APPENDIX-3 ROUTINE WORK FOR OPERATION

ROUTINE WORK FOR OPERATION

ROUTINE WORK FOR OPERATION

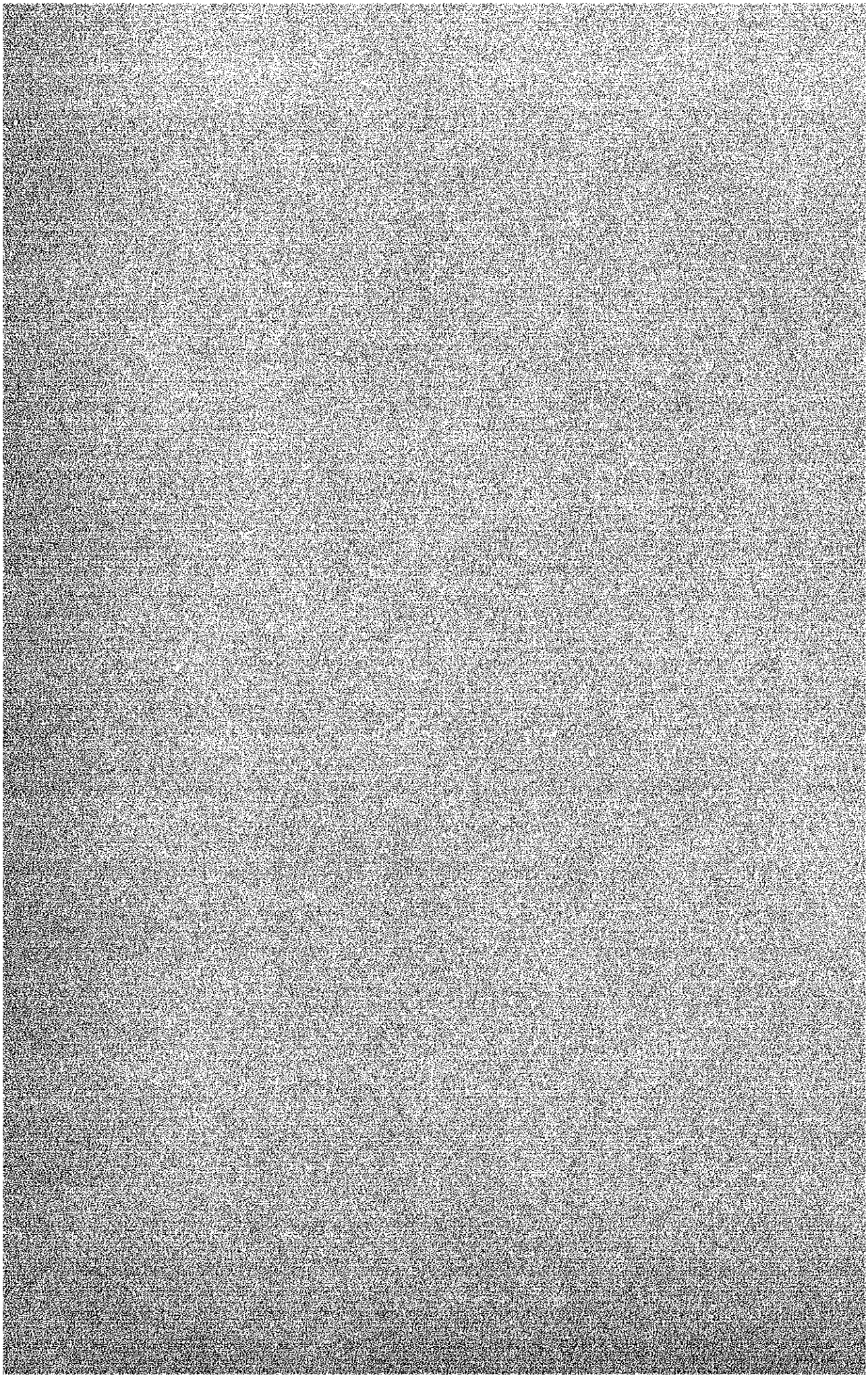
DAY / WEEK	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1st	Switch-over chemical injection pump. (1u & 2u). Switch-over of CAC (1u & 2u) Test of annunciators lamps in the control room (1u & 2u)	. Test of emergency governor for turbine and to Tb-BFP (1u & 2u) . Automatic starting test of auxiliary pump for turbine and Tb-BFP (1u & 2u). . Test of thrust bearing protection relay for turbine and Tb-BFP (1u & 2u).	.. Change-over and cleaning of residual oil strainers. (1u & 2u) .. Switch-over of M.F. O.P. (1u & 2u) .. Test running of intake screens. (1u & 2u).	..Switch-over of cooling fans for main Tr. (1u & 2u) ..Switch-over of S.A.C. (1u & 2u) ..Switch-over of raw water pump (1u & 2u)	.. Starting test of emergency diesel engine. ..Automatic starting test of back-up scanner fan (1u & 2u)	. .Automatic starting test of sump pump for boiler sump pit (1u & 2u) .. Automatic starting test of sump pump for turbine sump pit (1u & 2u)
2nd	.Change-over of main-steam ejector. (1u & 2u) . Switch-over of CAC (1u & 2u) . Test of annunciators lamps in the control room (1u & 2u)	.. Switch-over of pumps for ash collector (1u & 2u) ..Inspection of AH elements from observation glass (1u & 2u) ..Precision checking of major equipments for boiler. (1u & 2u)	..Switch-over of screen wash pump. (1u & 2u) ..Test running of intake screens (1u & 2u)	..Starting test of M-BFP (1u & 2u) ..Precision inspection of turbine by pass system. (1u & 2u) ...Switch-over of CP (1u & 2u)	..Switch-over gland-steam exhauster (1u & 2u) ..Starting test of emergency diesel engine	...Switch-over of demineralized water pump. ...Regeneration of H2 gas dryer. (1u & 2u)
3rd	..Change-over of heat exchanger for cooling water. (1u & 2u) .. Switch-over of CAC (1u & 2u) . Test of annunciator lamps in the control room. (1u & 2u)	..Test of emergency governor for turbine and Tb-BFP (1u & 2u) .. Automatic starting test of auxiliary pumps for turbine and Tb-BFP (1u & 2u) .. Test of thrust hearing protection relay for turbine and Tb-BFP (1u & 2u).	. Switch-over of cooling water pump. (1u & 2u). .. Test running of intake screens (1u & 2u) .. **Seal oil back-up pump test**	..Checking of consumable (lamps, inks.,Fuses, etc.) ...Switch-over of raw water pump. (1u & 2u) ...Switch-over of SAC (1u & 2u)	..Starting test of emergency diesel engine. .. Inspection of ventillation fans for boiler and turbine of ceiling. (1u & 2u)	..Checking of recorder charts (stock quantity). .. Automatic switch over test of emergency lighting system (1u & 2u)
4th	.. Switch-over of CAC (1u & 2u) ..Test of annunciator lamps in the control room (1u & 2u) ..Switch-over of cooling fans for emergency transformer	.. Switch-over of pumps for ash collector (1u & 2u) ...Precision checking of major equipment for turbine, (1u & 2u)	..Switch-over of screen wash pump (1u & 2u) .. Change-over of residual oil heater. (1u & 2u) ...Test running of intake screens (1u & 2u)	.. Change-over of oil cooler for main turbine oil (1u & 2u) ...Measurements of water drain in the main oil tank. (1u & 2u).	...Starting test of emergency diesel engine ...Servicing of observation glasses for furnace. (1u & 2u).	...Regeneration of H2 gas dryer. (1u & 2u) ...Starting test of emergency fire diesel engine.

APPENDIX – 3B

SERVING WORKS FOR OPERATION

DAY / ACTOR	DAILY WORKS	MONDAY	TUESDAY	WEDNSDAY	THURSDAY	FRIDAY	SATURDAY
BOILER OPERATOR	Annunciator test. Time setting of each recorder chart.	———	———	———	———	Gather data of defective condition for boiler.	Cleaning of boiler panel
TURBINE OPERATOR	Annunciator test Time setting of each recorder chart. Valve test for turbine & Tb–BFP (MSV & RSV, IPR)	Back washing of condenser.		Back washing of condenser	----------	Gather data of defective condition for turbine.	Cleaning of turbine panel.
ELECTRIC OPERATOR	Annunciator test. Time setting of each recorder chart.	----------	----------	----------	----------	Gather data of defective condition for electric.	Cleaning of electric panel.
LOCAL OPERATOR	Supplying of lubricating oil for equipments. Drain out of each compressure and air receiver.	Cleaning of burners. Measuring of burner tips.	Blowing out of level indicators for drum, deaerator and FW heater.	———	———	Servicing of tools.	Cleaning of local panels

APPENDIX-4 GUIDLINES FOR ANNUAL OVERHAULING



GUIDELINES FOR ANNUAL OVERHAULING

I. PREPARATION FOR ANNUAL OVERHAULING

1. Listing of necessary items to be overhauled

a) Defective equipment and facilities requested by Operation Section.

b) Deteriorated equipment and facilities uncovered by performance tests.

c) Improvement items to be applied.

d) Application of new technology

2. Review of Overhauling Schedule

To determine the overhauling schedule, Boiler, Turbine, Electrical and Instrument and Control engineers must make each schedule.

In this schedule, not only overhauling items listed above but also power demand of Metro Manila Area and operating conditions of other power plants should be considered carefully. Furthermore, the following items should be included in the schedule.

a) Necessary items to be overhauled

b) Tests and trial operations

- Tests to be carried out at unit shut-down
- Tests and test run during overhauling
- Tests and trial operation to be carried out at unit restart-up.

c) Planning for invitation of manufacturers engineer/s (if necessary).
d) Repair and inspection program to be carried out at manufacturer's factory.

3. Purchasing and procurement program of spare parts and materials.

Necessary spare parts and materials required for overhauling should be purchased and procured at earlier stage before overhauling starts. Information on old type machines and spare parts should be asked whether there are still available or not directly from manufacturers. If the old type ones are already obsolete or not manufactured at factory, replacement with new type should be considered. In addition to the above, the following items should be checked carefully.

a) Re-check of the existing spare parts and equipment.
b) Preparation of specifications for necessary spare parts, ordering and confirmation of delivery time.
c) Specification check of purchased spare parts and equipment.

4. Assurance of personnel and workers necessary for overhauling work.

Personnel and workers required to perform overhauling completely should be assured, and outside contractors should be arranged if necessary.

5. Re-check tools and instruments required for overhauling
   a) Overhead travelling crane, welding machines, tools, instruments, etc.
   b) Arrangement of machine shop and instruments and controls laboratory.
   c) Elevator, lifters, and temporary facilities
6. Safety and security regulations
   a) Security rules and regulations
   b) Tagging system
   c)

II. IMPLEMENTATION OF OVERHAULING

1. Schedule Control

   Overhauling schedule should be strictly controlled in accordance with original schedule since extension of schedule will affect the power supply program.

2. Recording

   Overhauling records should be prepared for future comparison and include the following items in detail.
   a) Abnormality uncovered during overhauling
   b) Assembling record
   c) Repaired items and repair method
   d) Deposits and scale records
   e) Calibration and readjustment sheets

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
1. Boiler and Auxiliaries 1) Boiler proper a) Separator (including start-up separator and flash tank)	i. Deposits - Location/condition - Appearance(pictures if necessary) - Quantity - Sampling and chemical analysis ii. Erosion and Corrosion iii. Inspection of internals and abnormality - loosening of bolts and packing - connecting parts with water pipe	i. Cracks, corrosion and erosion - welded parts - manhole - level and pressure gauges - nozzle neck - tube roll - drainage holes - normal operation level ii. Clogging and blocking of pipes - connecting pipes with level and pressure gauges - drain and blow pipes - chemical injection pipes - feed water pipes - steam pipes iii. Seat and Seal - cracks, corrosion and erosion of connecting and welded parts. iv. Damages of manhole seat	i. Final confirmation of completion ii. Confirmation of tools and materials iii. Performance should be finally confirmed at hydraulic test and trial operation.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
b) Headers	i. Deposits - Location/condition - Appearance (picture if necessary) - Quantity - Sampling and chemical analysis ii. Abnormality on inspection hole and sealing parts iii. Damages, distortion and deformation of headers, supporters and suspenders iv. Leakage from welded parts and leak at tube roll.	i. Cracks, erosion and corrosion ii. Leakages from welded parts and leak at tube roll. iii. Damages of inspection hole seats iv. Liquid penetrant test of welded parts	i. Perfect welding, pinholes and under-cut ii. No leakage should be onfirmed at hydraulic test.

Equipment/Machine	III - Inspection Items		
	During/After dismantling	After cleaning	During/After reassembling
c) Water tubes including screen tubes and furnace evaporator	i. Deposits inside and outside tubes - Location/Condition - Appearance(pictures if neccesary) - Thickness and quantity - Sampling and chemical analysis ii. Damages due to soot blowing iii. Leakage from welded parts and leak at tube roll iv. Cracks, corrosion and erosion v. Distortion and deformation of tube panels vi. Deformation and burnt-out of supporters and tube spacers vii. Refractory material	i. Cracks, corrosion and erosion ii. Distortion and deformation of tube panels. iii. Welded parts iv. Damages, burnt-out and deformation of tube spacers screen tube suspenders and supporters. v. Wearing out and damages due to soot blowing vi. Damages of protectors vii. Ash cut viii. Furnace materials and tiles ix. Expansion x. Thickness and measurement xi. Tube cutting - Scale and deposits, pictures (thickness, quantity and chemical analysis)	i. Perfect welding - pinholes and under-cut - radiographic or x-ray test ii. Deformation iii. Completeness of repair iv. No leakage should be confirmed at hydraulic test.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
		- Metal structure test and mechanical strength test. - Outer diameter and thickness - Scale solubility test xii. Non-destructive test.	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
d) Superheater and reheater tubes	i. Scale and deposits inside and outside tubes - Location/Condition - Appearance(pictures if necessary) - Thickness and quantity - Sampling and chemical analysis ii. Effect of soot blowing on tubes iii. Leakages from welded parts and leak at tube roll. iv. Cracks, corrosion and erosion	i. Cracks, corrosion and erosion - vanadium attack ii. Distortion and deformation of tube panels. iii. Leakages from welded parts and leak at tube roll. iv. Deformation and burnt-out of tube spacers and supporters. v. Burnt-out of fins and sealings. vi. Wearing out and damages due to soot blowing and ash vii. Damages of protectors viii. Expansion and corrosion of ceiling penetration parts and suspenders. ix. Burnt-out of refractory material. Burnt-out of splitter	i. Perfect welding - Pinholes and under-cut - Welded parts of slide spacer - Liquid penetrant test of welded parts. ii. Check of bend iii. No leak should be confirmed at hydraulic test.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
		xi. Thickness and outer diameter measurements xii. Tube cutting - Scale and deposits (thickness, quantity and chemical analysis) - Metal structure test and mechanical strength tests - Outer diameter and thickness measurements.	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
e) Economizer Tube	i. Scale and deposits inside and outside tubes - Location/condition - Appearance (pictures if necessary) - Thickness and quantity - Sampling and chemical analysis ii. Effect of soot blowing on tubes iii. Leakages from welded parts and leak at tube roll.	i. Cracks, corrosion and erosion ii. Distortion and deformation of tube panels. iii. Leakages from welded parts and leak at tube roll. iv. Burnt-out and deformation of fins, tube spacers and supporters. - Pinholes at fin and welded parts v. Burnt-out of outer casing, baffle plate and refractory material. vi. Corrosion and erosion due to ash and soot blowing vii. Damages of protector viii. Gas leakage	i. Perfect welding - Blow-out hole and under-cut ii. Bend iii. No leak should be confirmed at hydraulic test.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
f) Safety Valve	i. Entry of foreign matters and damages of disc seat. ii. Cracks of valve and welded parts. iii. Distortion of value stem, seizure of valve seat and wearing out. iv. Seizure and wearing out of sliding parts and adjusting ring. v. Spring and adjusting bolt.	i. Entry of foreign matters - Damages of disc seat - Cracks ii. Valve seat and crack of welded parts iii. Distortion of valve stem and wearing out iv. Sliding parts and adjusting ring. v. Spring and adjusting bolt. vi. Corrosion and damages of silencer	i. Foreign matters ii. Lift gap iii. At unit start-up popping pressure, reset pressure and blowing down pressure should be confirmed.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
g) Major Valves - Boiler stop valve - Blow valve and vent valve - Feed water stop valve and regulator - Superheater and reheater spray control valve and nozzle. - Start-up by-pass valve	i. Scale and deposits on valve inside. ii. Damages of packing and seal ring iii. Bolts and nuts iv. Driving unit, lubrication of gear and gear box. v. Deterioration of lubricating oil vi. Inspection of desuperheater - Cracks, corrosion, erosion and damages of nozzle and mixing chamber - Welded parts - Damages of liner and supporting plate	i. Pipe internal and welded parts ii. Damages and corrosion of valve seat iii. Cracks, distortion, wearing out and corrosion of valve stem. iv. Contact of guide parts v. Damages of packing, seal ring and flange. vi. Bolts and nuts vii. Wearing out of driving unit, gear and bearing viii. Connecting parts with pneumatic drive unit	i. Foreign matters ii. Manual opening and closing test, stroke check and smoothness of operation iii. Motor-driven valve test - limit switches - torque switches - full stroke operating time iv. Pneumatic driven valve test. - Actuating air pressure and stroke v. Leakage from valve seat should be confirmed at hydraulic test.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
h) Furnace - Furnace internals, ceiling and bottom - Openings and man-holes - Soot blowing parts - Burner parts - Bottom ash hopper - Casing	i. Clinkers and deposits ii. Burnt-out of furnace wall refractory material and heat insulator iii. Gas leakage	i. Furnace internals - Casing and sealing - Piping penetration parts - Deformation of skin casing - Distortion of refractory material and heat insulator - Hanger - Corrosion and erosion of bottom sealing portions ii. Bottom and ash hoppers - Deposits - Cracks, corrosion and erosion - Deformation and damages of sealing portion iii. Openings - Separation of refractory material from manholes and peep holes	i. Foreign matters ii. Leak test should be carried out at FDF operation test.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
		- Packings and leakages - Sealing air - Burnt out of fin and refractory material on burner and soot blowing portion. iv. Casing - Cracks and deformation of outer casing and gas leakage - Buck stay	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
2) Feed water pump (including booster pump) a) Feed water pump	i. Scale and deposits - Location/Condition - Appearance (pictures if necessary) - Thickness and quantity - Sampling and chemical analysis	i. Seizure, damage and foreign matters of rotating parts ii. Corrosion and cracks on each portion iii. Bow of rotor iv. Clearance of rotor and stator v. Clearance of each portion vi. Bearing clearance vii. White metal viii. Gland ix. Damages of balance disc seat	i. Measurement of each clearance ii. Centering of flexible coupling iii. Centering of gear coupling and wearing out of gear iv. Bolts and nuts.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
b) Feed Water Pump Turbine	i. scale and deposits - Location/condition - Appearance (pictures if necessary) - Thickness and quantity - Sampling and chemical analysis	i. Discoloration, stain, deformation and bow ii. Foreign matters, damage, wearing out, corrosion and erosion iii. Oil and steam leak iv. Foreign matters, wearing out, deformation and damage on steam strainer and governing valve. v. Damage of bucket and stationary blade. vi. Clearance of bearing and thrust bearing vii. Clearance between bucket and stationary blade. viii. Alignment ix. Gland sealing x. Lever for start-up and wearing out of turning device latch.	i. Measurement of each clearance. ii. Measurement of thrust marginal clearance. iii. Centering of pump and turbine.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
c) Appurtenance	i. Tooth contact and cracks		
- Variable speed gear	ii. Wearing out of each bearing		
	iii. Measurement of bearing clearance and backlash.		
	- Lubricating oil unit		
- Lubricating oil unit	i. Each portion of pumps		
	ii. Clogging of sludge strainer		
	iii. Oil cooler		
	iv. Deterioration of lubricating oil		
- Minimum flow system			
	i. Crack, wearing out and corrosion of orifice plate		
- Suction strainer			
	i. Clogging and damage of screen.		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
3) Air and gas duct equipment a) Forced draft fan and gas recirculation fan	i. Deposits ii. Wearing out and looseness of bolts, nuts and rivets iii. Wearing out of dampers and vanes and driving units. iv. Balancing and centering of fan blade v. Corrosion, wearing out and damage of casing, blade and boss liner. vi. Damage due to seizure and foreign matter of bearings vii. Clearance of bearing and wearing out of bearing. viii. Deterioration of lubricating oil ix. Accumulation of sludge and clogging of strainer x. Abnormalities of oil pump and cooler.		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
b) Air and gas ducts	i. Accumulation of deposits ii. Corrosion and damage of lining iii. Air and gas leak iv. Wearing out and corrosion of duct internals v. Cracks and damages of expansion joint, stay and buffle plate. vi. Deformation and burnt-out of damper and vane. vii. Damages of damper and vane actuators. viii. Tightening of manhole and bolt ix. Drainage valves for water washing		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
4) Air preheater a) Air preheater proper	i. Gas leakage from rotor penetrating parts. ii. Clogging and deposits on elements	i. Element - Corrosion and wearing out - Corrosion, wearing out and cracks on supporting materials - Looseness and eccentricity - Measurement of plate thickness ii. Sealing parts (rotor seal, circumferential seal and radial seal) - Corrosion and wearing out - Sealing and measurement of clearance - Looseness and damage of bolts iii. Rotor - Cracks and corrosion of rotor welded parts - Liquid penetrant test of rotor post and diaphragm welded parts	i. Air leak should be confirmed at FDF test run

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
		- Rotor balancing and centering - Corrosion and wearing out of pin and rack - Bolts and nuts iv. Housing - Corrosion - Measurement of level and deviation v. Bearing - Measurement of bearing clearance - Lubricating oil vi. Reduction Gear - Coupling gear - Oil seal - Bearing - Looseness of setting bolts - Lubricating oil	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
		vii. Air Motor - Coupling gear - Oil seal - Bearing - Wearing out of coupling bushing. - Air strainer - Solenoid valve	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembli
b) Steam coil air preheater	i. Air leakage from casing ii. Scale and deposits inside tube	i. Tube roll and corner seal ii. Corrosion and wearing out iii. Damages of fin iv. Bulkhead v. Leakage from flange and tube connection	i. Leakage check - Steam tube leak test - Air leak test

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
5) Fuel oil supply and firing system			
a) Fuel oil supply pump (heavy oil and light oil pumps)	i. Wearing and cracks of rotor		
	ii. Bearing and mechanical seal		
	iii. Oil seal and others		
	iv. Relief valve		
b) Oil heater	i. Corrosion and erosion of heater proper and tubes		
	ii. Damages and cracks of tube roll, tube plates and buffle plates		
	iii. Tube leak test		
c) Piping and valves	i. Clogging and deposits of strainer		
	ii. Leakage from valves		
	iii. Damages of valve, joints and flexible tube.		
	iv. Wearing out of shut-off valve, control valve and drain traps		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
d) Burner (Heavy and light oil burners)	i. Wearing out and damage of burner tip and nozzle. ii. Burnt-out and deformation of diffuser cone and protecting tube iii. Damages of resister damper iv. Actuator mechanism v. Flexible tube and universal joint.		
e) Ventilation system (Burner seal air fan, flame scanner cooling air fan, ventilation fan and ignitor booster fan)	i. Wearing out, corrosion and damages of shaft, bearing, liner and casing. ii. Damage of damper bearing and moving parts. iii. Clogging of air strainer		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
6) Soot blower			
a) Delivery tube (lance tube and feed tube)	i. Relation between blowing area, direction, blowing angle and boiler tubes ii. Damages of tubes around blowing area iii. Clogging of nozzle	i. Corrosion, wearing out and cracks of nozzle. ii. Corrosion, deformation and burnt-out of lance tube and feed pipe iii. Clogging of drain hole iv. Corrosion and damage of gland	i. Relation between blowing area, location, blowing angle and boiler tubes.
b) Poppet valve	i. Cracks and corrosion of valve, valve body and valve stem ii. Valve touch and spring iii. Corrosion and burnt-out of pressure adjusting ring		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
c) Sealing unit	i. Deposits of wall box inside ii. Wearing out of brush and sleeve iii. Corrosion and wearing out of scraper plate and wall and plate iv. Clogging and wearing out of seal air, aspirating air tubes and pipings. v. Corrosion and damages of gland and gland packing ring vi. Damages of refractory material for wall box		
d) Driving Unit	i. Wearing out and damage of air motor blade ii. Fouling of gear box iii. Wearing out of gear, bearing, chain and roller axis brake shoe iv. Deterioration of lubricating oil		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
7) Steam, feed water pipes and steam vessels a. Steam and feed water pipes	i. Scale and deposits - Location/Condition - Appearance (pictures if necessary) - Thickness and quantity - Sampling and chemical analysis ii. Cracks and corrosion especially on welded parts iii. Damages of flange iv. Bolts and nuts v. Pipe hangers, supporters and restraint vi. Thickness measurement of contracting and bending parts, if necessary.		

Equipment/Machine	III - Inspection Items		
	During/After dismantling	After cleaning	During/After reassembling
b) Steam vessels	i. Accumulation of deposits - Location/Condition - Appearance (pictures if necessary) - Thickness and quantity - Sampling and chemical analysis	i. Corrosion,,erosion and cracks - Welded parts - Manhole - Nozzle neck and drain hole ii. Damages of manhole seat iii. Liquid penetrant test of welded parts, if necessary.	
8) Compressed air system			
a) Air compressor (Instrument and station service air compressor)	i. Deposits and fouling ii. Measurement of each clearance.	i. Suction and discharge valves - Wearing out, cracks and damage of valve plate, seat and valve spring. - Valve seat fitting, if necessary - Wearing out of valve guide - Unloader mechanism	i. Hydraulic test of oil cooler, intercooler and after cooler. ii. Performance test of safety valve.

Equipment/Machine	III - Inspection Items		
	During/After dismantling	After cleaning	During/After reassembling
		ii. Piston and cylinder - Wearing out, cracks and damage of oscillating parts. - Clearance between piston and cylinder - Looseness of cylinder top nut - Gland Defective metalic packing and gland packing ring should be replaced. - Wearing out and cracks of piston ring - Fouling of cylinder jacket - Measurement of sizes of cylinder liner, piston, piston rod, piston ring slot, piston ring, metalic packing and spring - Measurement of piston rod strain	

Equipment/Machine	III - Inspection Items		
	During/After dismantling	After cleaning	During/After reassembling
		iii. Crosshead, cranckshaft and connecting rod - Wearing out and crack - Measurement of clearance - Wearing out of bearing - Separation of white metal - Looseness of bolts iv. Oil pump, lubricator and oil cooler - Tooth contact and damage - Measurement of oiler pin and oiler sleep - Fouling of oil filter and replacement of filter - Lubricator - Oil cooler - Relief valve	

Equipment/Machine	III - Inspection Items		
	During/After dismantling	After cleaning	During/After reassembling
		v. Crankcase - Deterioration of lubricating oil and replacement of oil, analysis if necessary. vi. Intercooler and after cooler - Deposits and damage of cooling coil - Deposits and damage of outer cylinder - Safety valve drain trap - Drain separator vii. Air filter - Fouling, foreign matter and damage	

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
b) Air receiver	i. Scale and deposits ii. Crack and corrosion - Stain inside receiver - Welded parts - Nozzle neck and drain hole - Liquid penetrant test of welded parts, if necessary iii. Damage of manhole and seat iv. Function of safety valve and drain trap.		
c) Dehumidifier	i. Dehumidification agent (silica gel or activated alumina) ii. Clogging of filter iii. Wearing out and damage of control valve	i. Loss and grading of dehumidification agent (silica gel and activated alumina) ii. Insulation and conductivity of heater iii. Wearing out and damage of control valve moving parts	i. Normal level of dehumidification agent ii. Measurement of dew point of dehumidified air.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
9) Other valve and piping			
a) Regulating valve (control valve including piston valve)	i. Wearing out of valve body inner wall. ii. Inner valve and valve seat contact, and fitting and liquid penetrant test, if necessary iii. Each welded part		i. Air tightness test ii. Performance test
b) Safety valve	i. Corrosion, damage and crack of valve body ii. Nozzle and disc contact, and fitting and liquid penetrant test, if necessary. iii. Curvature and wearing out of spindle iv. Spring		i. Performance test
c) Reducing valve	i. Corrosion, damage and crack of valve body ii. Valve seat contact iii. Wearing out of moving parts.		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
d) General use valve	i. Corrosion, damage and crack of valve body. ii. Valve seat contact iii. Crack, curvature, wearing out and corrosion of valve stem. iv. Seal ring, packing and flange. v. Bolts and nuts.		
2. Turbine and Auxiliaries			
1) Turbine proper	i. Centering		Check items described in item -During/After dismantling should be repeated in detail, if necessary. i. Deterioration of bolts and nuts. ii. Expansion and moving parts. The following items should be confirmed at unit restart-up.
a) Turbine	ii. Rotor, Chest and pedestal iii. Clearances - Thrust bearing and each journal bearing - Bucket, stationary blade and diaphragm - Tip clearance of bucket - Gland seal		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
	- Sealing strips and oil seal - Others iv. Alignment v. Level of each portion vi. Deposits and scale vii. Discoloration and stain viii. Entry of foreign matter ix. Crack, damage, flaw, deformation and curvature x. Contact between rotating parts and slationary parts. xi. Corrosion and erosion xii. Wearing out xiii. Steam leakage ivx. Looseness of bolts and nuts		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
b) Chest	i. Deposits and scale of chest inside ii. Corrosion and erosion of each portion iii. Tightening portion iv. Crack and casting - Steam inlet - Flange - Inner and outer bend - Corner - Reinforcing rib - Complicated configuration parts - Welded parts v. Horizontal upper and lower joint surface vi. Engagement vii. Contact viii. Moving part		Check items described in item - During and After Dismantling should be repeated in detail, if necessary i. Contact and clearance of horizontal upper and lower joint surface ii. Leveling of horizontal upper and lower joint surface iii. Deformation and displacement of chest

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
	ix. Looseness of each portion - Tightening and caulking x. Crack, wearing out and seizure of bolts and nuts. xi. Crack and damage of washer. xii. Contact, wearing out, curvature, crack and erosion of fin		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
c) Stationary Blade and Nozzle	i. Deposits ii. Corrosion and erosion iii. Contact iv. Damages due to foreign matter v. Engagement vi. Nozzle and welded parts vii. Crack viii. Seal ring ix. Horizontal joint surface x. Deformation xi. Wearing out, damage and contact of fin xii. Key and key slot, contact of pin xiii. Deterioration of spring ivx. Looseness and crack of lockout bolt vx. Clearance to rotor.		Check item described in item During/After Dismantling should be repeated in detail, if necessary.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
d) Bucket	i. Deposits and scale ii. Damage due to foreign matter iii. Corrosion and erosion iv. Contact v. Crack vi. Looseness of tenon vii. Dovetail - Motor blading - Riveting pipe - Gap between moving blade and stationary blade viii. Shroud - shroud ring - tenon ix. Separation and damage of lacing wire, damping wire and silver soldering parts		Check item described in item During/After dismantling should be repeated in detail, if necessary.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
	x. Separation, crack and erosion of strip, stellite and silver soldering parts. xi. Seal ring xii. Wearing out, discoloration, curvature, crack and corrosion of sealing fin. xiii. Engagement and clearance ivx. Clearance of bucket vx. Dovetail hook		

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
e) Rotor	i. Centering ii. Rotor position iii. Alignment iv. Deflection of rotor v. Leveling of rotor vi. Scale and deposits vii. Corrosion and erosion viii. Contact ix. Heat groove and labyrinth groove x. Journal and thrust collar xi. Rotor grounding device xii. Engagement xiii.		Check items described in item During/After dismantling should be repeated in detail, if necessary. i. Gap and clearance ii. Lubricating oil flow

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
f) Shaft coupling	i. Coupling ii. Expansion of centering bolts. iii. Centering iv. Coupling bolts v. Coupling surface and spigot joint vi. Spacer engagement vii. Turning gear viii. Shrink fitting ix. Setscrew of bolt cover x. Flexible type coupling - Sludge - Wearing out of engagement - Seizure - Tooth damage xi. Crack and galvanic corrosion		Check items described in item During/After dismantling should be repeated in detail, if necessary.

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
g) Steam gland	i. Loss and looseness of dovetail fin ii. Discoloration, wearing out and corrosion of fin iii. Damage of retaining ring iv. Tightness of packing case v. Clearance of packing vi. Damage and looseness of tieback hardware vii. Crack, damage, fatigue and elasticity of spring viii. Crack, damage, fatigue and elasticity (in case of spring back system) ix. Engagement of rotating part and stationary part, and tightning ring (in case of barrel type radial packing)		Check item described in item During/After dismantling should be repeated in detail, if necessary. i. Spring tension (in case of spring back system. ii. Movable allowance (in case of radial packing system)

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
h) Bearing	i. Movement of shaft ii. Gap between bearing and oil iii. Contact with shaft coupling iv. Damage, abrasion, discoloration, crack, separation of babbit v. Parallelism with journal vi. Thrust gap vii. Contact surface of thrust bearing pad viii. Back face gap ix. Damage of bearing and adjusting ring x. Bearing position adjusting pad xi. Galvanic corrosion xii. Looseness of each bearing xiii. Deposits in oil passage		Check items described in item During/After dismantling should be repeated in detail, if necessary. i. Circumference of bearing ii. Modification of white metal iii. Engagement and interference of insert bush iv. Bearing position adjusting pad and shim liner v. Tightening torque of bearing holder vi. Levelness of pedestal vii. Dislocation of alignment viii. Looseness of anchor bolts

Equipment/Machine	III - Inspection items		
	During/After dismantling	After cleaning	During/After reassembling
	xiv. Foreign matter, stain and oil leak in pedestal xv. Contact, wearing out, deformation and deposits of flingers.		