeover Light Oil/Fuel Oil
- ↑ TTV → GV Transfer
- ↑ GRF Start
- ↑ ACC Automatic
- ↑ First Set of BFPT Automatic (-)
- ↑ Second Set of BFPT Automatic (-)
- ↑ SUS Purge Start
- ↑ Silica Purge Start

Date : . . . . Unit No.1 Shutdown Curve (Schedule)

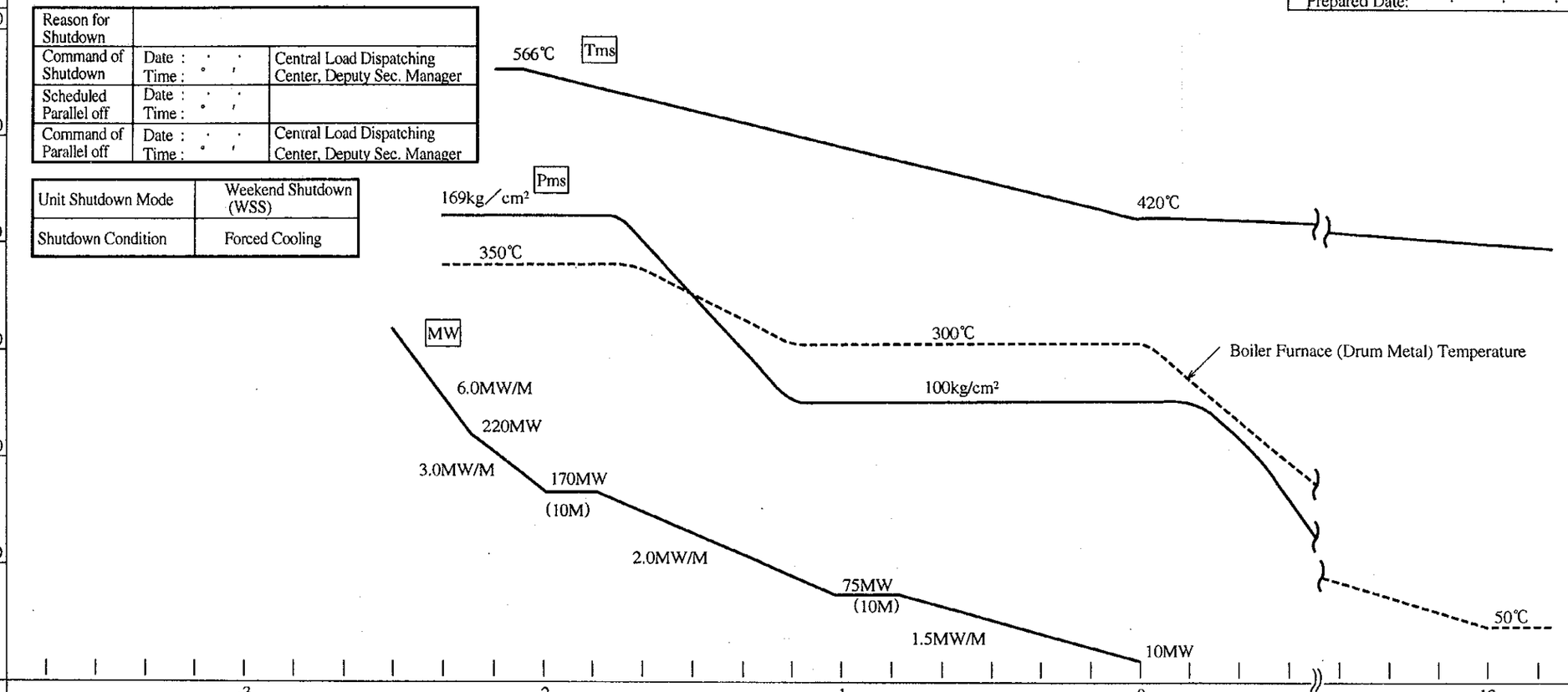
Sub Sec	Deputy Manager of Operation Sec	Manager of Operation Sec.	Deputy Plant Manager	Plant Manager

Prepared Date: . . .

℃	mmHg	rpm	kg/cm²	MW
600	1,200	6,000		600
500	1,000	5,000	200	500
400	800	4,000		400
300	600	3,000		300
			100	
200	400	2,000		200
100	200	1,000		100

Reason for Shutdown		
Command of Shutdown	Date : . . Time : ° ′	Central Load Dispatching Center, Deputy Sec. Manager
Scheduled Parallel off	Date : . . Time : ° ′	
Command of Parallel off	Date : . . Time : ° ′	Central Load Dispatching Center, Deputy Sec. Manager

Unit Shutdown Mode	Weekend Shutdown (WSS)
Shutdown Condition	Forced Cooling



Time		-3 -2 -1 0 12
Major Schedule		Reaching 170MW; Reaching 75MW; Switching to House Service; Parallel off; Boiler Extinguishing; Shutdown of Draft System
Time	Schedule	(-) (-) (-) (-)
	Actual	(-) (-) (-) (-) (-) (-)
Commentaries		*Forced Cooling (Without Boiler Water Draining) · Required Time : about 12 Hours · Air Flow Rate : 60～70% · Boiler Furnace Temp (Temp standard for Drum Metal) Cooling Completion at 50℃

↑ First set of BFPT Stop
↑ Sliding Pressure Operation "ON"
↑ Completion of Sliding Pressure Operation
↑ BFPM Start-up
↑ ACC Change over
↑ SBP Stop
↑ HP Bleeding Stop
↑ Opening Recirculating Valve of Eco
↑ GRF Stop
↑ Second set of BFPT Stop
↑ LP Bleeding Stop
↑ Switching to House Service
↑ 20-110 OFF
↑ Turbine Trip
↑ Boiler Extinguishing
↑ GMF Stop
↑ Vacuum Break of Condenser
↑ Turning "ON" (-)
↑ Shutdown of Draft System
↑ BFPM Stop
↑ BCP Stop

Date:

Monthly Routine List for No.2 Unit (At the time of Operation)

Week	Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	Day							
	Shift Duties	Ⓒ ▲Ground Relay Test for Excitation Circuit · Ignition Test of Pilot Torch · Backwash of Cooler for Cooling Water · Auxiliary Equipment for start/stop of BFPT	Ⓒ · Oil Cooler of Main Turbine (→) (Jan.Apr.Jul.Oct.) Ⓒ · BFPT Oil Cooler 2A (→) 2B (→) · TAG Check (to rewrite, if it is vague)	Ⓒ ▲Vacuum Pump of Condenser (→) · Measurement of Air Volume of Condenser Vacuum Pump 2A kg/H 2B kg/H	Ⓒ ■SC Feed Water Pump (→) Ⓒ · Condensate Booster Pump (→) Ⓒ · Condensate Pump (→)	· Request for Opening. Closing Test of Main Valves		Ⓢ ▲Cooling Fan for DC-TV Scanner · A,B-EMF Reactivation · Panel cleaning · ANN Test
	Day time Duty	Ⓞ ●Main Valves D M Ⓦ ●Extraction Check Valve of Turbine D M	· Filling in Data List	Ⓢ · Diesel Generator (at site) D E M	Ⓦ · Fire Extinguishing Appliance for Boiler, etc. (Boiler High·Low Pressure Pump Yard (May,Aug.,Nov.,Feb.)	· Overall Inspection, Oiling		
2	Day							
	Shift Duties	Ⓒ ▲Chemical Dosing Pump N_2H_4 (→) NH_3 (→) Ⓒ · Ash Disposal P (→)	Ⓒ · Reactivation of Hydrogen Gas Drier · Ignition Test of Pilot Torch Ⓒ · Vacuum Pump of Seal Oil (→) D Ⓢ · Emergency Pump of Seal Oil D	Ⓢ · BFPT Oil Pump D · ANN Test of oil Level of BFPT Oil Tank Ⓢ · Sea water Booster Pump Idling 2A Sec Time 2B Sec	Ⓢ ▲CWP Bearing Feed Water Pump Ⓢ ▲Light Oil Pump for Starting up Ⓒ ■Light Oil Pump for Ignition (→)	Ⓢ ■Auxiliary Oil Pump for FDF Ⓢ ■Control Oil Pump for FDF	Ⓒ · Supplement of Light Bulbs in the storage Box used for site (Apr.,Aug.,Dec.) ■Electrolysation Equipment of Sea Water Injection Pump (→) Sea Water Pump (→)	Ⓦ · Electromagnetic Valve of station service water of CWP · Panel Cleaning · ANN Test · Education for Hazardous Material Protection (once/year,on June)
	Day time Duty	Ⓞ Ⓦ ●BFPT Valve D M ●Thrust Protection Device for BFPT D M	· Data Input,making Lists (for one year)		Ⓦ ● Oil Trip Mg D M Ⓦ ● Thrust Protection Device Mg D M Ⓢ · Main Turbine Oil Pump D · ANN Test of Oil Level of Main Oil Tank	· Overall Inspection, Oiling		
3	Day							
	Shift Duties	Ⓒ · Control Air Compressor (→)	Ⓒ · Ignition Test of Pilot Torch · BCP (→)	Ⓒ · H-FOP (→)	Ⓒ ■Gland Exhauster (→)	Ⓢ · BFPM · Request for Opening. Closing Test of Main Valves	Ⓒ ▲Cooling Fan for Main Transformer (→) Ⓒ ▲Cooling Fan for No.2 Tie Transformer (→) #2 Spare	· Panel Cleaning · A,B-EMF Reactivation · ANN Test ▲Training for Wearing Protection Utensils for High Pressure Gas (To execute each Shift)
	Day time Duty	Ⓞ ●Main Valves D M Ⓦ ●Extraction Check Valve of Turbine D M	Ⓦ · Filling in Data List · Fire Extinguishing Appliance for Transformer (Main Trans.,Others) (May,Aug.,Nov.,Feb.)	Ⓢ · Diesel Generator (Central) D E M	· Equalizing Charge of Battery (Apr.,Oct.)	· Ammonia Nozzle Purge · Overall Inspection, Oiling		
4	Day							
	Shift Duties		Ⓒ · Ignition Test of Pilot Torch ▲Cooling Water Pump for Generator Stator (→)	Ⓒ ▲Bearing Cooling Water Pump (→) Ⓒ · Starting Procedure for Auxiliary Equipment of Condensate Demineralizer	Ⓞ · Water Spray Test of Nitrogection Equipment (Presence of Safety Guard Personnel) · Emergency Shut Off Valve of Ammonia	· A,B-AH Center Blow	Ⓒ ■IPB Cooling Fan (→) Ⓒ ■Main Rectifier Fan (→)	· Panel Cleaning · ANN Test · Training for Preservation and Protection of High Pressure Gas (twice/year,May,Nov.)
	Day time Duty	Ⓞ ●BFPT Valve D M	· Making Routine List for Next Month · Check of Routine execution condition · Data Input,Making Lists (for four years)			· Overall Inspection, Oiling · Checking Chart,Daily Log and Number of Sheets		

▲ : Even-Numbered Months
■ : Odd-Numbered Months
● : To be executed avoiding Heavy Loaded Period, Heavy Loaded Time
Ⓢ : Starting Test Ⓦ : Working Test
Ⓒ : Change-over Test Ⓞ : Opening·Closing Test

— : Recording in Other Sheets
Mg : Presence of Manager
D : Presence of Deputy Manager
E : Presence of Electrical Personnel
M : Presence of Mechanical Personnel
Cp : Presence of Control Personnel

· Replacement of Chart : 1st Shift (1st day/Every month)
· Back wash of Condenser shall be executed in even-numbered days
· Request of Opening · Closing test of Main Valves shall be done in the morning
· To write down weekly safety book (Sunday every week)

Monthly Routine List for No.2 Unit (At the time of Economy Shutdown)

Date:

Week	Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	Day							
	Shift Duties	▲Ground Relay Test for Excitation Circuit	Ⓢ · Spray Pump of Antiforming Equipment · Tag Check (to rewrite,if it is vague)	Ⓢ · Turning of Main Turbine Ⓢ · Main Turbine TOP Ⓢ · Gland Exhauster Ⓢ · Gas Extractor of Main Oil Tank Ⓢ · Oil Purifier	Ⓞ · Fuel,Auxiliary Damper ■SAH Drain Pump ■Manual Turning of SC Feed Water Pump	Ⓢ · CWP (A) ⓄⓄⓄ · FDF Moving Blade · Air·Gas Duct Damper · GMF Inlet Damper [Cp] Ⓢ · Sea Water Booster Pump Idling 2A Sec Time 2B Sec		· ANN Test · Panel cleaning
	Day time Duties		· Filling in Data List	Ⓢ · Diesel Generator (at site) [D] [E] [M]	Ⓦ · Fire Extinguishing Appliance for Boiler,etc. (Boiler High·Low Pressure Pump Yard) (May,Aug.,Nov.,Feb.)	· Overall Inspection, Oiling		
2	Day							
	Shift Duties	ⓌⓌⒸ · Burner Retracting · Burner Tilt · Ash Disposal (→)	Ⓢ · Reactivation of Hydrogen Gas Drier · Emergency Pump of Seal Oil [D] Ⓒ · Vacuum Pump of Seal Oil (→) [D]	Ⓢ · Light Oil Pump for Starting up Ⓢ · Light Oil Pump for Ignition ⓈⓈ · Main Turbine Turning · BFPT Turning Ⓢ · AOP of BFPT Ⓢ · EOP of BFPT Ⓢ · Circulating Pump of BFPT	Ⓞ · Fuel,Auxiliary Damper [Cp]	ⓄⓄⓄ · FDF Moving Blade · Air·Gas Duct Damper · GMF Inlet Damper [Cp]	Ⓢ · Wash Pump for Rotary Screen · Supplement of Light Bulbs in the storage Box used for Site (Apr.,Aug.,Dec.)	· ANN Test · Panel cleaning · Education for Hazardous Material Protection (once/year,on Junc)
	Day time Duties	Ⓒ · Control Air Compressor (→)	· Data Input,making Lists (for one year)			· Overall Inspection, Oiling		
3	Day							
	Shift Duties		Ⓢ · H-FOP,L-FOP	ⓈⓈⓈ · Main Turbine Turning · AOP of Main Turbine · EOP of Main Turbine	Ⓞ · Fuel,Auxiliary Damper	ⓈⓈⓄⓈⓈⓄ · CWP (B) · Gas Draft System FDF,GMF,AH · FDF Moving Blade,GMF Inlet Damper [Cp] · EP Loading,Hammering Test · Pilot Torch,TV Scanner · GMF Turning · Air·Gas Duct Damper	Ⓢ ▲Cooling Fan for Main Transformer,Station Service Transformer Ⓢ ▲Cooling Fan for No.2 Tie Transformer (→) [# Spare]	▲Training for Wearing Protection Utensils for High Pressure Gas (To execute each Shift) · ANN Test · Panel Cleaning
	Day time Duties		Ⓦ · Fire Extinguishing Appliance for Transformer (Main Trans.,Others) (May,Aug.,Nov.,Feb.) · Filling in Data List	Ⓢ · Diesel Generator (Central) [D] [E] [M]	· Equalizing Charge of Battery (Apr.,Oct.)	· Overall Inspection, Oiling		
4	Day							
	Shift Duties		Ⓒ · Cooling Water Pump for Generator Stator (→)	ⓈⓈⓈⒸ · Main Turbine Turning · BFPT Turning · AOP of BFPT · Bearing Cooling Water Pump (→)	Ⓞ · Fuel,Auxiliary Damper · Water Spray Test of Nitrogection Equipment (Presence of Safety Guard Personnel)	ⓄⓄⓄ · FDF Moving Blade · Air·Gas Duct Damper · GMF Inlet Damper [Cp]	Ⓢ · Wash Pump for Rotary Screen	· ANN Test · Panel Cleaning · Training for Preservation and Protection of High Pressure Gas (twice/year,May,Nov.)
	Day time Duties		· Making Routine List for Next Month · Check of Routine execution condition · Data Input ,Making Lists (for four years)			· Overall Inspection,Oiling · Checking Chart,Daily Log and Number of Sheets		

▲ : Even-Numbered Months　Ⓢ : Starting Test　Ⓦ : Working Test　—— : Recording in Other Sheets　[E] : Presence of Electrical Personnel　· Replacement of Chart : 1st Shift (1st day/Every month)

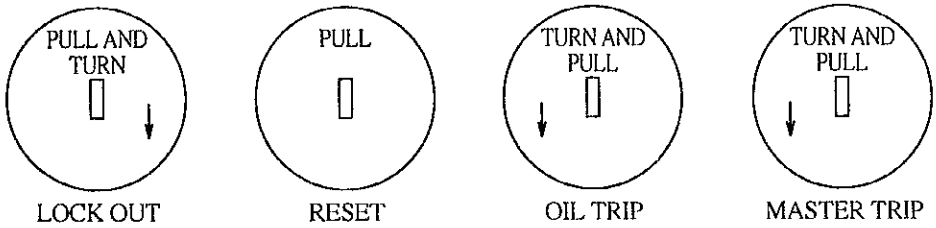
■ : Odd-Numbered Months　Ⓒ : Change-over Test　Ⓞ : Opening·Closing Test　[Mg] : Presence of Manager　[M] : Presence of Mechanical Personnel　· Routines such as starting,working test,etc.will be executed from one week after the unit shutdown

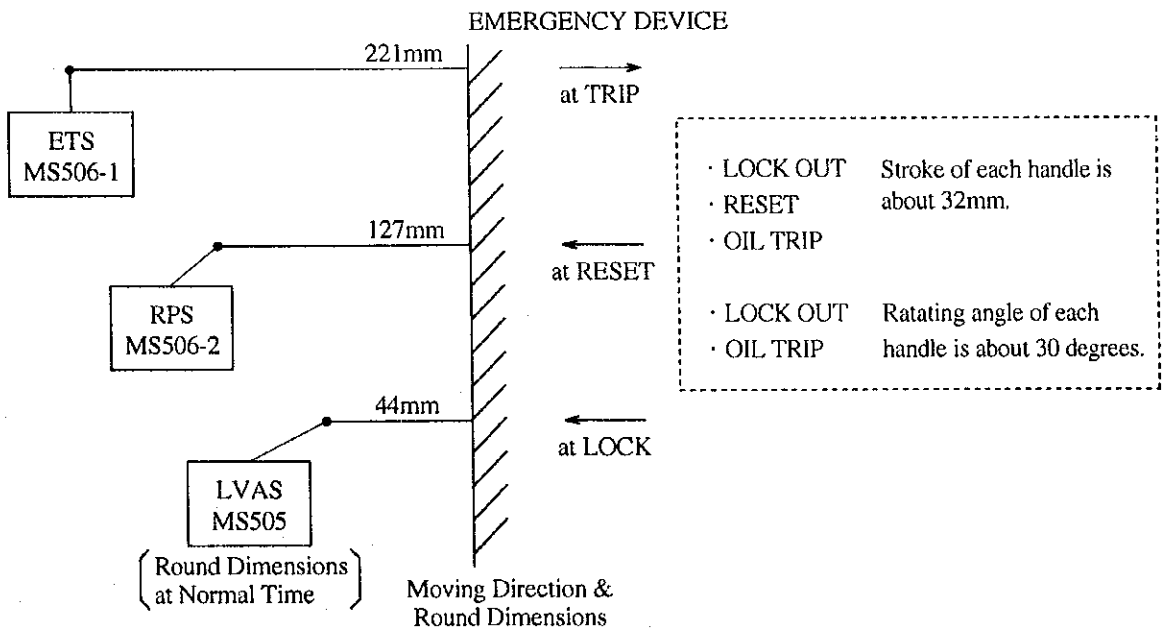
[D] : Presence of Deputy Manager　[Cp] : Presence of Control Personnel

Routine Operation Check Sheet for Unit No.2

Routine No.2-Sat.	Main Turbine Oil Trip Test		
	Operation Procedure	Remarks	Check
1. Preparation			
《Check in Advance》			
1	Test start shall be reported to "Central Load Dispatching Center" and "Operation Manager" to obtain approval.		
2	Such things are prepared as metal fittings for lockout stop, gloves, routine test results recording paper.		
3	Test start is to be paged.	Superintendent is in charge of the implementation.	
《Measures in case of Emergency》			
1	In case that each process indicating lamp for oil trip test is not lighted. (1) To confirm the existence of burning lamp out (2) To confirm whether the stroke of each visible working part is normal or not.		
2	In emergency case of others, surveying & grasping the conditions, turbine is stoped, if needed.		

ARRANGEMENT OF TEST HANDLES





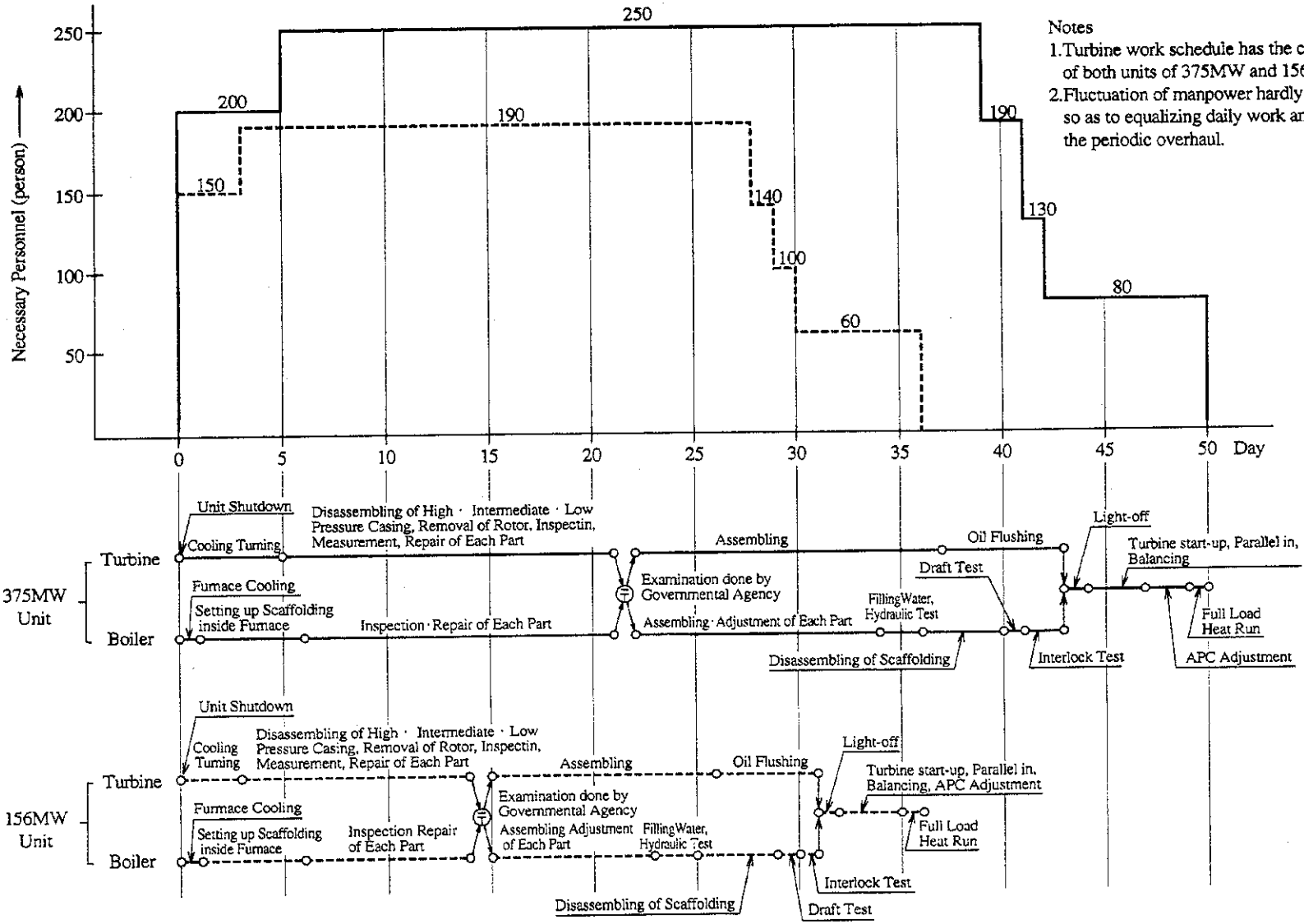
(Lever Dimensions & the Arrangements for Indicating Each Process)

Within Front standard of Turbine, on the Left.

	Operation Procedure	Remarks	Check
2. Operation			
《LOCK OUT》			
1	(1) Wearing gloves on both hands, keeping center of gravity lower in front of test handle and to set out operation position (2) Pulling lock handle by left hand, turning it to clockwise direction and to hold it until test completion. (3) To set stopper metal fittings to lock out handle. (4) To confirm lighting lock out indicating lamp .	To be lighted O lamp of the body To be lighted W lamp of BA panel	
《OIL TRIP》			
2	(1) Turning OIL TRIP handle to anti-clockwise direction until the end by right hand and pull it. (2) To confirm lighting trip indicating lamp, turning off reset indicating lamp.	To be lighted G lamp of TRIP body "Over Speed Trip" of BTG Panel To be turned off R lamp of Reset body To be turned off W lamp of BA panel	
《RESET》			
3	(1) To return OIL TRIP handle to its original position (2) To pull RESET handle until the end by right hand (3) To confirm lighting the indicating lamp during RESET, turning off tirp indicating lamp (4) To return RESET handle to its original position (5) To confirm lighting reset indicating lamp, turning off the indicating lamp during RESET	During RESET To be lighted O lamp of the body To be lighted W lamp of the BA panel To be turned off G lamp of TRIP body To reset ANN of BTG panel To be lighted R lamp of the RESET body To be lighted W lamp of BTG panel During RESET To be turned off O lamp of the body To be turned off W lamp of BA panel	
《RELEASE OF LOCK OUT》			
4	(1) To take off stopper metal fittings of LOCK OUT handle (2) To return LOCK OUT handle to its original position		
3. Completion			
1	(1) Test completion is to be paged. (2) Test results are to be recorded in the recording paper for routine test results.		

Routine No.2-Thur.	Emergency Seal Oil Pump Start-up Test		
	Operation Procedure	Remarks	Check
1. Preparation			
1	To confirm power source "ON" of emergency seal oil pump, the CS position of "Automatic"		
2. Operation			
1	To turn "ON" CS of the running vacuum pump.		
2	· H-35 Valve "CLOSE" · H-38 Valve "OPEN"	Valve Handling to Confirm Start-up Pressure of Emergency Seal Oil Pump	
3	Confirming delivery pressure (5.5kg/cm^2)of seal oil pump, to make root valve (H-33) of pressure SW "CLOSE", then to open testing valve (H-34) of pressure SW gradually.		
4	Under the delivery pressure 5.0kg/cm^2 of seal oil pump, automatic start-up of emergency seal oil pump.	To confirm ANN Local Panel · Seal Oil Delivery Pressure Low · Emergency Seal Oil Pump Start BTG Panel · Hydrogen Gas Seal Oil System Trouble	
5	To inspect the existence of abnormality of the pump.		
3. Recovery			
1	Without abnormality, closing testing valve (H-34) gradually, opening root valve (H-33) of pressure SW, then to confirm delivery pressure.		
2	· H-38 Valve "CLOSE" · H-35 Valve "OPEN"		
3	After delivery pressure restores normal value, emergency seal oil pump will be stopped and CS is set to automatic position.		
4	To return CS of running vacuum pump to the automatic position.		

Standard Work Schedule and Necessary Personnel for Major Overhaul at Oil -Fired Thermal Power Plants (375MW&156MW) in Japan



Notes

1. Turbine work schedule has the critilcal pass in major overhaul of both units of 375MW and 156MW.
2. Fluctuation of manpower hardly occur with planned schedule so as to equalizing daily work amount through the period of the periodic overhaul.