

NOT DISCLOSE TO DHI

For Construction

0	14 May 2020	Issued for construction	<i>Yujir</i>	<i>R. Mimura</i>	<i>D. Uesugi</i>
D	28 Feb 2020	Revised as per owner's comments	Nanba	Mimura	Uesugi Nishimura
C	25 Jul 2019	Revised as per owner's comments	Nanba	Mimura	Uesugi
B	20 May 2019	Revised as per owner's comments	Mimura	Kuroshima	Uesugi
A	8 Apr. 2019	First Issue	Nanba	Mimura Kuroshima	Uesugi
REV	DATE	DESCRIPTION	Approved	Checked	Prepared

OWNER



VAN PHONG POWER COMPANY LIMITED

PROJECT

Van Phong 1 BOT Thermal Power Plant Project

OWNER'S ENGINEER

Pöyry Switzerland Ltd.



Status
☐ Approved
☐ Approved with Comment
☐ Not Approved
☐ Reviewed
☐ Reviewed with Comment

EPC CONTRACTORS

IHI-TESSC-CTCI-DHI CONSORTIUM

IHI TOSHIBA

CTCI

中鼎工程股份有限公司
CTCI Corporation



PROJECT DOCUMENT No
VP1-C-L1-M-GEN-00500

REV

0

DOCUMENT TITLE

Basic Operation Philosophy for Boiler

EPC

IHI

IHI Corporation

EPC DOCUMENT No.

K090-05A

REV

D

注 意

本図書は株式会社 I H I の秘密情報を含んでいます。
本図書について以下のことを I H I の書面による事前承諾なく行うことを禁じます。

- (1) 複製 (方法を問わず)
- (2) 第三者への開示
- (3) 供与目的以外への使用

CAUTION

THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF IHI Corporation.

THE DOCUMENT ALWAYS REQUIRES PRIOR WRITTEN CONSENT OF IHI FOR
(1) ITS REPRODUCTION BY ANY MEANS,
(2) ITS DISCLOSURE TO A THIRD PARTY, OR
(3) ITS USE FOR ANY PURPOSE OTHER THAN THOSE FOR WHICH IT IS SUPPLIED.

NOT DISCLOSE TO DHI

配布先	数								
Owner	1	D	May 14 2020	Issued for construction. Added the boiler single operation as per discussion.					
※ PJ 部	1	C	Feb 28 2020	1. Revised as per owner's comments. 2. Deleted startup curves, please refer to "VP1-C-L2-G-MA-00001".	Nishimura	Uesugi	Mimura	Nanba	
※ 基設	1								
※ 運技	1								
※ 燃部	1	B	Jul 25 2019	Revised as per owner's comments.		Uesugi	Mimura	Nanba	
※ 制電部	1								
※ 本体	1								
※ 鉄配	3	A	May 20 2019	Revised as per owner's comments.	Uesugi	Kuroshima		Mimura	
※ 機器部	1								
※ 品管部	1								
※ 調達 (豊)	1	O	Apr. 08 2019	First issue.	Uesugi	Kuroshima	Mimura	Nanba	
※ 建計工	1								
※ 建イン	1								
相生技部	1								
相工計画									
※ 調達 (相)									
相工技									
相工務									
相品管部									
※ 予算									
※ 海営									
控									
合計	16								
		NO.	DATE	DESCRIPTION	DRAWN	DESIGNED	CHECKED	APPROVED	
		SCALE		Van Phong 1 BOT Thermal Power Plant Project					
		1ST ANGLE PROJECTION		Basic Operation Philosophy for Boiler					
		3RD ANGLE PROJECTION							
				Basic Design Group Boiler Basic Design Dept. Engineering Center Boilers Business Unit Resources, Energy & Environment Business Area	DRAWING NO.			REV.	
					JOB NO.	CODE NO.		D	
					5411-F37	K090-05A		1	
								11	

1. Purpose of This Document

This document provides the basic operation philosophy for boiler in Van Phong 1 BOT Thermal Power Plant Project. The boiler is designed to operate in compliance with EPC Contract Schedule 11 “Development Agreement Obligations Pertinent to Contractor” and the Vietnamese Grid Code.

2. Contents

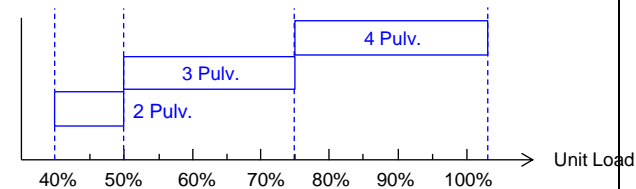
1. Normal Operation	P. 3
2. Boiler Start-up	P. 6
3. Boiler Shutdown	P. 7
4. Pulverizer Operation	P. 8
5. Fuel Oil Burner Operation	P. 9
6. Mixed Firing	P. 9
7. Auxiliary Steam	P. 10
8. Runback Operation caused by Boiler	P. 10
9. House Load Operation	P. 11
10. Boiler Island Operation	P. 11
11. MFT	P. 11

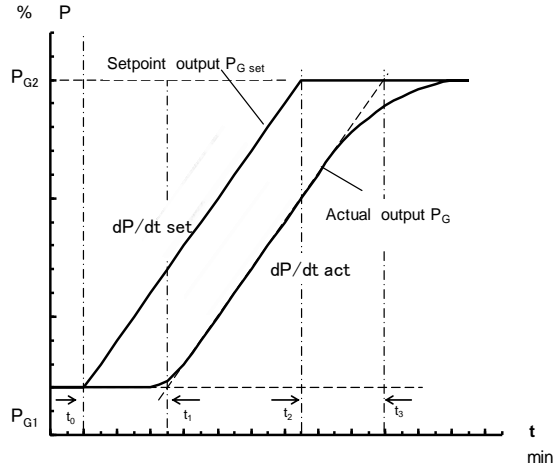
3. Reference Documents

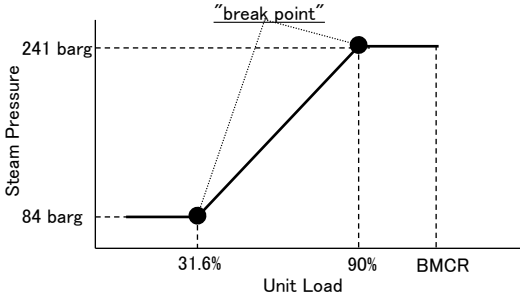
	Document No.	IHI Document No.
Development Agreement Obligations Pertinent to Contractor	EPC Contract Schedule 11	N/A
Heat Balance Diagram	VP1-C-L2-G-MA-00001	N/A
P&ID for Air and Flue Gas System	VP1-C-L1-P-H-25006	K300-311
P&ID for Steam and Feedwater System	VP1-C-L1-P-L-25007	K600-311
System Description for Air and Flue Gas System	VP1-C-L1-P-H-25000	K300-3A1
System Design Description for Steam and Feedwater System (IHI Portion)	VP1-C-L1-P-L-25001	K600-3A1
Function of Burner Management System	VP1-C-L1-I-CJF-55012	K460-841
Commissioning Procedure for Boiler Cold Clean Up	VP1-C-L1-F-H-95028	E097-914
Boiler Feedwater Quality Requirement	VP1-C-L1-M-HAY-00506	K090-059

DRAWING NO	
JOB NO	CODE NO
5411-F37	K090-05A

No.	Item	Basic Operation	Remarks
1	Normal Operation	<p>(1) Normal Operation</p> <p>Once the boiler start-up operation has been completed, the boiler operations shifted to "Normal Operation" (i.e., boiler can be operated according to the load demand with dispatching power control) when following conditions are established.</p> <ul style="list-style-type: none"> - Boiler is operated with once through operation (Dry mode) - Coal firing - HP bypass valves and LP bypass valves are fully closed - All feedwater heaters (HP and LP heaters) are in service - All necessary controllers are put in automatically <p>(2) Normal Operation Range</p> <p>40%NDC to 100%NDC</p> <p>(3) Minimum Continuous Load without Ignition Fuel Oil Support</p> <p>40%NDC</p> <p>(4) Steam Temperature Control Range</p> <p>The steam temperature control load range are as follow.</p> <ul style="list-style-type: none"> - Main steam temperature at turbine inlet (566degC) 40%NDC to BMCR - Hot reheat steam temperature at turbine inlet (566degC) 75%NDC to BMCR <p>(5) Pulverizer Operation Band</p> <p>The boiler is equipped with five (5) pulverizers. For normal operation with 100%NDC, four (4) pulverizers are in service and one (1) pulverizer is reserved.</p> <p>The pulverizer has an allowable operation range of coal flow. Minimum range is defined to avoid possible vibration as a result of gridding roller slipping. Maximum range is defined by gridding capacity of pulverizer. Due to its range, "pulverizer operation band" which is allowable operation range related to the number of operating pulverizer is defined as follow.</p> <ul style="list-style-type: none"> - 4 pulverizers band: 75%NDC to 100%NDC - 3 pulverizers band: 50%NDC to 75%NDC - 2 pulverizers band: 40%NDC to 50%NDC <p><u>NOTE</u></p> <p>a. These operating bands will be optimized and finalized during detail design / commissioning stage.</p> <p>b. For pulverizer Start-up or shutdown sequence, approx. 30 min stable unit load is required to maintain stable condition.</p> <p>Unit load change can be started after pulverizer Start-up or shutdown sequence is completed.</p> <p>c. In case of two (2) pulverizers out of service, maximum generated output cannot achieve the BMCR load even if fuel oil burners are also light-off.</p> <p>d. Pulverizer Start-up or shutdown is conducted manually according to unit load.</p>	



No.	Item	Basic Operation	Remarks
1	Normal Operation (cont'd)	<p>(6) Fuel Oil Burners Operation</p> <ol style="list-style-type: none"> Fuel oil burners are required to be fired during unit Start-up and shutdown. Fuel oil burners are required to be fired during pulverizer individual Start-up and shutdown. Fuel oil burners are not required to be fired at the normal operating load from 40% to BMCR except above situation. <p>(7) Ramp Rate during Normal operation</p> <p>40%NDC to 50%NDC: 1%NDC/min</p> <p>50%NDC to 100%NDC: 2%NDC/min</p> <p><u>NOTE</u></p> <ol style="list-style-type: none"> Above ramp rate apply to each pulverizer band where each pulverizer band relates to 2, 3 and 4 pulverizers in service. At the time of Pulverizer Start-up and shutdown across the Pulverizer band (i.e. 75%L), the above ramp rate is excluded. <p>(8) Definition of Ramp Rate</p> <p>Ramp rate is defined as following conditions.</p> <ol style="list-style-type: none"> During ramp load change, any process deviations/alarms such as steam pressure/ temperature, air and flue gas draft shall be allowed without unit trip. Ramp rate shall be defined based on following formula. $\text{Load Change Rate [\%NDC/min]} = (P_{G2} - P_{G1}) / (t_3 - t_1)$ <p>P_{G2} : Set point generator output after load change [%NDC]</p> <p>P_{G1} : Generator output before load change [%NDC]</p> <p>Time delay from start of MW demand change to start of actual MW change (t_1-t_0) shall not be considered for load change rate. (See the curve)</p> <p><u>NOTE</u></p> <ol style="list-style-type: none"> Steam Temperature Variation at steam turbine inlet: <p>Proposed steam temperature variation during load ramp change : +20 / -40 deg.C</p> <p>This temperature variation is preliminary basis. To be discussed with L2.</p> <ol style="list-style-type: none"> The DCS tuning including the tuning of load ramp change will be done at site during plant commissioning. 	

No.	Item	Basic Operation	Remarks
1	Normal Operation (cont'd)	<p data-bbox="315 188 517 212">(9) Operating Pressure</p> <p data-bbox="349 220 1279 244">The boiler is designed to operate in the sliding (variable) pressure up to the "break point" as following curve.</p> <p data-bbox="349 248 826 272">The "break point" shall be coordinated with L2 supplier.</p> <div data-bbox="465 292 983 587">  <p>The graph illustrates the boiler's operating pressure curve. The Y-axis represents Steam Pressure in barg, with marked values at 84 and 241. The X-axis represents Unit Load, with marked values at 31.6%, 90%, and BMCR. The curve is horizontal at 84 barg until 31.6% unit load, then rises linearly to 241 barg at 90% unit load (labeled 'break point'), and remains constant at 241 barg until BMCR.</p> </div>	

No.	Item	Basic Operation	Remarks
2	Boiler Start-up	<p>(1) Break Point for Auto Plant Start-up (APS) Sequence</p> <p>Following is the breakpoints for APS. At each breakpoint, operator checks the operation condition and decides to proceed next sequence. Breakpoint will be finalized after coordination with L2 and L3.</p> <p>●Preparation for Unit Start-up → ●Turbine Clean Up → ●Boiler Clean Up → ●Boiler Light-off Preparation → ●Boiler Light-off → ●Turbine Start → ●Synchronization → ●Load Up</p> <p>(2) Estimated Start-up time (*1)</p> <ul style="list-style-type: none"> - Initial Cold Mode (Time of outage : >72hrs) Light off to MCR : 715min. - Cold Mode (Time of outage : 56-72hrs) Light off to MCR : 590min. - Warm Mode (Time of outage : 8-56hrs) Light off to MCR : 415min. - Hot Mode (Time of outage : <8hrs) Light off to MCR : 220min. <p><u>NOTE</u></p> <p>a. Starting point of duration is defined as completion of boiler furnace purge and establish of water quality. Ending point of duration is defined as achieving NDC load.</p> <p>b. Start-up time may be changed depending on coal properties. The high moisture coal and the low HGI coal have a little negative impact on the start -up time.</p> <p>(3) Wet Mode and Dry Mode Operation during Start-up</p> <p>The boiler operating condition is transferred from "Wet Mode" to "Dry Mode" during start-up. The transfer load is between 35%NDC to 40%NDC.</p> <p>(4) Boiler Filling and Clean-up Sequence</p> <p>a. Boiler Filling</p> <p>When the feedwater quality satisfies the permissible level for introducing to the boiler (*2), the boiler filling can be started. During this procedure, boiler feedwater flow is maintained to be 5%BMCR to 10%BMCR. When the separator drain tank level reaches the set point, the boiler filling is completed.</p> <p>b. Boiler Cold Clean-up</p> <p>Boiler cold clean-up should be carried out to establish the water quality for burner ignition (*2). There are two steps in this boiler cold clean-up as follows.</p> <p>If the evaporator outlet fluid temperature is 120degC or higher (boiler warm, hot or very hot mode), this cold clean-up process can be skipped.</p> <p>(i) Cold Clean-up Blowdown</p> <p>All of feedwater through economizer, furnace and separator drain tank should be dumped out of the cycle via P-valve and Pb-valve until the water quality achieves the acceptable value for the condenser. The feedwater flow is maintained to be 25%BMCR</p> <p>(ii) Cold Clean-up Circulation</p> <p>Subsequently to the completion of "Cold Clean-up Blowdown", all of feedwater through economizer, evaporator and separator drain tank could be collected into condenser via P-valve and Pb-valve(*3). This circulation step is conducted until the water quality reaches the acceptable value for ignition (*2). The feedwater flow is maintained to be 25%BMCR.</p> <p>Please refer to the Boiler Clean-up Procedure(*4) for the details.</p> <p>(5) Steam pressure control at boiler start-up</p> <p>a. In Wet mode operation, steam pressure is controlled by turbine bypass valve.</p> <p>b. After conversion from Wet mode to One-through mode, steam pressure is controlled under feedwater control mode.</p>	<p>(*1) The definition of the boiler start mode in terms of temperature at the inlet of separator manifold is shown below.</p> <ul style="list-style-type: none"> - Initial Cold mode : < 120 degC - Cold mode : 120 - 150 degC - Warm mode : 150 - 200 degC - Hot mode : > 200 degC <p>(*2) Refer to VP1-C-L1-M-HAY-00506 (K090-059), Boiler Feedwater Quality Requirement</p> <p>(*3) Refer to VP1-C-L1-P-L-25007 (K600-311), P&ID for Steam and Feedwater Steam</p> <p>(*4) Refer to VP1-C-L1-F-H-95028 (E097-914), Commissioning Procedure for Boiler Cold Clean Up</p>

No.	Item	Basic Operation	Remarks
2	Boiler Start-up (cont'd)	<p>(6) Start-up Completion</p> <p>The first coal pulverizer will be started with PB operation after some plant conditions of draft system and individual pulverizer system are completed (*5). Boiler start-up mode will be completed when following conditions are all satisfied. After completion of boiler start-up mode, normal operation ramp rate can be applied.</p> <ul style="list-style-type: none"> a. Reach to 50% rated load with stable. b. All designed number of pulverizers at each load are placed into service. (*6) c. All steam temperature and pressure reach to designed value at each load (*7) d. For water chemistry requirements during plant start up, please refer to document "VP1-C-L1-M-HAY-00506". <p>(7) Fuel Oil Burners control during boiler start-up</p> <p>Fuel oil burners are placed into service automatically when receiving signals from APS. The fuel oil burners will be shut-down after two pulverizers will have started and the target MWD will be reached during the boiler start-up period. The fuel oil burners are designed to be capable of 30%NDC operation. The minimum load without oil support is 40%NDC.</p> <p>(8) Pulverizer Operation during boiler start-up</p> <p>Pulverizers are placed into service manually according to unit load (*8).</p>	<p>(*5) Refer to VP1-C-L1-CJF-55012 (K460-841), Function of Burner Management System</p> <p>(*6) The designed number of pulverizers are shown in Section 1 (5).</p> <p>(*7) The designed steam temperature and pressure at each load are shown in EPC Schedule 8-4 "Heat Balance Diagram".</p> <p>(*8) The precipitators enter service before the pulverizers starting-up based on IHI's experience.</p>
3	Boiler Shutdown	<p>(1) Break Point for Auto Plant Shutdown (APS) Sequence</p> <p>Following is the breakpoints for APS. At each breakpoint, operator checks the operation condition and decides to proceed next sequence. Breakpoint will be finalized after coordination with L2 and L3.</p> <p>●Preparation for Unit Shutdown → ●Load Down → ●Desynchronization → ●Boiler Shutdown → ●Aux. Equipment Shutdown</p> <p>(2) Boiler Shutdown</p> <ul style="list-style-type: none"> a. Normal boiler shutdown operation will commence on 40%NDC with 2 pulverizers in service . b. To keep 40%NDC and 2 pulverizers are required for minimum 30 min. to release accumulated heat in boiler. c. Supplemental firing of fuel oil burners during unit shutdown is required for safety shutdown to absorb coal flow fluctuation during pulverizer shutdown sequence. d. The de-loading rate is shown below. <ul style="list-style-type: none"> - From 100%NDC to 40%NDC : 2%NDC/min - From 40NDC to opening the main circuit breaker : 1%NDC/min e. For water chemistry requirements during plant shutdown, please refer to document "VP1-C-L1-M-HAY-00506". <p>(3) Steam pressure control at shutdown</p> <p>Start-up bypass valve is required to control main steam pressure below 40%NDC.</p> <p>(4) Fuel Oil Burners operation during boiler shutdown</p> <p>Fuel oil burners are placed into service and placed out of service automatically when receiving light off or shutdown signals from APS.</p> <p>(5) Pulverizer Operation during boiler shutdown</p> <p>Pulverizers are placed out of service manually according to unit load.</p>	

No.	Item	Basic Operation	Remarks
3	Boiler Shutdown (cont'd)	<p>(6) Boiler shutdown mode</p> <p>a. Boiler bunking mode Boiler bunking condition can be established to keep the boiler warm by closing required air / gas dampers.</p> <p>b. Boiler forced cooling mode Boiler forced cooling can be carried out by cooling air from FDF.</p>	
4	Pulverizer Operation	<p>(1) Pulverizer Operating Band Refer to section 1-(5).</p> <p>(2) Minimum Operating Quantity of Pulverizer Minimum two(2) pulverizers are required to establish normal operating condition.</p> <p>(3) Pulverizer Start and Stop Pulverizers are placed into service and out of service manually by pulverizer start-up PB and shut-down PB in accordance with unit load demand.</p> <p>(4) Individual Start-up and Shut-down Sequence Pulverizer has an individual automatic start-up and shut-down sequence.</p> <p>(5) Pulverizer Outlet Temperature Pulverizer outlet temperature is controlled at 65 degC (*9)</p> <p>(6) Minimum Coal Flow Rate Minimum coal flow rate without supplementary oil firing is 25t/h per pulverizer.</p> <p>(7) Un-purged pulverizer start In case of pulverizer trip or MFT, un-purged coal will remain in pulverizers. The un-purged pulverizer after pulverizer tripped or MFT is not allowed to start without cleaning of the remaining coal in the pulverizer by vacuum car to avoid pulverizer fire.</p> <p>(8) Pyrite Purge At normal operation, pyrite purged from each pulverizer is collected into pyrite hopper provided with each pulverizer. The collected pyrite in the hopper is stored in pyrite box. The pyrite in the pyrite box needs to be pull out manually in case high level is detected.</p>	(*9) This setting is Performance Coal condition. Actual operation condition will be finalized in commissioning.

No.	Item	Basic Operation	Remarks
5	Fuel Oil Burner Operation	<p>(1) Fuel Oil Burner Capacity Total capacity is equivalent to 30%NDC.</p> <p>(2) Fuel Oil Burner Start and Stop All burners are placed into service and out of service automatically by APS and BMS in following cases, as far as MFT and required interlock for fuel oil burners are reset.</p> <ul style="list-style-type: none"> - Boiler start-up and shut-down - Pulverizer start-up and shut-down <p>(3) Fuel Oil Flow Control Burner fuel oil flow is controlled by fuel oil flow control valve located in boiler area.</p> <p>(4) Fuel Oil Pressure Control Burner fuel oil pressure is required to control 1.4MPa(g) (*10) at inlet of fuel oil flow control valve by oil pump outlet pressure control valve(*11).</p> <p>(5) Burner Purge Sequence Once burner is shutoff, burner purge sequence will automatically start and fuel oil remained from burner individual shutoff valve to burners will be purged into furnace with using atomizing steam. However, in case of MFT, burner purge sequence will be blocked to start and/or continue because there is no flame in furnace. In this case, un-purged burner guns shall be removed and fuel oil remained inside the burner guns shall be cleaned up manually.</p>	<p>(*10) This setting is design condition. Actual operation condition will be finalized in commissioning.</p> <p>(*11) L3 Scope</p>
6	Mixed Firing	<p>Mixed firing of coal and oil at same burner port is allowed to following condition.</p> <ul style="list-style-type: none"> a. Boiler start-up and shutdown mode of unit. b. Pulverizer individual start-up and shutdown. <p>In normal operation, the mixed firing of coal and oil at same burner port is not permitted.</p>	

No.	Item	Basic Operation	Remarks
7	Auxiliary Steam	<p>(1) Auxiliary Steam System for Boiler</p> <p>a. Steam users</p> <ul style="list-style-type: none"> - Boiler and GAH Sootblowers (Intermittent) - Pulverizer Inert Steam (Start-up / Shutdown of Pulverizers) - Atomizing Steam for fuel oil burners (Start-up / Shutdown and Support firing of Pulverizers) <p>b. Steam source</p> <ul style="list-style-type: none"> - Auxiliary boiler (L3 Scope): Unit start-up and Unit shutdown - Boiler HRA wall outlet header: when cold reheat steam pressure is less than 2.5MPa (less than 50%NDC) (*12) - Cold Reheat Pipe: when cold reheat steam pressure is more than 2.5MPa (more than 50%NDC) (*12) <p>c. Steam Condition of Auxiliary Steam Header.</p> <ul style="list-style-type: none"> - Pressure : 2.0MPa (*13) <p>(2) Auxiliary Steam System for others</p> <p>Prepared by L2 and L3.</p>	<p>(*12) Steam pressure and plant load are tentative.</p> <p>(*13) This setting is design condition. Actual operation condition will be finalized in commissioning.</p>
8	Runback Operation Caused by Boiler	<p>(1) Runback Items</p> <ul style="list-style-type: none"> - Pulverizer Trip Runback (4 sets to 3 sets) - Pulverizer Trip Runback (3 sets to 2 sets) - Draft System (Any FDF or PAF or IDF) Trip Runback (2 units to 1 unit) - T-BFP Trip Runback (2 units to 1 unit) <p>(2) Pulverizer Trip Runback Operation</p> <p>When pulverizer runback happens, coal flow rate of remaining pulverizers are maintained and MWD is reduced to the load which is equivalent to the coal flow rate of remaining pulverizers.</p> <p>(3) Draft System Trip Runback</p> <p>If one draft system tripped (Any FDF or PAF or IDF(*14)), unit load will be reduced to 40% Load without tripping of other fans.</p> <p>In case of PAF trip, fuel oil burners operation is required. Under discussion.</p> <p>(4) Mode of operation during runback</p> <p>Control mode is transferred from "boiler-turbine coordinated control" to "load tracking mode" ("Turbine follow mode").</p> <p>Turbine inlet steam pressure is controlled by turbine governor.</p>	<p>(*14) IDF is L3 Scope</p>

No.	Item	Basic Operation	Remarks
9	House Load Operation	<p>In the case of load rejection, each Unit runbacks to house load without unit tripping and power its auxiliaries to maintain the availability of the Unit.</p> <p>The boiler load is reduced to 40% Load.</p> <p>Following is the change of operating condition while house load operation is occurred.</p> <ol style="list-style-type: none"> Required generated steam changes to equivalent to 40%NDC. The pulverizers trip and the number of operating pulverizers becomes two. Turbine bypass valve opens to control the HP & IP turbine inlet press. in constant. <p>Revised as per discussion with owner.</p>	
10	Boiler Island Operation	<p>In the case of turbine trip, the boiler runbacks to boiler single operation load without boiler tripping.</p> <p>The boiler load is reduced to 30% Load.</p> <p>Following is the change of operating condition while boiler single operation is occurred.</p> <ol style="list-style-type: none"> Required generated steam changes to equivalent to 30%NDC. The pulverizers trip and the number of operating pulverizers becomes two. Turbine bypass valve opens to dump steam to condenser. 	
11	MFT	<p>(1) MFT Items caused by Boiler are as follows;</p> <ul style="list-style-type: none"> - MFT PB ON - Both FDFs Trip - Both IDFs Trip (*14) - Furnace Draft High High / Low Low - Complete Flame Failure - Partial Loss of Flame - All Fuel Input Shut Off - Total Combustion Air Flow Low Low - Reheater Protection - Main Steam Pressure High High - Feedwater Flow Low Low - Both BFPs Trip (*15) - Separator Inlet Manifold Steam Temperature High High - GAH Trip - Separator Drain Tank Level High High <p>(2) MFT Items caused by Turbine Generator (*16) are follows;</p> <ul style="list-style-type: none"> -Turbine Trip Deleted because boiler single operation is considered. - Condenser Protection - Loss of DCS power supply, DCS failure 	<p>(*14) IDF is L3 Scope</p> <p>(*15) BFP is L2 Scope</p> <p>(*16) MFT items are coordinated with L2 supplier.</p>