ANNEX 3

TRANSFORMER AND CONTROL SYSTEM

Check list of site inspection for Transformer and Control System
(Unit 1)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of Substation

1-1. Disconnecting Switch 121 and 221 (161 kV DS)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 11, 13-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 121					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	—1)	—1)	—1)	-
DS 221					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) It was not operated during inspection period.

1-2. Circuit Breaker C21 (161 kV ACB) – paralleling-switch

Manufacturer TOSHIBA
Type ACF-161K
Manufactured in 1958
Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△1)	△1)	△1)	123
3	Condition of air-tank	○	○	○	-
4	Condition of control panel	○			124
5	Air pressure value [lbw/in^2]	237			-
6	Switching condition	○	○	○	-
7	Number of switching	1,988			125

1) The ironware was rusty.

1-3. Current Transformer

Manufacturer TOSHIBA
Type AR / QM14OB
Manufactured in 1958
Inspection in 13-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	131
2	Condition of ironware	△1)	△1)	△1)	133
3	Condition of the body	○	○	○	-
4	Oil level	○2)	○2)	○2)	133

1) The ironware was rusty.
2) It is difficult to read oil level due to the discoloration.

1-4. Arrester (121 kV)

Manufacturer TOSHIBA
Type Ph. A, B RV-LC121Y / Ph. C RVLFC-121MY
Manufactured in Ph. A, B 1958 / Ph. C 1980
Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	141
2	Condition of ironware	○	○	○	-

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer MITSUBISHI Electric
Manufactured in 1959
Inspection in 13-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	1504-09
2	Condition of oil cooler	×2)	×2)	△3)	1510-14
3	Check for oil leaks	×4)	×4)	○	1515-20
4	Condition of insulator	○	○	○	-
5	Condition of meters	△5)	△5)	×6)	1521-26
6	Oil level of Conservator (Gen. output 21MW) [%]	23	52	38	-
7	Temperature of oil (Gen. output 21MW) [℃]	35	35	ND6)	1525
8	Flow value of cooling water [l/sec]	ND7)			1527
9	Condition of N_2-SEAL equipment	×8)	×8)	×8)	1528-30
10	Operation sound	○	○	○	-

1) The main tank is rusty.
2) Insulation oil has been leaked. Packing has deteriorated.
3) There is no oil leakage. But packing has deteriorated.
4) The oil has been leaked in phase A and B.
5) The oil flow meter cannot be read due to the discoloration. Thermometer of phase A was replaced.
6) The oil flow meter cannot be read due to the discoloration. Thermometer is not working.
7) Water flow relay has been broken and the alarm is not used.
8) It has been removed for a long time.

1-6. 11kV Cable and BUS (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	161
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	163
4	Condition of cable (Outdoor part)	×1)			163-6
5	Condition of Cable cleat	×2)			164-6
6	Condition of cable-pit cover	×3)			167

1) The cable of outdoor part has severe degradation of the surface.
2) Cable cleat is rotten.
3) The cover was made of the checkered plate. The deformed cover is unstable and the some parts are lost. The cables are exposure to the weather, therefore degradation of a cable is in progress.

1-7. Control Cable and Tough

Inspection in 13-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	171
2	Condition of trough	×2)	×2)	×2)	-

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / KG148 / 11.5kV, 3,000A / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of the parts of DS.	○			212
3	Condition of the contact of DS.	○	○	○	213
4	Condition of moving system at DS.	○			-
5	Operation number of DS.	ND			-
6	Condition of cable head	○	○	○	-
7	Condition of cable (Indoor part)	○	○	○	214

2-2. Surge Absorber

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / SR / 0.3μF-11.5kV / 1958 / TOSHIBA

SA (Arrester) / RV-R1A / 10kV / 1958 / TOAHIBA

Tr / DI-CC / 1kVA-11000:220V / 1958 / HITACHI

DS (for SA) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (for Tr) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of SA. (Capacitor)	×1)	○	○	225-6
3	Condition of SA. (LA)	○	○	○	-
4	Condition of Tr.	○			-
5	Condition of DS. (for SA.)	○			222
6	Condition of DS. (for Tr.)	○			-

1) The paint of case is peeling off. A little oil is leaked from earthing part. It is recommended that the insulation should be maintained before an accident occurs.
This equipment seems to contain PCB. It is recommended that countermeasure for PCB should be carried out.

2-3. Voltage Transformer

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / VTR-SM10A / 11k/110V-2x200VA / 1958 / TOSHIBA

VT2 / VTR-SM10A / 11k/110V-2x500VA / 1958 / TOSHIBA

Fuse-DS1 (for VT1) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Fuse-DS2 (for VT2) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Inspection in 11-Jul-2012

Items		Result	Photo No.
1	Condition of cabinet	○	-
2	Condition of VT1 (front side)	○	-
3	Oil level of VT1	×1)	234
4	Condition of VT2 (back side)	○	-
5	Oil level of VT2	○	235
6	Condition of DS1	○	-
7	Condition of DS2	○	-

1) Oil level cannot be checked by oil level gauge.

2-4. INCOMING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / VTR-SM10A / 11k/110V-2x200VA / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of CT	○	○	○	-
3	Condition of cable head	○	○	○	
4	Condition of cable (from Gen.)	○	○	○	-

2-5. HOUSE SERVICE

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H11) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (89H12) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Cable (to 89H11) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H12) / (UK) / (UK) / (UK) / (UK)

Cable Head (to 89H12) / (UK) / (UK) / (UK) / (UK)

Inspection in 11-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of DS (89H11)	○			252
3	Switching condition of DS (89H11)	○			-
4	Condition of DS (89H12)	○			-
5	Switching condition of DS (89H12)	○			-
6	Condition of cable head	○	○	○	-
7	Condition of cable	○	○	○	-

3. Control Panel for Generator

3-1. GEN (Control Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	312-5
2	Operating conditions of meter	○	312
3	Condition of status indicator	○	313
4	Condition of fault indicator	×2)	314
5	Condition of oscillograph	×3)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Fault indicator may malfunction due to the degradation.
3) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Unit 2)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of Substation

1-1. Disconnecting Switch 122 and 222 (161 kV DS)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 18, 21-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 122					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	△1)	△1)	△1)	112-4
4	Switching condition	—2)	—2)	—2)	-
DS 222					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) The tip of the blade side contactor has melted.
2) It was not operated during inspection period.

1-2. Circuit Breaker C22 (161 kV ACB) – paralleling-switch

Manufacturer TOSHIBA
Type ACF-161K
Manufactured in 1958
Inspection in 18, 21-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△1)	△1)	△1)	123
3	Condition of air-tank	○	○	○	-
4	Condition of control panel	○			-
5	Air pressure value [lbw/in^2]	215			-
6	Switching condition	○	○	○	-
7	Number of switching	2,217			-

1) The ironware was rusty.

1-3. Current Transformer

Manufacturer TOSHIBA
Type AR / QM14OB

Manufactured in 1958
Inspection in 18, 20-Jul-2012

	Items	Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	△1)	○	132
2	Condition of ironware	△2)	△2)	△2)	135
3	Condition of the body	○	○	○	-
4	Oil level	○3)	○3)	○3)	133-4

1) Oil has been leaked from the repaired point.
2) The ironware was rusty.
3) Oil level is difficult to read due to the discoloration of oil level gauge.

1-4. Arrester (121 kV)

Manufacturer TOSHIBA
Type RV-LC121Y
Manufactured in 1958
Inspection in 18-Jul-2012

	Items	Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer MITSUBISHI Electric
Manufactured in 1958
Inspection in 19, 21-Jul-2012

	Items	Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	△3)	×2)	△3)	1514-17
3	Check for oil leaks	×4)	×4)	×4)	1513-15
4	Condition of insulator	○	○	○	-
5	Condition of meters	×5)	×5)	△6)	1507-12
6	Oil level of Conservator (Gen. output 22MW) [%]	25	29	47	-
7	Temperature of oil (Gen. output 22MW) [℃]	ND5)	ND5)	32	1507-09
8	Flow value of cooling water [l/sec]	ND7)			1503
9	Condition of N_2-SEAL equipment	×8)	×8)	×8)	-
10	Operation sound	○	○	○	-

1) The main tank is rusty.
2) Insulation oil has been leaked. Packing has deteriorated.
3) There is no oil leakage. But packing has deteriorated.
4) The oil leakage has occurred at all phase.
5) The oil flow meter cannot be read due to the discoloration. Thermometer is not working.
6) The oil flow meter cannot be read due to the discoloration. Thermometer is not working.
7) Water flow relay has been broken and the alarm is not used.
8) It has been removed for a long time.

1-6. 11kV Cable and BUS (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	-
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	162
4	Condition of cable (Outdoor part)	×1)			164-6
5	Condition of Cable cleat	×2)			167
6	Condition of cable-pit cover	×3)			169

1) The cable of outdoor part has severe degradation of the surface.
2) Cable cleat is rotten.
3) The cover was made of the checkered plate. The deformed cover is unstable and some parts are lost. The cables are exposure to the weather, therefore degradation of a cable is in progress.

1-7. Control Cable and Trough

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	171
2	Condition of trough	×2)	×2)	×2)	172

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / KG148 / 11.5kV, 3,000A / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of the parts of DS.	○			-
3	Condition of the contact of DS.	○	○	○	-
4	Condition of moving system at DS.	○			-
5	Operation number of DS.	ND			-
6	Condition of cable head	△1)	△1)	△1)	214-7
7	Condition of cable (Indoor part)	○	○	○	-

1) Although the oil leakage was found, it does not have impact on performance.

2-2. Surge Absorber

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / SR / 0.3μF-11.5kV / 1958 / TOSHIBA

SA (Arrester) / RV-R1A / 10kV / 1958 / TOAHIBA

Tr / DI-CC / 1kVA-11000:220V / 1958 / HITACHI

DS (for SA) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (for Tr) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of SA. (Capacitor)	○	○	○	-
3	Condition of SA. (LA)	○	○	○	-
4	Condition of Tr.	○			-
5	Condition of DS. (for SA.)	○			-
6	Condition of DS. (for Tr.)	○			-

2-3. Voltage Transformer

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / VTR-SM10A / 11000:110V-2x200VA / 1958 / TOSHIBA

VT2 / VTR-SM10A / 11000:110V-2x500VA / 1958 / TOSHIBA

Fuse-DS1 (for VT1) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Fuse-DS2 (for VT2) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Inspection in 17-Jul-2012

Items		Result	Photo No.
1	Condition of cabinet	○	-

2	Condition of VT1 (front side)	○	-
3	Oil level of VT1	×1)	233
4	Condition of VT2 (back side)	○	-
5	Oil level of VT2	○	-
6	Condition of DS1	○	-
7	Condition of DS2	○	-

1) Oil level cannot be checked by oil level gauge.

2-4. INCOMING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / ADB10A / 2,000:5A, 4x40VA, 11kV / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of CT	○	○	○	-
3	Condition of cable head	○	○	○	
4	Condition of cable (from Gen.)	○	○	○	-

2-5. HOUSE SERVICE

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H21) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (89H22) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Cable (to 89H21) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H22) / (UK) / (UK) / (UK) / (UK)

Cable Head (to 89H22) / (UK) / (UK) / (UK) / (UK)

Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of DS (89H21)	○			-
3	Switching condition of DS (89H21)	○			-
4	Condition of DS (89H22)	○			-
5	Switching condition of DS (89H22)	○			-
6	Condition of cable head	○	○	○	-
7	Condition of cable	○	○	○	-

3. Control Panel for Generator

3-1. GEN (Control Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Operating conditions of meter	○	-
3	Condition of status indicator	○	-
4	Condition of fault indicator	×2)	-
5	Condition of oscillograph	×3)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Fault indicator may malfunction due to the degradation.
3) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Unit 3)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of substation

1-1. Disconnecting Switch 123 and 223 (161 kV DS)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19, 25, 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 123					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	—1)	—1)	—1)	-
DS 223					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) It was not operated during inspection period.

1-2. Circuit Breaker C23 (161 kV ACB) – paralleling-switch

Manufacturer TOSHIBA
Type ACF-161K
Manufactured in 1958
Inspection in 18, 25, 26-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△1)	△1)	△1)	122
3	Condition of air-tank	○	○	○	-
4	Condition of control panel	○			-
5	Air pressure value [kgf/cm^2]	14.9 2)			125
6	Switching condition	○	○	○	-
7	Number of switching	1,342			-

1) The ironware was rusty.
2) The pressure gauge was replaced and the unit was changed.

1-3. Current Transformer

Manufacturer TOSHIBA
Type AR / QM14OB
Manufactured in 1958
Inspection in 19, 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△1)	△1)	△1)	132
3	Condition of the body	△2)	○	○	133
4	Oil level	ND3)	ND3)	ND3)	-

1) The ironware was rusty.
2) Oil leakage was repaired by putty.
3) Oil level is difficult to read due to the discoloration of oil level gauge.

1-4. Arrester (121 kV)

Manufacturer phase A, B: TOSHIBA, phase C: SIEMENS
Type phase A, B: RV-LC121Y, phase C: M2 120-ON
Manufactured in phase A, B: 1958, phase C: -
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer MITSUBISHI Electric
Manufactured in 1958
Inspection in 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	△3)	△3)	×2)	1524
3	Check for oil leaks	×4)	×4)	×4)	1526
4	Condition of insulator	○	○	○	-
5	Condition of meters	×5)	×5)	△6)	1504
6	Oil level of Conservator (Gen. output 22MW) [%]				-
7	Temperature of oil (Gen. output 22MW) [℃]				-
8	Flow value of cooling water [l/sec]	ND7)			-
9	Condition of N_2-SEAL equipment	×8)	×8)	×8)	1510
10	Operation sound	○	○	○	-

1) The main tank is rusty.
2) Insulation oil has been leaked. Packing has deteriorated.
3) There is no oil leak. But packing has deteriorated.
4) The oil leakage has occurred at all phase.
5) The oil flow meter cannot be read due to the discoloration. Thermometer is not working.
6) The oil flow meter cannot be read due to the discoloration.
7) Water flow relay has been broken and the alarm is not used.
8) It has been removed for a long time.

1-6. 11kV Cable and BUS (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	-
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	-
4	Condition of cable (Outdoor part)	×1)			163
5	Condition of Cable cleat	×2)			166
6	Condition of cable-pit cover	×3)			-

1) The cable of outdoor part has severe degradation of the surface.
2) Cable cleat is rotten.
3) The cover was made of the checkered plate. The deformed cover is unstable and some parts are lost. The cables are exposure to the weather, therefore degradation of a cable is in progress.

1-7. Control Cable and Trough

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	-
2	Condition of trough	×2)	×2)	×2)	-

1) Cable sheathing has deteriorated.
2) Degradation of a cable trough cover is severe and some parts are lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / KG148 / 11.5kV, 3,000A / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of the parts of DS.	○			-
3	Condition of the contact of DS.	○	○	○	-
4	Condition of moving system at DS.	○			-
5	Operation number of DS.	ND			-
6	Condition of cable head	○	△1)	△1)	214
7	Condition of cable (Indoor part)	○	○	○	-

1) Although the oil leakage was found, it did not have impact on performance.

2-2. Surge Absorber

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / SR / 0.3μF-11.5kV / 1958 / TOSHIBA

SA (Arrester) / RV-R1A / 10kV / 1958 / TOAHIBA

Tr / DI-CC / 1kVA-11000:220V / 1958 / HITACHI

DS (for SA) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (for Tr) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Inspection in 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of SA. (Capacitor)	○	○	○	-
3	Condition of SA. (LA)	○	○	○	-
4	Condition of Tr.	○			-
5	Condition of DS. (for SA.)	○			-
6	Condition of DS. (for Tr.)	○			-

2-3. Voltage Transformer

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / VTR-SM10A / 11000:110V-2x200VA / 1958 / TOSHIBA

VT2 / VTR-SM10A / 11000:110V-2x500VA / 1958 / TOSHIBA

Fuse-DS1 (for VT1) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Fuse-DS2 (for VT2) / FPJ-10-DJ / 11kV, 3A / 1958 / TOAHIBA

Inspection in 25-Jul-2012

Items		Result	Photo No.
1	Condition of cabinet	○	-
2	Condition of VT1 (front side)	○	-
3	Oil level of VT1	×1)	234
4	Condition of VT2 (back side)	○	-
5	Oil level of VT2	○	-
6	Condition of DS1	○	-
7	Condition of DS2	○	-

1) Oil level cannot be checked by oil level gauge.

2-4. INCOMING

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / ADB10A / 2,000:5A, 4x40VA, 11kV / 1958 / TOSHIBA

Cable / (UK) / 11kV, 1x1.5in^2 / 1958 / Shiowa Electric Wire & Cable

Cable Head / TEW-314 / (UK) / 1958 / Shiowa Electric Wire & Cable

Inspection in 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of CT	○	○	○	-
3	Condition of cable head	○	○	○	
4	Condition of cable (from Gen.)	○	○	○	-

2-5. HOUSE SERVICE

Manufacturer TOSHIBA

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H31) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

DS (89H32) / KG148 / 11.5kV, 600A / 1958 / TOSHIBA

Cable (to 89H31) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H32) / (UK) / (UK) / (UK) / (UK)

Cable Head (to 89H32) / (UK) / (UK) / (UK) / (UK)

Inspection in 25-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of DS (89H31)	○			-
3	Switching condition of DS (89H31)	○			-
4	Condition of DS (89H32)	○			-
5	Switching condition of DS (89H32)	○			-
6	Condition of cable head	○	○	○	-
7	Condition of cable	○	○	○	-

3. Control panel for Generator

3-1. GEN # (Control Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Operating conditions of meter	○	-
3	Condition of status indicator	○	-
4	Condition of fault indicator	×2)	-
5	Condition of oscillograph	×3)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Fault indicator may malfunction due to the degradation.
3) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection Panel)

Manufacturer TOSHIBA
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in 1958
Inspection in 11-Jul-2012

	Items	Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Unit 4)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of Substation

1-1. Disconnecting Switch 124 (161 kV DS) and 224 (145kV DS)

Manufacturer 124: TOSHIBA, 224: BBC (BROWN. BOVERI & CIE)
Type 124: PH-36K, 224: TO145mc75
Manufactured in 124: 1958, 224: 1972
Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 124					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	—1)	—1)	—1)	-
DS 224					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) It was not operated during inspection period.

1-2. Circuit Breaker C24 (145 kV GCB) – paralleling-switch

Manufacturer ABB
Type LTB145D1/B
Manufactured in 2008
Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of control panel	○			-
4	Gas pressure value [MPa]	-			-
5	Switching condition	○	○	○	-
6	Number of switching	517			-

1-3. Current Transformer

Manufacturer emek (Made in Turkey)
Type AT1-145
Manufactured in 2010
Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of the body	○	○	○	-
4	Oil level	○	○	○	-

1-4. Arrester (121 kV)

Manufacturer BBC
Type HK F 123
Manufactured in 1971
Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	△1)	△1)	△1)	143-5
2	Condition of ironware	○	○	○	-
3	Number of counter	200	226	2	-

1) Although the crack was found to rib of the insulator of each phase, the serious damage for the main part is not found.

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer ELIN (Made in Austria)
Manufactured in 1971
Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	△2)	△2)	△2)	-
3	Check for oil leaks	×3)	×3)	×3)	-
4	Condition of insulator	○	○	○	-
5	Condition of meters	△4)	△4)	△4)	-
6	Oil level of Conservator (Gen. output 21MW) [%]	50	55	55	-
7	Temperature of oil (Gen. output 21MW) [℃]	45	43	42	-
8	Operation sound	○	○	○	-

1) The main tank is rusty.
2) All coolers are replaced with parts which are not from original company.
3) The oil leakage has occurred at all phase.
4) The temperature and pressure meter are difficult to read due to the discoloration.

1-6. 11kV Cable and Bus (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	-
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	-
4	Condition of cable (Outdoor part)	△1)			164
5	Condition of Cable cleat	△2)			166
6	Condition of cable-pit cover	×3)			-

1) The surface of a cable has deteriorated and a fine crack is seen.
2) Cable cleat deteriorated.
3) Cable pit does not have the cover.

1-7. Control Cable and Trough

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	171-2
2	Condition of trough	×2)	×2)	×2)	-

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer BBC

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / ADG2491 / 24kV, 4,000A / (UK) / BBC

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	×1)			2108-11
2	Condition of the parts of DS.	×2)			2102
3	Condition of the contact of DS.	-	-	-	-
4	Condition of moving system at DS.	×3)			-
5	Operation number of DS.	ND			-
6	Condition of cable head	×4)	×4)	×4)	2103-05
7	Condition of cable (Indoor part)	(UK)5)	(UK)5)	(UK)5)	-

1) The cabinet has deteriorated by the operation mistake in 1996.
2) DS is lost by the operation mistake, and temporary connection is made with the copper plate.
3) Some operation mechanisms of DS remain, however cannot be used.
4) A part of cable head has a severe damage by the operation mistake of DS.
5) The cables cannot be checked because of the bottom cover of a cabinet.

2-2. Surge Absorber

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / Phfps 11/11, 4/1 / 11kV / 1971 / (UK)

SA (Arrester) / HKF kw 15 / Ub max.15kV / 1971 / BBC

DS / (UK) / 10kV, 630A / 1971 / BBC

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△1)			-
2	Condition of SA. (Capacitor)	○	○	○	-
3	Condition of SA. (LA)	○	○	○	-
4	Condition of DS.	○			-

1) The cabinet has deteriorated by the operation mistake of DS in “OUTGOING”.

2-3. Potential Transformer

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / (UK) / (UK) / (UK) / (UK)

VT2 / (UK) / (UK) / (UK) / (UK)

Fuse-holder (for VT1, 2) / DSP 20 / 20kV, 200A / 1971 / DRIESCHER.WEGBERG

Fuse / (UK) / 6A / (UK) / DRIESCHER.WEGBERG

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△1)			237

2	Condition of VT1 (front side)	○	○	○	-
3	Condition of VT2 (back side)	○	○	○	
4	Condition of Fuse & holder 1 (front side)	○			-
5	Condition of Fuse & holder 2 (back side)	○			-

1) The cabinet has deteriorated by the operation mistake of DS in "OUTGOING".

2-4. INCOMING

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / (UK) / (UK) / (UK) / (UK)

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△1)			242
2	Condition of cable head	○	○	○	-
3	Condition of cable (from Gen.)	○	○	○	-

1) The cabinet has deteriorated by the operation mistake of DS in "OUTGOING".

2-5. HOUSE SERVICE

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H41) / (UK) / (UK) / (UK) / (UK)

DS (89H42) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H41) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H42) / (UK) / (UK) / (UK) / (UK)

Inspection in 23-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	×1)			256,258
2	Condition of DS (89H41)	○			-
3	Switching condition of DS (89H41)	○			-
4	Condition of DS (89H42)	×2)			254
5	Switching condition of DS (89H42)	○			-
6	Condition of cable terminal	×3)	×3)	×3)	257
7	Condition of cable	△4)	△4)	△4)	259

1) The cabinet has serious degradation under the impact of the operation mistake of DS.

2) The part of bus and insulator are lost under the impact of the operation mistake of DS.

3) The terminal of the house service cable from No. 5 unit cannot be used under the impact of the operation mistake of DS.

4) The damage of a cable is not found however, the length will become less short by re-processing of a terminal.

3. Control Panel for Generator

3-1. GEN # (Meter panel)

Manufacturer BBC
Manufactured in -
Inspection in 23-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Operating conditions of meter	×2)	-
3	Condition of status indicator	○	-
4	Condition of fault indicator	×3)	-
5	Condition of oscillograph	×4)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Malfunction was confirmed by meter. This cause is considered to be TD.
3) Fault indicator may malfunction due to the degradation.
4) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer BBC
Manufactured in -
Inspection in 23-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection panel)

Manufacturer BBC
Manufactured in 19
Inspection in 23-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in 19
Inspection in 23-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Unit 5)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of Substation

1-1. Disconnecting Switch 125 (145 kV DS) and 225 (145kV DS)

Manufacturer BBC (BROWN. BOVERI & CIE)
Type TO145mc75
Manufactured in 1972
Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 125					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○2)	112
4	Switching condition	—1)	—1)	—1)	-
DS 225					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) It was not operated during inspection period.
2) There is a bird's nest in the contact part of DS 125. It is recommended that it should be removed.

1-2. Circuit Breaker C25 (145 kV GCB) – paralleling-switch

Manufacturer BBC
Type DCF170mc4
Manufactured in 1971
Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of control panel	△1)			124
4	Air pressure value [kg/cm^2]	15.8			-
5	Switching condition	○	○	○	-
6	Number of switching	629$^{2)}$			125

1) The window panel has been broken.
2) The counter was reset once or is considered not to work correctly.

1-3. Current Transformer

Manufacturer Phase A, B: BBC, Phase C: TOSHIBA
Type Phase A, B:TMBRh145 C:AR-QM140B1
Manufactured in Phase A, B:1972 C:1969
Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of the body	○	○	○	-
4	Oil level	-	-	○	-

1-4. Arrester (121 kV)

Manufacturer BBC
Type HK F 123
Manufactured in 1971
Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	△1)	○	△1)	143
2	Condition of ironware	○	○	○	-
3	Number of counter	200	190	90	-

1) Although the crack was found to rib of the insulator of each phase, the serious damage for the main part is not found.

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer ELIN (Made in Austria)
Manufactured in 1971
Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	△2)	△2)	△2)	-
3	Check for oil leaks	×3)	×3)	×3)	-
4	Condition of insulator	○	○	○	-
5	Condition of meters	△4)	△4)	△4)	1508-09
6	Oil level of Conservator (Gen. output 23MW) [%]	51	30	55	-
7	Temperature of oil (Gen. output 23MW) [℃]	42	39	42	-
8	Operation sound	○	○	○	-

1) The main tank is rusty.
2) All coolers are replaced with parts which are not from original company.
3) The oil leakage has occurred at all phase.
4) The temperature and pressure meter are difficult to read due to the discoloration.

1-6. 11kV Cable and Bus (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	-
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	-
4	Condition of cable (Outdoor part)	△1)			163
5	Condition of Cable cleat	△2)			-
6	Condition of cable-pit cover	×3)			163

1) The surface of a cable has deteriorated and a fine crack is seen.
2) Cable cleat deteriorated.
3) Cable pit does not have the cover.

1-7. Control Cable and Trough

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	-
2	Condition of trough	×2)	×2)	×2)	-

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer BBC

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / ADG2491 / 24kV, 4,000A / (UK) / BBC

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of the parts of DS.	○			-
3	Condition of the contact of DS.	○	○	○	-
4	Condition of moving system at DS.	○			-
5	Operation number of DS.	ND			-
6	Condition of cable head	○	○	△1)	214
7	Condition of cable (Indoor part)	(UK)2)	(UK)2)	(UK)2)	214

1) A part of cable head has a severe damage.

2) The cables cannot be checked because of the bottom cover of a cabinet. One of phase A was replaced to XLPE cable.

2-2. Surge Absorber

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / Phfps 11/11, 4/1 / 11kV / 1971 / (UK)

SA (Arrester) / HKF kw 15 / Ub max.15kV / 1971 / BBC

DS / AE12/630-52 / 10kV, 630A / 1971 / BBC

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of SA. (Capacitor)	○	○	○	-
3	Condition of SA. (LA)	○	○	○	-
4	Condition of DS.	○			-

2-3. Potential Transformer

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / (UK) / (UK) / (UK) / (UK)

VT2 / (UK) / (UK) / (UK) / (UK)

Fuse-holder (for VT1, 2) / DSP 20 / 20kV, 200A / 1971 / DRIESCHER.WEGBERG

Fuse / (UK) / 6A / (UK) / DRIESCHER.WEGBERG

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of VT1 (front side)	○	○	○	-
3	Condition of VT2 (back side)	○	○	○	-
4	Condition of Fuse & holder 1 (front side)	○			-

5	Condition of Fuse & holder 2 (back side)	○	-

2-4. INCOMING

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / (UK) / (UK) / (UK) / (UK)

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of cable head	○	○	○	-
3	Condition of cable (from Gen.)	○	○	○	-

2-5. HOUSE SERVICE

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H61) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H61) / (UK) / (UK) / (UK) / (UK)

Inspection in 27-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△ 1)			-
2	Condition of DS (89H51)	- 2)			-
3	Switching condition of DS (89H51)	- 2)			-
4	Condition of DS (89H52)	○			-
5	Switching condition of DS (89H52)	○			-
6	Condition of cable terminal	○	○	○	-
7	Condition of cable	× 3)	× 3)	× 3)	253

1) The cabinet has damage under the impact of the operation mistake of DS.

2) DS (89H51) was lost by the operation mistake.

3) The cable has damage under the impact of an operation mistake of DS.

3. Control Panel for Generator

3-1. GEN # (Meter panel)

Manufacturer BBC
Manufactured in
Inspection in 27-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Operating conditions of meter	×2)	-
3	Condition of status indicator	○	-
4	Condition of fault indicator	×3)	-
5	Condition of oscillograph	×4)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Malfunction was confirmed by meter. This cause is considered to be TD.
3) Fault indicator may malfunction due to the degradation.
4) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer BBC
Manufactured in
Inspection in 27-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection Panel)

Manufacturer BBC
Manufactured in 19
Inspection in 27-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in 19
Inspection in 27-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Unit 6)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of Substation

1-1. Disconnecting Switch 126 (145 kV DS) and 226 (145kV DS)

Manufacturer BBC (BROWN. BOVERI & CIE)
Type TO145mc75
Manufactured in 1972
Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
DS 126					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	—1)	—1)	—1)	-
DS 226					
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	○	○	○	-

1) It was not operated during inspection period.

1-2. Circuit Breaker (145 kV GCB) – paralleling-switch

Manufacturer BBC
Type DCF170mc4
Manufactured in 1971
Inspection in 19, 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of control panel	○			-
4	Gas pressure value [kg/cm^2]	16.1			-
5	Switching condition	○	○	○	-
6	Number of switching	2,240			124

1-3. Current Transformer

Manufacturer BBC
Type TMBRh145
Manufactured in 1972
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of the body	○	○	○	-

1-4. Arrester (121 kV)

Manufacturer BBC
Type HK F 123
Manufactured in 1971
Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter	221	201	203	-

1-5. Main Transformer (11/132kV, oil-filled, water-cooled, single-phase x 3, No-Tap)

Manufacturer ELIN (Made in Austria)
Manufactured in 1971
Inspection in 21-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	△2)	△2)	△2)	-
3	Check for oil leaks	×3)	×3)	×3)	-
4	Condition of insulator	○	○	○	-
5	Condition of meters	△4)	△4)	△4)	-
6	Oil level of Conservator (Gen. output 23MW) [%]	65	70	60	-
7	Temperature of oil (Gen. output 23MW) [℃]	45	49	42	-
8	Operation sound	○	○	○	-

1) The main tank is rusty.
2) All coolers are replaced with parts which are not from original company.
3) The oil leakage has occurred at all phase.
4) The temperature and pressure meter are difficult to read due to the discoloration.

1-6. 11kV Cable and Bus (11kV Cupper Bar, 11 kV Cable [type-unknown])

Inspection in 18-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of 11kV BUS	○	○	○	-
2	Condition of insulator	○	○	○	-
3	Condition of cable head	○	○	○	-
4	Condition of cable (Outdoor part)	△1)			164
5	Condition of Cable cleat	△2)			163
6	Condition of cable-pit cover	×3)			165

1) The surface of a cable has deteriorated and a fine crack is seen.
2) Cable cleat deteriorated.
3) Cable pit does not have the cover.

1-7. Control Cable and Trough

Inspection in 17-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cable	△1)	△1)	△1)	-
2	Condition of trough	×2)	×2)	×2)	-

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

2. Cubicle for Generator

2-1. OUTGOING

Manufacturer BBC

Parts information (part/type/spec./MFGdate/Manufacturer)

DS / TR3-FFA / 12kV, 2500A / 1992 / HITACHI

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△1)			215
2	Condition of the parts of DS.	○2)			-
3	Condition of the contact of DS.	○	○	○	-
4	Condition of moving system at DS.	○			-
5	Operation number of DS.	ND			-
6	Condition of cable head	○	○	△3)	214
7	Condition of cable (Indoor part)	(UK)4)	(UK)4)	(UK)4)	-

1) The cabinet has deteriorated by the operation mistake.
2) DS was lost by the operation mistake, and it was replaced around 1992.
3) Some parts of cable head have severe damage by the operation mistake of DS.
4) The cables cannot be checked because of the bottom cover of a cabinet.

2-2. Surge Absorber

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

SA (Capacitor) / Phfps 11/11, 4/1 / 11kV / 1971 / (UK)

SA (Arrester) / HKF kw 15 / Ub max.15kV / 1971 / BBC

DS / AE12/630-52 / 10kV, 630A / 1971 / BBC

Inspection in 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of SA. (Capacitor)	○	○	○	-
3	Condition of SA. (LA)	○	○	○	-
4	Condition of DS.	○			-

2-3. Potential Transformer

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

VT1 / (UK) / (UK) / (UK) / (UK)

VT2 / (UK) / (UK) / (UK) / (UK)

Fuse-holder (for VT1, 2) / DSP 20 / 20kV, 200A / 1971 / DRIESCHER.WEGBERG

Fuse / (UK) / 6A / (UK) / DRIESCHER.WEGBERG

Inspection in 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	△1)			-
2	Condition of VT1 (front side)	○	○	○	-
3	Condition of VT2 (back side)	○	○	○	-

4	Condition of Fuse & holder 1 (front side)	○	-
5	Condition of Fuse & holder 2 (back side)	○	-

1) The cabinet has deteriorated by the operation mistake of DS of "OUTGOING".

2-4. INCOMING

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

CT / (UK) / (UK) / (UK) / (UK)

Cable / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Cable Head / (UK) / (UK) / (UK) / KABEL+DRAHT MANNHEIM

Inspection in 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of cable head	○	○	○	-
3	Condition of cable (from Gen.)	○	○	○	-

2-5. HOUSE SERVICE

Manufacturer BBC

Parts information (part/type/spec./MFG.date/Manufacturer)

DS (89H61) / (UK) / (UK) / (UK) / (UK)

Cable (to 89H61) / (UK) / (UK) / (UK) / (UK)

Inspection in 30-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of cabinet	○			-
2	Condition of DS (89H61)	- 1)			251
3	Switching condition of DS (89H61)	- 1)			-
4	Condition of cable terminal	○	○	○	252
5	Condition of cable	○	○	○	252

1) DS was removed and transferred to another unit.

3. Control Panel for Generator

3-1. GEN # (Meter Panel)

Manufacturer BBC
Manufactured in -
Inspection in 30-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Operating conditions of meter	×2)	-
3	Condition of status indicator	○	-
4	Condition of fault indicator	×3)	-
5	Condition of oscillograph	×4)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) Malfunction was confirmed by meter. This cause is considered to be TD.
3) Fault indicator may malfunction due to the degradation.
4) The oscillograph of active and reactive power is not working.

3-2. Control Desk

Manufacturer BBC
Manufactured in -
Inspection in 30-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of switch	△2)	-

1) The component parts in the panel are very old. It is recommended that they should be replaced.
2) All the switches can be operated, however some switches are tight.

3-3. GEN # (Protection Panel)

Manufacturer BBC
Manufactured in -
Inspection in 30-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-
2	Condition of oscillograph	×2)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.
2) The oscillograph of generator voltage is not working.

3-4. Automatic Control Panel

Manufacturer HITACHI
Manufactured in -
Inspection in 30-Jul-2012

Items		Result	Photo No.
1	Condition of panel and component parts	△1)	-

1) The component parts in a panel are very old. It is recommended that they should be replaced.

Check list of site inspection for Transformer and Control System
(Common equipment)

REMARKS ○: Good condition
△: Caution
×: Consider to countermeasure
ND: No data (with damaged meter and things like that)

1. Equipment of 230kV

1-1. Disconnecting switch (189-B3)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

1-2. Disconnecting switch (189-1)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

1-3. Disconnecting switch (189-2 + ES)

Manufacturer TAKAOKA
Type THBE / LG (ES: EB / AB)
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

1-4. Disconnecting switch (189-3 + ES)

Manufacturer TOSHIBA
Type PH-36KE
Manufactured in 1960
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

1-5. Circuit breaker (152)

Manufacturer SIEMENS (made in Germany)
Type 3AS2
Manufactured in 1985
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing area	○	○	○	-
4	Condition of control panel	○			107
5	Gas pressure value [bar]	6.6 1)			109
6	Air pressure value [bar]	317			-
7	Switching condition	-	-	-	-
8	Number of switching	ND			-

1) Because SF6 gas has leaked from the breaker, the cylinder is connected for gas supply.

1-6. Capacitor Voltage Transformer (CVT1)

Manufacturer TRENCH ELECTRIC (made in CANADA)
Type TEMP 230H
Manufactured in 1985
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of blocking coil	○	○	-	-
4	Check of oil leak	○	○	○	-
5	Check of function	○	× 1)	○	110

1) The signal of voltage seems not to be outputted from VT of phase B.

1-7. Capacitor Voltage Transformer (CVT2)

Manufacturer NISSIN
Type IM245
Manufactured in 1987
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	-
4	Check of function	○	○	○	-

1-8. Current Transformer (CT1)

Manufacturer RITZ
Type OSKF 245
Manufactured in 1985
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○ 1)	○	117
3	Check of oil leak	○	○	○	-
4	Check of function	○	○	○	-

1) It is recommended that the nest of a bird should be removed.

1-9. Arrester (LA1)

Manufacturer SIEMENS (made in Germany)
Type 3EM3 196-OZ
Manufactured in (UK)
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter 1)	174	170	170	-

1) The number of counter was confirmed on 14.Aug.2007.

2. Equipment of B1-bank

2-1. 132kV Disconnecting Switch (89B-1)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

2-2. 132kV Disconnecting Switch (89B-2)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

2-3. 132kV Circuit Breaker (152-1)

Manufacturer MITSUBISHI
Type 120-SFMT-32B
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel	○	○	○	-
5	Gas pressure value [kgf/cm^2]	5.65	5.60	5.48	-
6	Switching condition	-	-	-	-
7	Number of switching	767	756	755	-

2-4. Booster Transformer (BTr.1)

Manufacturer MITSUBISHI
Type CUW
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	△1)	△1)	△1)	-
2	Condition of oil cooler	○	○	○	212
3	Check for oil leaks	○	○	○	-
4	Condition of insulator	○	○	○	-
5	Condition of meters	×2)	×2)	×2)	209-11
6	Oil level of Conservator [%]	57	63	60	-
7	Temperature of oil [℃]	ND	ND	ND	-
8	Temperature of winding [℃]	41	ND	44	
9	Condition of oil control panel	○			-
10	Operation sound	○	○	○	-

1) The paint is peeling off and the main tank was rusty.
2) Some thermometers cannot be read due to the discoloration.

2-5. 230kV Arrester (LA3)

Manufacturer MITSUBISHI
Type MAL-PB
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-

2-6. 230kV Disconnecting Switch (189B-1)

Manufacturer TAKAOKA
Type THBE / LG (ES: EB / AB)
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

2-7. 230kV Circuit Breaker (152-B1)

Manufacturer MITSUBISHI
Type 200-SFMT-40B
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel	○			-
5	Gas pressure value [kgf/cm^2] (at 30℃)	5.62	5.70	5.60	-
6	Air pressure value [kgf/cm^2]	-	16.0	-	-
7	Switching condition	○	○	○	-
8	Number of switching	629	630	616	-

3. Equipment of B2-bank

3-1. 132kV Disconnecting Switch (189-21)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

3-2. 132kV Disconnecting Switch (189B-22)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

3-3. 132kV Circuit Breaker (152-2)

Manufacturer TOSHIBA
Type ACF-161K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△ 1)	△ 1)	△ 1)	305
3	Condition of air-tank	○	○	○	-
4	Condition of control panel	○			-
5	Air pressure value [lbw/in^2]	227			-
6	Switching condition	-	-	-	-
7	Number of switching	>1,009 2)			308

1) The ironware was rusty.
2) The digit in thousand's place is not operating. Operation frequency seems to be 1,009 times or more.

3-4. 132kV Current Transformer (CT1)

Manufacturer INDIAN TRANSFORMERS (made in India)
Type ITCPL/MEPE/JAGUAR/132KVCT/GA (DRG.No.)
Manufactured in 2004
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	△1)	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	-
4	Oil level	×2)	△3)	△3)	312
5	Check of function	○	○	○	-

1) A part of the insulator rib has been broken.
2) Oil level cannot be confirmed because there is no oil level in the range of a gauge.
3) The oil level is low.

3-5. 132kV Disconnecting Switch (189-23)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	△1)	○	314
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-
5	Condition of Earthing switch	×2)	×2)	×2)	315

1) Some insulators have been broken.
2) Earthing switch has been broken and cannot be used.

3-6. Booster Transformer (BTr.2)

Manufacturer MITSUBISHI
Type CUW
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of main tank	×1)	×1)	△2)	320,322
2	Condition of oil cooler	○	○	○	-
3	Check for oil leaks	△3)	△3)	○	-
4	Condition of insulator	△4)	○	○	325
5	Condition of meters	○	○	×5)	324
6	Oil level of Conservator [%]	52	23	40	-
7	Temperature of oil [℃]	37	37	ND	-
8	Temperature of winding [℃]	39	42	40	
9	Condition of oil control panel		○		-
10	Operation sound	○	○	○	-

1) The tank was repaired in Myanmar.
2) The paint is peeling off and the main tank is a little rusty.
3) The oil leakage from the modified place was confirmed.
4) The insulator-rib has been broken.
5) Some thermometers cannot be read due to the discoloration.

3-7. 230kV Arrester (LA2)

Manufacturer SIEMENS (made in Germany)
Type 3EM3 196-OZ
Manufactured in (UK)
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter	9,950	9,950	9,950	-

3-8. 230kV Disconnecting Switch (189-B2)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

3-9. 230kV Circuit Breaker (152-B2)

Manufacturer MITSUBISHI
Type 200-SFMT-40B
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel	○			-
5	Gas pressure value [kgf/cm^2] (at 30℃)	5.82	5.90	5.85	-
6	Air pressure value [kgf/cm^2]	-	15.7	-	-
7	Switching condition	-	-	-	-
8	Number of switching	665	635	663	-

4. Equipment of 132kV N/L 1L

4-1. Disconnecting Switch (128-3)

Manufacturer TAKAOKA
Type THR5 / LG
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

4-2. Disconnecting Switch (228-3)

Manufacturer TAKAOKA
Type THR5 / LG
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

4-3. Circuit Breaker (152-3)

Manufacturer TMT&D
Type 120-SFMT-40E
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel	○			-
5	Gas pressure value [MPa]	0.55			-
6	Switching condition	○	○	○	-
7	Number of switching	374			-

4-4. Disconnecting Switch (289-3)

Manufacturer TAKAOKA
Type THR5 / LG (ES: EH3 / AB)
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

4-5. Capacitor Voltage Transformer (CVT)

Manufacturer NISSIN
Type IM145
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	
4	Check of function	○	○	○	-

4-6. Arrester (LA)

Manufacturer MEIDEN
Type ZSE-E1
Manufactured in 2003
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter	8	13	9	-

5. Equipment of 132kV N/L 2L

5-1. Disconnecting Switch (128)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

5-2. Disconnecting Switch (228)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

5-3. Circuit Breaker (152-1)

Manufacturer TOSHIBA
Type ACF-161K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	△1)	△1)	△1)	505
3	Condition of air-tank	○	○	○	-
4	Condition of control panel	○			-
5	Air pressure value [lb/in^2]	218			-
6	Switching condition	-	-	-	-
7	Number of switching	1,386			-

1) The ironware was rusty.

5-4. Current Transformer (CT)

Manufacturer TOSHIBA
Type AR / QM140B
Manufactured in 1985
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○1)	○	○	509
4	Check of function	○	○	○	-

1) Repaired oil leakage.

5-5. Disconnecting Switch (289)

Manufacturer TOSHIBA
Type PH-36K
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

5-6. Capacitor Voltage Transformer (CVT)

Manufacturer TRENCH ELECTRIC (made in CANADA)
Type TEMP 13-8
Manufactured in 1985
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	△	○	514
4	Check of function	○	○	○	-

6. Equipment of 132kV Incoming BPS1

6-1. Disconnecting Switch (389-B1)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

6-2. Disconnecting Switch (389-B2)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

6-3. Circuit Breaker (352)

Manufacturer MITSUBISHI
Type 120-SFMT-32B
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel		○		-
5	Gas pressure value [kgf/cm^2]	5.80	5.85	5.80	
6	Switching condition	-	-	-	-
7	Number of switching	190	1	190	-

6-4. Disconnecting Switch (389)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

6-5. Coupling Capacitor

Manufacturer NISSIN
Type CHU-CK
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	
4	Check of function	○	○	○	-

6-6. Arrester (LA)

Manufacturer MITSUBISHI
Type -
Manufactured in -
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter	9,951	9,952	9,950	

7. Equipment of INTERBUS Tr.

7-1. Disconnecting Switch (289-1)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

7-2. Disconnecting Switch (289-2)

Manufacturer TAKAOKA
Type THBE / LG
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of blade	○	○	○	-
3	Condition of contact part	○	○	○	-
4	Switching condition	-	-	-	-

7-3. Circuit Breaker (252)

Manufacturer MITSUBISHI
Type 120-SFMT-32B
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Condition of arc-suppressing tank	○	○	○	-
4	Condition of control panel	○			-
5	Gas pressure value [kgf/cm^2]	5.80	5.70	5.70	-
6	Switching condition	-	-	-	-
7	Number of switching	351	351	351	-

7-4. Arrester (LA)

Manufacturer MITSUBISHI
Type -
Manufactured in -
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Number of counter	9,952	9,953	9,951	-

7-5. INTERBUS Transformer (Tr)

Manufacturer HYUNDAI (made in Korea)
Type TL-0124
Manufactured in 1997
Inspection in 19-Jul-2012

Items		Result	Photo No.
1	Condition of main tank	△1)	705
2	Condition of oil cooler	△2)	-
3	Check for oil leaks	△3)	708-9
4	Condition of insulator	○	-
5	Condition of meters	○	-
6	Oil level of Conservator [%]	20	-
7	Temperature of oil [℃] (at air-temp.: 30℃)	41	-
8	Condition of LTC	○	-
9	Number of LTC move	378	-
10	Operation sound	○	-

1) Paint has deteriorated.
2) The cooler-fin was rusty due to the degradation and the crack of paint. If the cooler is not repainted, it will become a cause of leakage oil.
3) Oil leakage was confirmed in the Buchholtz-relay part.

8. Equipment of 132kV Bus

8-1. Capacitor Voltage Transformer (CVT)

Manufacturer NISSIN
Type IM145
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	-
4	Check of function	○	○	○	-

8-2. Capacitor Voltage Transformer (CVT)

Manufacturer NISSIN
Type IM145
Manufactured in 1988
Inspection in 19-Jul-2012

Items		Result			Photo No.
		Phase A	Phase B	Phase C	
1	Condition of insulator	○	○	○	-
2	Condition of ironware	○	○	○	-
3	Check of oil leak	○	○	○	-
4	Check of function	○	○	○	-

9. Equipment of 11kV House Service

9-1. "HOUSE SERVICE" cubicle (252H)

Manufacturer TOSHIBA
Type -
Manufactured in 1958
Inspection in 19-Jul-2012

	Items	Result	Photo No.
1	Condition of cabinet	△1)	901
2	Condition of internal equipment	△2)	902
3	Check of oil leak	△2)	-
4	Condition of meter	×	-

1) It seems that there is a problem in opening and closing of a door.
2) The breaker may not have sufficient capability, because it is very old and oil has leaked.

9-2. 11kV/11kV Tie-transformer

Manufacturer MITSUBISHI
Type CR
Manufactured in 1958
Inspection in 19-Jul-2012

	Items	Result	Photo No.
1	Condition of main tank	×1)	904
2	Condition of oil cooler	×1)	-
3	Check for oil leaks	×1)	907
4	Condition of insulator	○	-
5	Condition of meters	×2)	908
6	Oil level of Conservator [%]	27	-
7	Temperature of oil [℃] (at air-temp.: 30℃)	ND	-
8	Operation sound	○	-

1) The main tank was rusty. Oil has been leaked from many joint parts.
2) The thermometer is difficult to read due to the discoloration.

9-3. 11kV Step Voltage Regulator

Manufacturer MITSUBISHI
Type UR
Manufactured in 1958
Inspection in 19-Jul-2012

	Items	Result	Photo No.
1	Condition of main tank	×1)	910
2	Condition of oil cooler	×1)	-
3	Check for oil leaks	×1)	912
4	Condition of insulator	○	-
5	Condition of meters	×2)	-
6	Oil level of Conservator [%]	29	-
7	Temperature of oil [℃] (at air-temp.: 30℃)	ND	-
8	Operation sound	○	-

1) The main tank was rusty. Oil has been leaked from many joint parts.
2) The thermometer is difficult to read due to the discoloration.

9-4. 11kV Circuit Breaker (252H1)

Manufacturer BRUSH (made in England)
Type -
Manufactured in -
Inspection in 19-Jul-2012

Items		Result	Photo No.
1	Condition of visual	○	913
2	Check of oil leak	○	-
3	Condition of meter	○	-
4	Condition of relay	○	-

* It seems that this breaker is not original equipment and is modified. Therefore, the breaker may not have sufficient capacity for fault current. This breaker seems to operate correctly when an accident happens.

9-5. 11kV Power Center Cubicle

Manufacturer TOSHIBA
Type -
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result	Photo No.
1	Condition of cabinet	○	-
2	Condition of internal equipment	△1)	923
3	Check of oil leak	△1)	922
4	Condition of meter	×2)	-
5	Condition of relay	×3)	919,921

1) The breaker may not have sufficient capability, because it is very old and oil is leaked.
2) Some meters are not working.
3) Relay is very old and installation environment is not good. Therefore, it may not operate correctly.

9-6. 11kV/400V House Transformer

Manufacturer MITSUBISHI
Type CR
Manufactured in 1959
Inspection in 19-Jul-2012

Items		Result		Photo No.
		No.1	No.2	
1	Condition of main tank	×1)	△1)	925
2	Condition of oil cooler	△1)	△1)	-
3	Check for oil leaks	×1)	△1)	926
4	Condition of insulator	○	○	-
5	Condition of meters	△2)	△2)	-
6	Oil level of Conservator [%]	32	50	-
7	Temperature of oil [℃] (at air-temp.: 30℃)	48	42	-
8	Operation sound	○	○	-

1) The main tank was rusty. Oil has been leaked from many joint parts.
2) The thermometer is difficult to read due to the discoloration.

9-7. 400V Load Center

Manufacturer TOSHIBA
Type -
Manufactured in 1958
Inspection in 19-Jul-2012

Items		Result	Photo No.
1	Condition of cabinet	△	-
2	Condition of internal equipment	△1)	931,932
3	Condition of meter	×2)	-

1) Some switches are lost. Moreover, some switches don't have the insufficient capacity for the power supply.
2) Some meters are not working.

10. Others

10-1. Water Pumps for Booster Transformer

Manufacturer -
Type -
Manufactured in No.1, 2: 1958
Inspection in 19-Jul-2012

	Items	Result						Photo No.
		1	2	3	4	5	6	
1	Condition of pomp	○	○	○	○	○	○	-
2	Condition of motor	○	○	○	○	○	○	-
3	Condition of Control panel	○		○		○		-
4	Operation sound	○						-

10-2. Rectifier & Battery

Manufacturer Rectifier (Left) CHLORIDE STANDBY SYSTEMS (made in England)
(Right) VENTA
Battery HBL Power Systems (made in India)
Type -
Manufactured in Rectifier -, Battery 2009
Inspection in 19-Jul-2012

	Items	Result		Photo No.
		Left	Right	
1	Condition of battery	○	○	1010
2	Condition of Rectifier cabinet	○	○	1007-8
3	Condition of internal equipment of Rectifier	×1)	○	1009
4	Operation sound of Rectifier	○	○	-

1) Some parts were removed.

10-3. Control Cables

Manufacturer -
Type -
Manufactured in -
Inspection in 19-Jul-2012

	Items	Result	Photo No.
1	Condition of Cable	×1)	1015
2	Condition of Cable pit	○	-
3	Condition of Cable pit cover	×2)	1014

1) Cable sheathing has deteriorated.
2) Cable trough cover is lost.

No 111

Date 10-Jul-12

Equipment of Substation

132kV Disconnecting Switch (121)

No 112

Date 10-Jul-12

Equipment of Substation

132kV Disconnecting Switch (121)

No 113

Date 10-Jul-12

Equipment of Substation

132kV Disconnecting Switch (121)

No 114

Date 10-Jul-12

Equipment of Substation

132kV Disconnecting Switch (221)

No 115

Date 10-Jul-12

Equipment of Substation

132kV Disconnecting Switch (221)

写真

No 116

Date

No 121

Date 13-Jul-12

Equipment of Substation

132kV Circuit Breaker (C21)

No 122

Date 13-Jul-12

Equipment of Substation

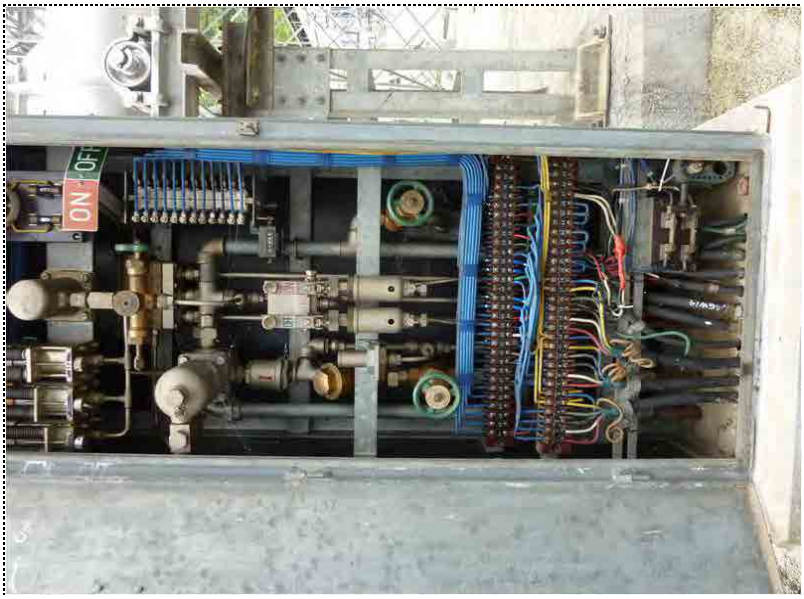
132kV Circuit Breaker (C21)

No 123

Date 13-Jul-12

Equipment of Substation

132kV Circuit Breaker (C21)



No 124

Date 13-Jul-12

Equipment of Substation

132kV Circuit Breaker (C21)

No 125

Date 13-Jul-12

Equipment of Substation

132kV Circuit Breaker (C21)

写真

No

Date

No 131

Date 13-Jul-12

Equipment of Substation

132kV Current Transformer

No 132

Date 13-Jul-12

Equipment of Substation

132kV Current Transformer

No 133

Date 13-Jul-12

Equipment of Substation

132kV Current Transformer

No 141

Date 13-Jul-12

Equipment of Substation

132kV Arrester

No 142

Date 13-Jul-12

Equipment of Substation

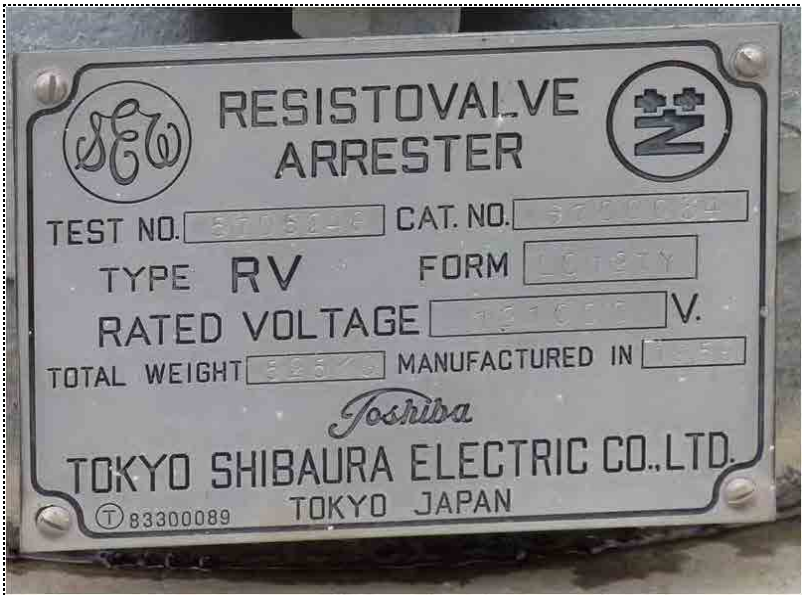
132kV Arrester
Phase A, B

No 143

Date 13-Jul-12

Equipment of Substation

132kV Arrester
Phase C



No 144

Date 13-Jul-12

Equipment of Substation

132kV Arrester
Phase A, B

No 145

Date 13-Jul-12

Equipment of Substation

132kV Arrester
Phase C

写真

No 146

Date 13-Jul-12

No 1501

Date 13-Jul-12

Equipment of Substation

Main Transformer
Phase is A, B, and C from the right.

写真

No 1502

Date

写真

No 1503

Date

No 1504

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A

No 1505

Date 10-Jul-12

Equipment of Substation

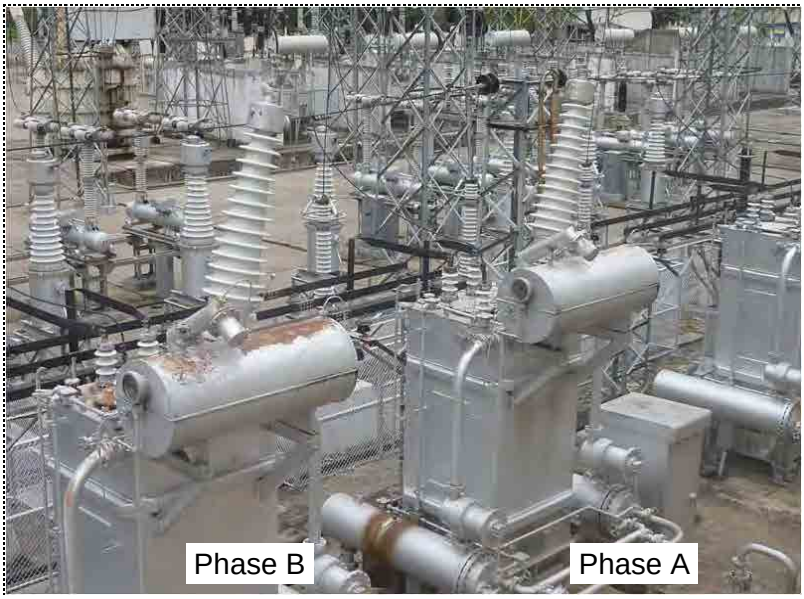
Main Transformer
Phase B

No 1506

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase C



No 1507

Date 14-Jul-12

Equipment of Substation

Main Transformer
Phase A

No 1508

Date 14-Jul-12

Equipment of Substation

Main Transformer
Phase B

No 1509

Date 14-Jul-12

Equipment of Substation

Main Transformer
Phase C

No 1510

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A

No 1511

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Packing has extreme degradation.

No 1512

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A

No 1513

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B

No 1514

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase C

No 1515

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil leakage under Transformer

No 1516

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil leakage under Transformer

No 1517

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A

No 1518

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
Oil leakage under Transformer

No 1519

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
conditions of an oil leak.

No 1520

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
Oil was leaked to cooling water
drainage pit.

No 1521

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Thermometer

No 1522

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil-flow meter

No 1523

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
Thermometer

No 1524

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil-flow meter

No 1525

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase C
Thermometer is not working.

No 1526

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase C
Oil-flow meter

No 1527

Date 10-Jul-12

Equipment of Substation

Main Transformer
Flow meter of Cooling water is not working.

No 1528

Date 10-Jul-12

Main Transformer
Phase A
N2-SEAL equipment

No 1529

Date 10-Jul-12

Main Transformer
Phase B
N2-SEAL equipment

No 1530

Date 10-Jul-12

Main Transformer
Phase C
N2-SEAL equipment

No 1531

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
Oil cooler is being repaired due to oil leakage.

No 1532

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
The cooler is being cleaned using compressed air.

No 1533

Date 10-Jul-12

Equipment of Substation

Main Transformer
Phase B
Cooling holes were clogged with leakage oil and cooling efficiency dropped.

No 161

Date 10-Jul-12

11kV BUS & cable (outside)

No 162

Date 10-Jul-12

11kV BUS & cable (outside)

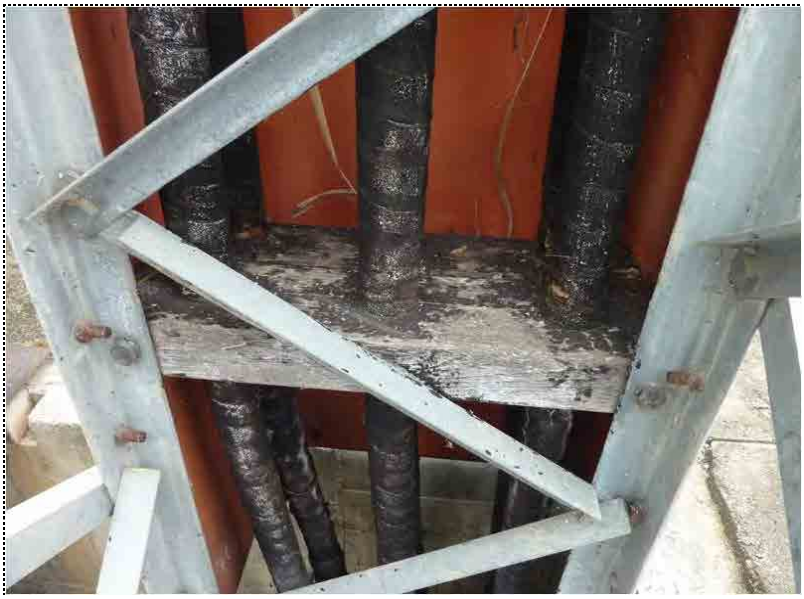
11kV BUS-bar

No 163

Date 10-Jul-12

11kV BUS & cable (outside)

Cable head



No 164

Date 10-Jul-12

11kV BUS & cable (outside)

Cable cleat

No 165

Date 10-Jul-12

11kV BUS & cable (outside)

Damaged cable

No 166

Date 10-Jul-12

11kV BUS & cable (outside)

Cable and the cleat in cable pit

No 171

Date 10-Jul-12

Control cable and trough

Cable was deteriorated due to exposure to the weather.

No 211

Date 10-Jul-12

Control cable and trough

The damaged cable was repaired by the tape.

No 212

Date 10-Jul-12

Control cable and trough

No 201

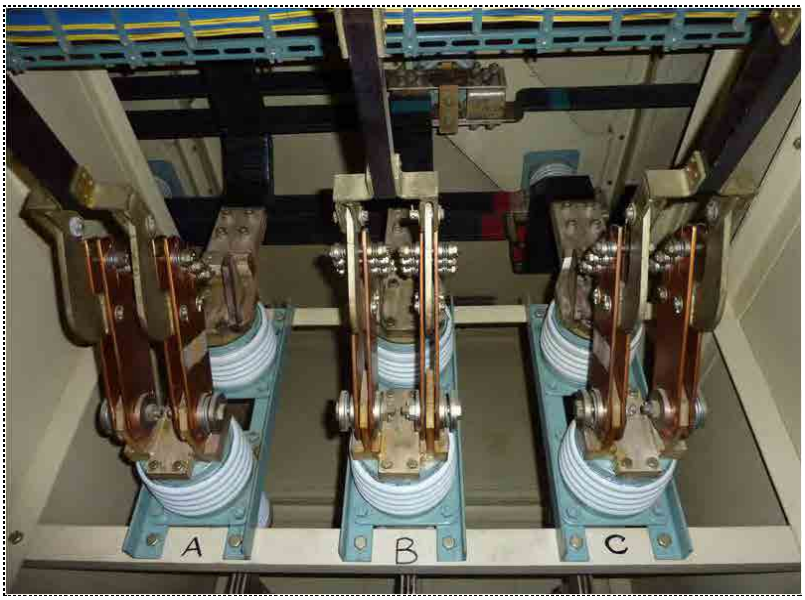
Date 10-Jul-12

Generator Cubicle

No 211

Date 10-Jul-12

Outgoing panel

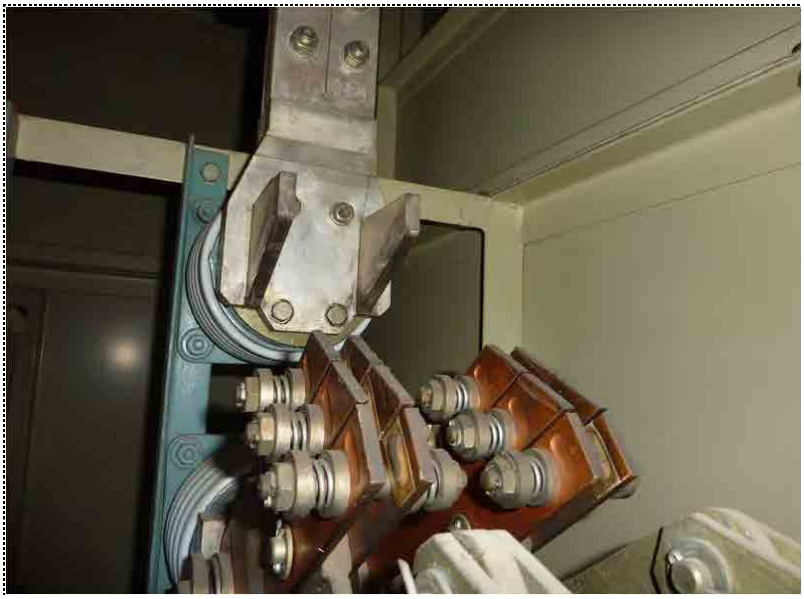


No 212

Date 10-Jul-12

Outgoing panel

Disconnecting Switch (89G1)



No 213

Date 10-Jul-12

Outgoing panel

Disconnecting Switch (89G1)

No 214

Date 10-Jul-12

Outgoing panel

Cable to Main Transformer

No 215

Date 10-Jul-12

Outgoing panel

Cable to Main Transformer

No 221

Date 10-Jul-12

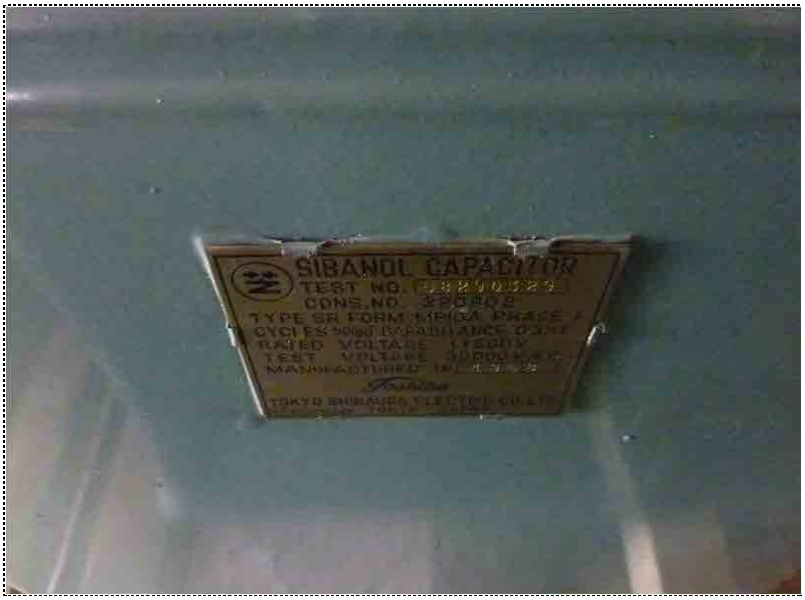
Surge Absorber panel

No 222

Date 10-Jul-12

Surge Absorber panel

Disconnecting Switch for Surge Absorber

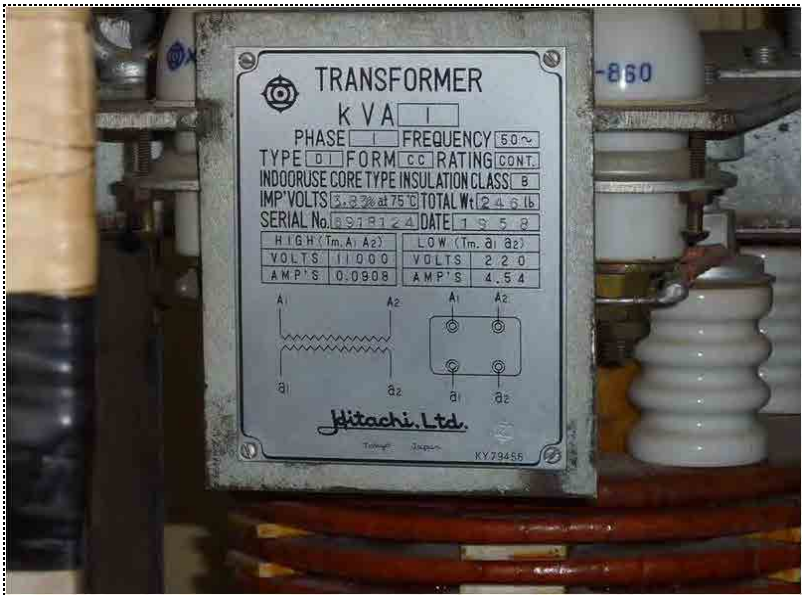


No 223

Date 10-Jul-12

Surge Absorber panel

Nameplate of SA (capacitor)



No 224

Date 10-Jul-12

Surge Absorber panel

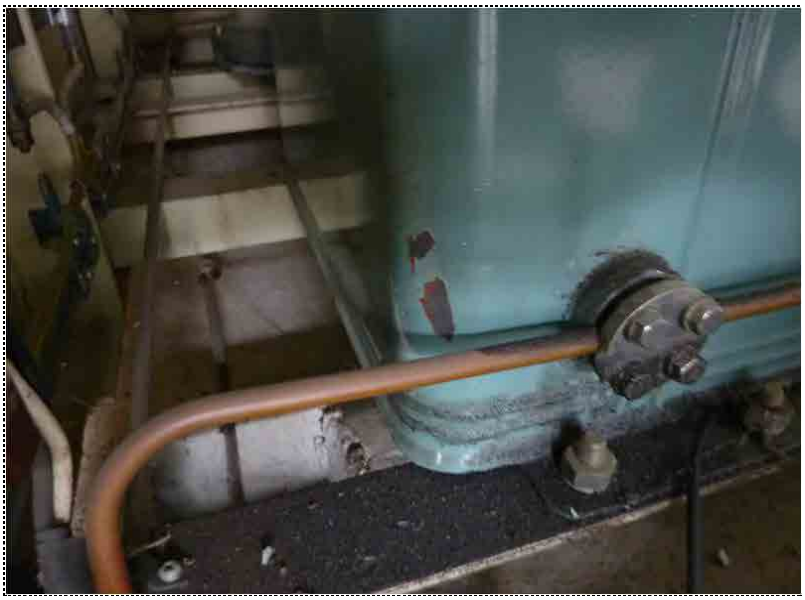
Nameplate of AUX-transformer (for AVR)

No 225

Date 10-Jul-12

Surge Absorber panel

Oil leakage from capacitor (phase A)



No 226

Date 10-Jul-12

Surge Absorber panel

Oil leakage from capacitor (phase A)

No 231

Date 10-Jul-12

Voltage Transformer panel

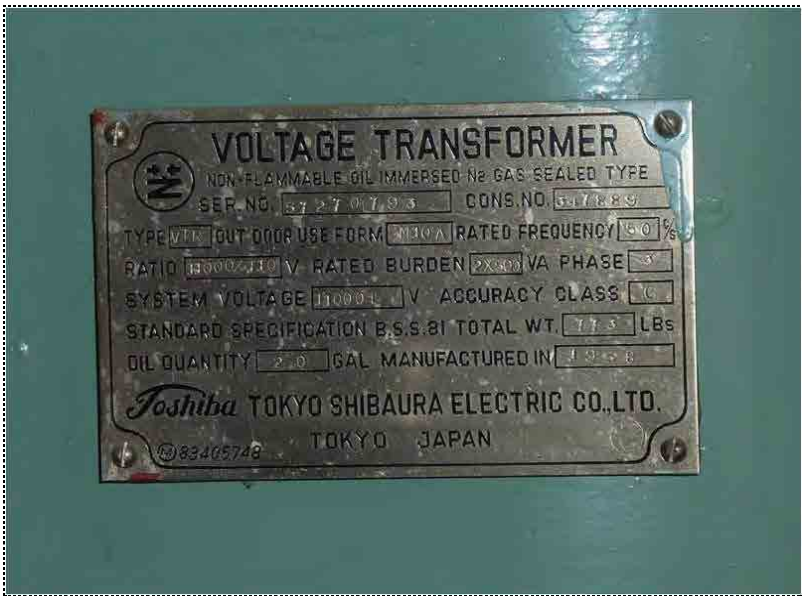
Inside of cubicle
Front: 200VA-VT
Rear: 500VA-VT

No 232

Date 10-Jul-12

Voltage Transformer panel

Name plate (200VA)



No 233

Date 10-Jul-12

Voltage Transformer panel

Name plate (500VA)

No 234

Date 10-Jul-12

Voltage Transformer panel

Oil level indicator (200VA)
oil level cannot be confirmed.

No 235

Date 10-Jul-12

Voltage Transformer panel

Oil level indicator (500VA)

写真

No

Date

No 241

Date 10-Jul-12

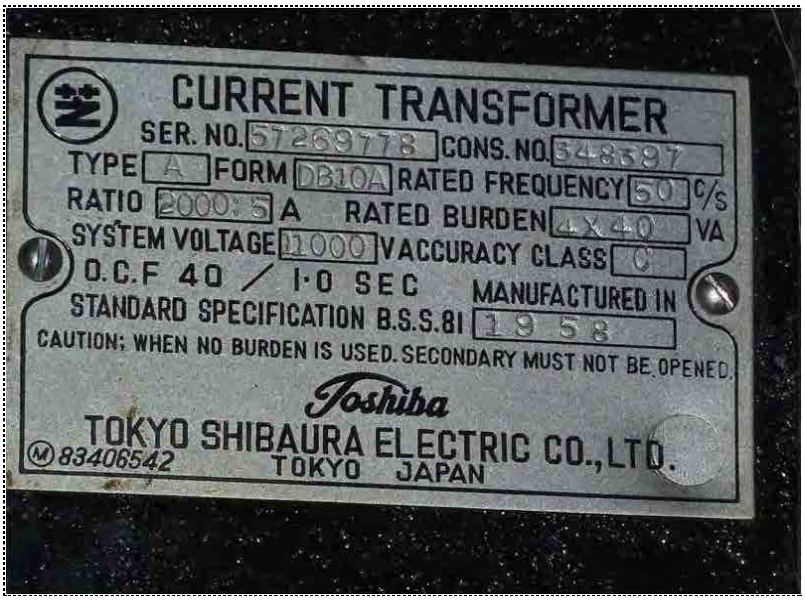
Incoming panel

No 242

Date 10-Jul-12

Incoming panel

11kV Current Transformer (4x40VA)



No 243

Date 10-Jul-12

Incoming panel

Nameplate of Current Transformer

No 244

Date 10-Jul-12

Incoming panel

11kV cable head

No 244

Date 10-Jul-12

Incoming panel

11kV cable head

No 245

Date 10-Jul-12

Incoming panel

End of 11kV cable

No 251

Date 10-Jul-12

House Service panel

No 252

Date 10-Jul-12

House Service panel

Disconnecting Switch (89H11)

No 253

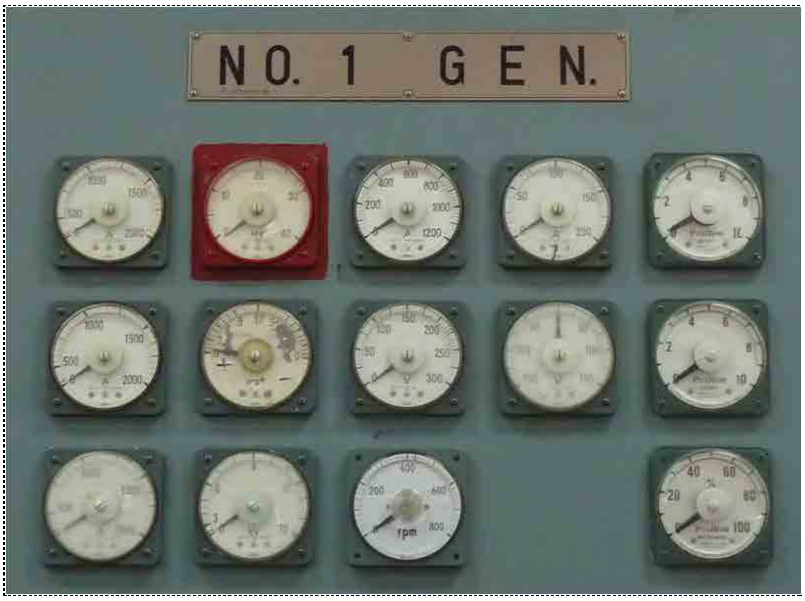
Date 10-Jul-12

House Service panel

No 311

Date 10-Jul-12

No.1 Gen. panel

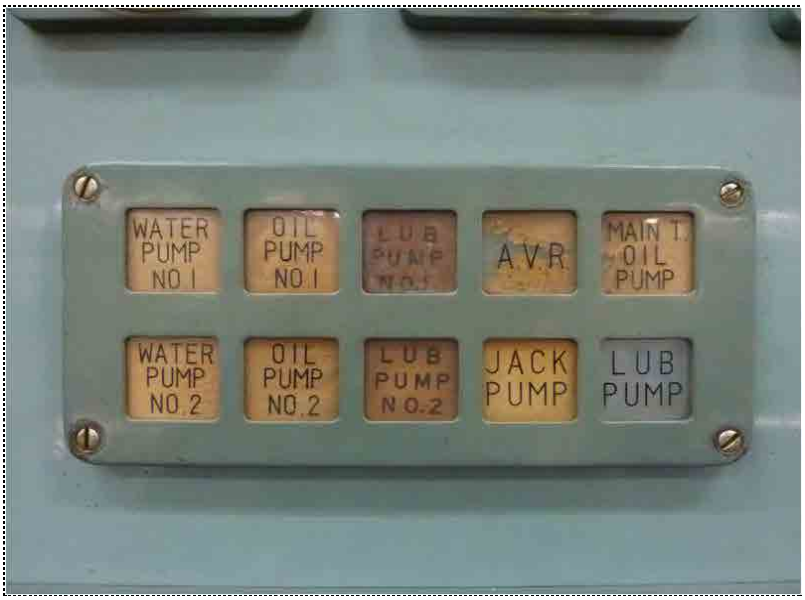


No 312

Date 10-Jul-12

No.1 Gen. panel

Meters



No 313

Date 10-Jul-12

No.1 Gen. panel

Status indicator

No 314

Date 10-Jul-12

No.1 Gen. panel

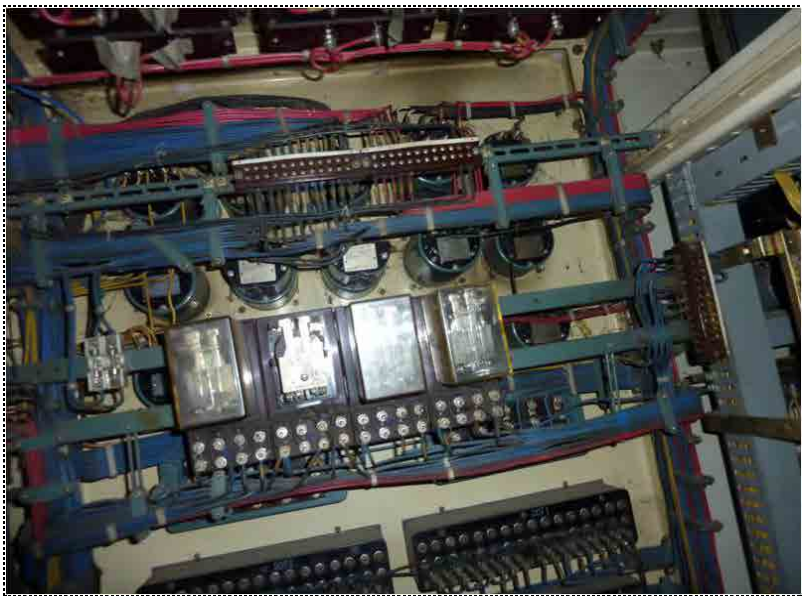
Fault indicator

No 315

Date 10-Jul-12

No.1 Gen. panel

Oscillograph



No 316

Date 10-Jul-12

No.1 Gen. panel

Backside

No 317

Date 10-Jul-12

No.1 Gen. panel

Backside

No 318

Date 10-Jul-12

No.1 Gen. panel

Backside

写真

No 319

Date 10-Jul-12

No.1 Gen. panel

No 321

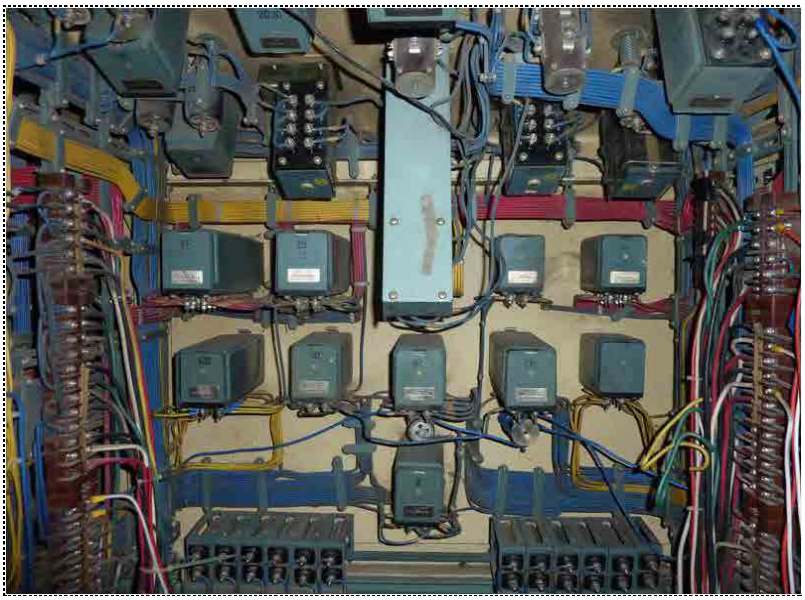
Date 10-Jul-12

Control desk

No 322

Date 10-Jul-12

Control desk



No 323

Date 10-Jul-12

Control desk

Inside of control desk

No 331

Date 10-Jul-12

Control panel

Protection relay panel

No 341

Date 10-Jul-12

Control panel

Automatic Control Panel

写真

No 342

Date

No 111

Date 18-Jul-12

Equipment of Substation

132kV Disconnecting Switch (122)

No 112

Date 18-Jul-12

Equipment of Substation

132kV Disconnecting Switch (122)
Phase A, B
Tip has melted.

No 113

Date 18-Jul-12

Equipment of Substation

132kV Disconnecting Switch (122)
Phase B
Tip has melted.

No 114

Date 18-Jul-12

Equipment of Substation

132kV Disconnecting Switch (122)
Phase C
Tip has melted.

No 115

Date 18-Jul-12

Equipment of Substation

132kV Disconnecting Switch (222)

写真

No

Date

No 121

Date 18-Jul-12

Equipment of Substation

Circuit Breaker

No 122

Date 18-Jul-12

Equipment of Substation

Circuit Breaker

No 123

Date 18-Jul-12

Equipment of Substation

Circuit Breaker

No 131

Date 18-Jul-12

Equipment of Substation

Current Transformer

No 132

Date 20-Jul-12

Equipment of Substation

Current Transformer
Phase B
Oil was leaked from the repaired point.

No 133

Date 20-Jul-12

Equipment of Substation

Current Transformer
Phase A
Indicators have discolored at all phase.

No 134

Date 20-Jul-12

Equipment of Substation

Current Transformer
Phase A
Although an oil level is 90%, it cannot be checked from the ground.

No 135

Date 20-Jul-12

Equipment of Substation

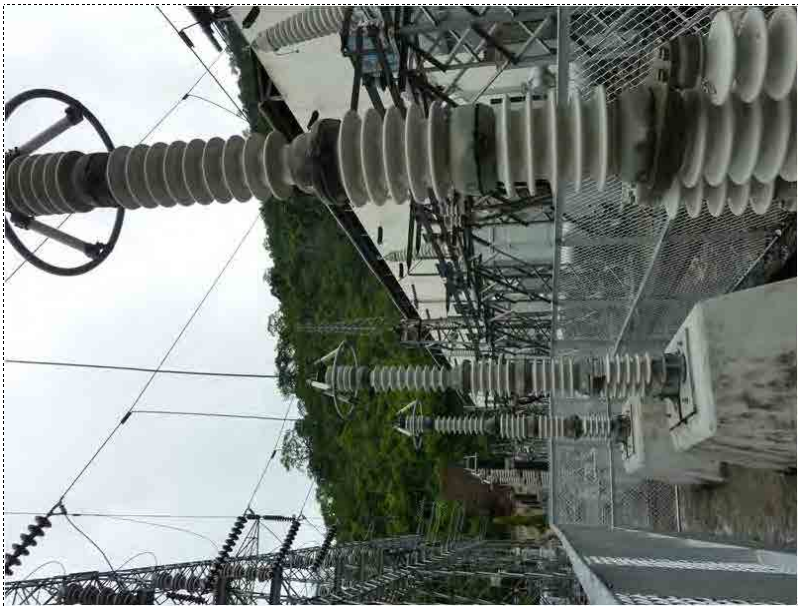
Current Transformer
Phase C
Top of Current Transformer

No 136

Date 20-Jul-12

Equipment of Substation

Current Transformer
Condition of terminal



No 141

Date 18-Jul-12

Arrester

写真

No 142

Date 18-Jul-12

Arrester

写真

No 143

Date 18-Jul-12

Arrester

No 1501

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1502

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1503

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1504

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1505

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1506

Date 19-Jul-12

Equipment of Substation

Main Transformer

No 1507

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase A
Thermometer was not working.

No 1508

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase B
Thermometer was not working.

No 1509

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase C

No 1510

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil flow meter

No 1511

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase B
Oil flow meter

No 1512

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase C
Oil flow meter

No 1513

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase A
Oil leakage under MTr

No 1514

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase B
Condition of oil leakage

No 1515

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase C
Condition of oil leakage

No 1516

Date 19-Jul-12

Equipment of Substation

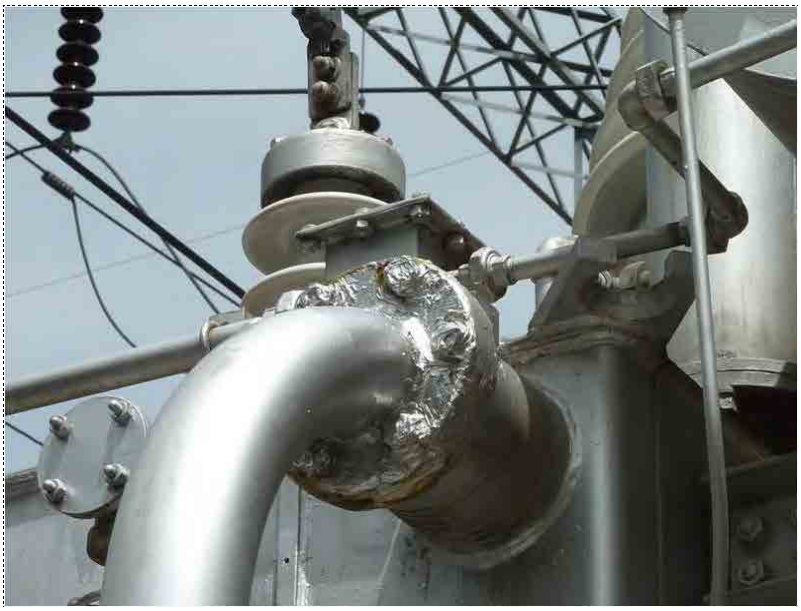
Main Transformer
Phase A

No 1517

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase B



No 1518

Date 19-Jul-12

Equipment of Substation

Main Transformer
Phase C
Repair conditions of oil leakage

写真

No 1519

Date

写真

No 1520

Date

写真

No 1521

Date

No 161

Date 18-Jul-12

11kV BUS & cable (outside)

No 162

Date 18-Jul-12

11kV BUS & cable (outside)

11kV cable head

No 163

Date 18-Jul-12

11kV BUS & cable (outside)

No 164

Date 18-Jul-12

11kV BUS & cable (outside)

Damaged cable

No 165

Date 18-Jul-12

11kV BUS & cable (outside)

Damaged cable

No 166

Date 18-Jul-12

11kV BUS & cable (outside)

Damaged cable

No 167

Date 18-Jul-12

11kV BUS & cable (outside)

Condition of cleat

No 168

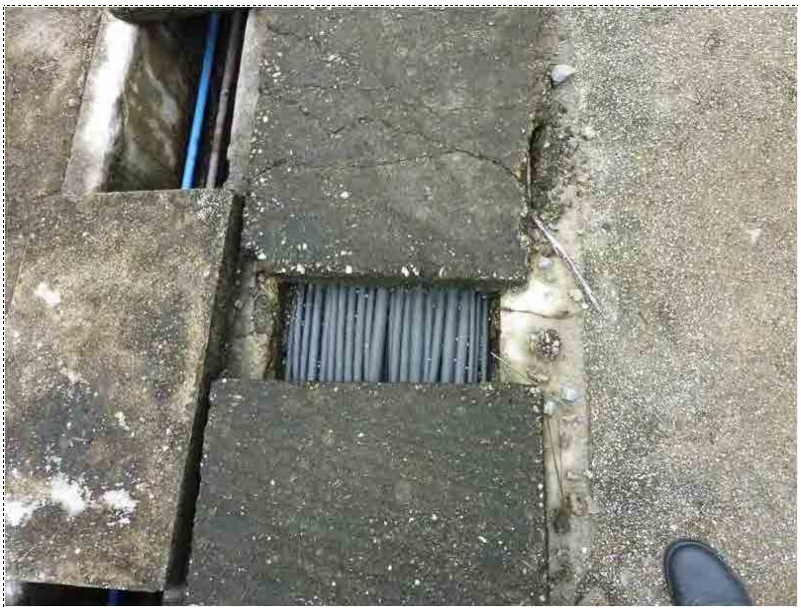
Date 18-Jul-12

11kV BUS & cable (outside)

No 169

Date 18-Jul-12

11kV BUS & cable (outside)



No 171

Date 18-Jul-12

Control cable (outside)

No 172

Date 18-Jul-12

Control cable (outside)

No 173

Date 18-Jul-12

Control cable (outside)

No 211

Date 17-Jul-12

Outgoing panel

No 212

Date 17-Jul-12

Outgoing panel

No 213

Date 17-Jul-12

Outgoing panel

No 214

Date 17-Jul-12

Outgoing panel

No 215

Date 17-Jul-12

Outgoing panel

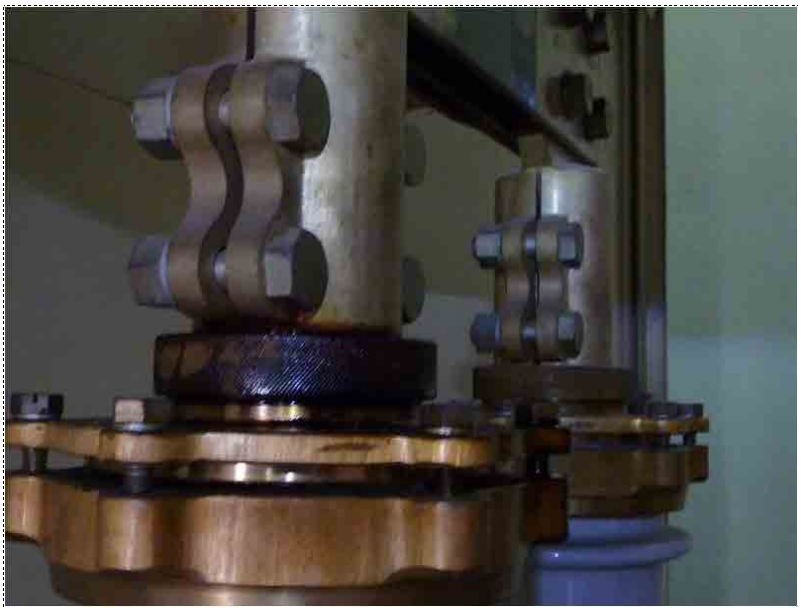
Phase C

No 216

Date 17-Jul-12

Outgoing panel

Phase B



No 217

Date 17-Jul-12

Outgoing panel

Phase A

No 218

Date 17-Jul-12

Outgoing panel

Cable to MTr

No 219

Date 17-Jul-12

Outgoing panel

No 221

Date 17-Jul-12

Surge Absorber panel

No 222

Date 17-Jul-12

Surge Absorber panel

Capacitor of Surge Absorber

No 223

Date 17-Jul-12

Surge Absorber panel

Arrester of Surge Absorber

No 224

Date 17-Jul-12

Surge Absorber panel

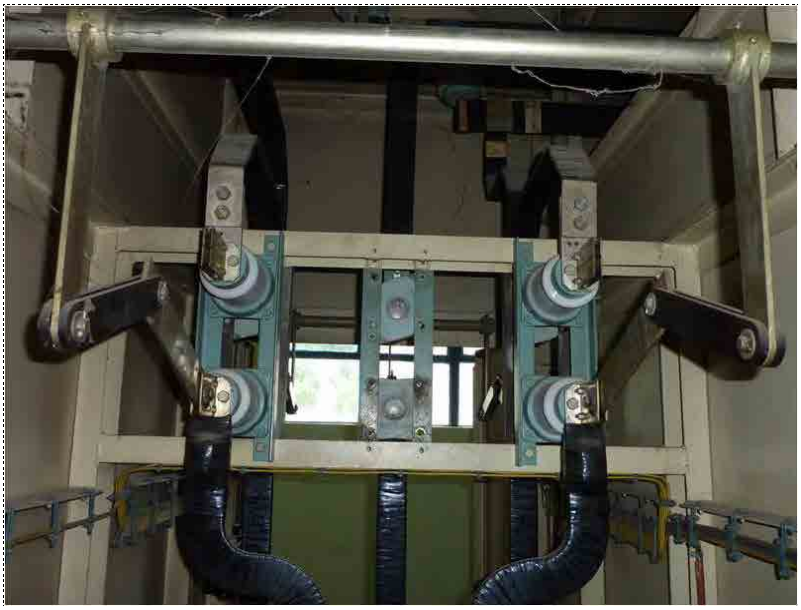
AUX-Transformer for AVR

No 225

Date 17-Jul-12

Surge Absorber panel

Disconnecting Switch for Surge Absorber



No 226

Date 17-Jul-12

Surge Absorber panel

Disconnecting Switch for Transformer

No 231

Date 17-Jul-12

Voltage Transformer panel

Inside of cubicle
Front: 200VA-Voltage Transformer
Rear: 500VA-Voltage Transformer

No 232

Date 17-Jul-12

Voltage Transformer panel

No 233

Date 17-Jul-12

Voltage Transformer panel

Oil level indicator (200VA)
oil level cannot be confirmed.

No 234

Date 17-Jul-12

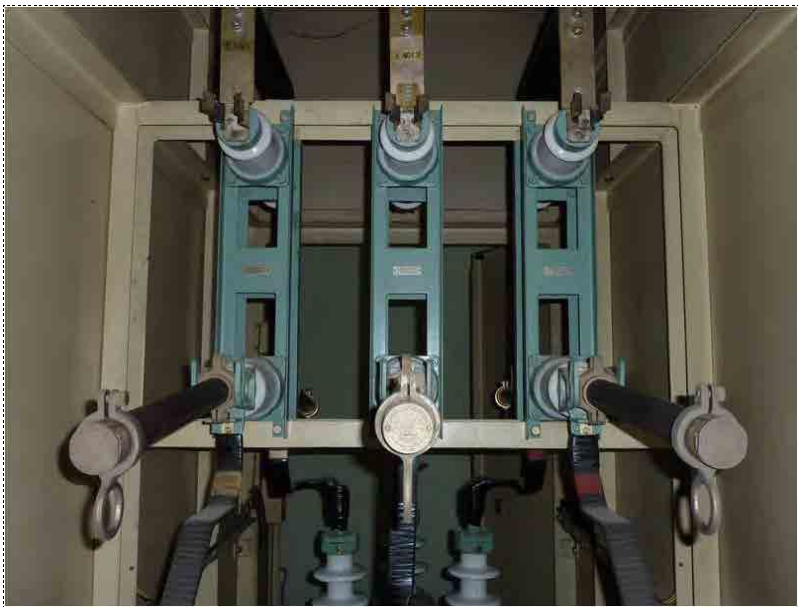
Voltage Transformer panel

No 235

Date 17-Jul-12

Voltage Transformer panel

Oil level indicator (500VA)



No 236

Date 17-Jul-12

Voltage Transformer panel

No 241

Date 17-Jul-12

Incoming panel

No 242

Date 17-Jul-12

Incoming panel

No 243

Date 17-Jul-12

Incoming panel

No 244

Date 17-Jul-12

Incoming panel

No 245

Date 17-Jul-12

Incoming panel

写真

No 246

Date 17-Jul-12

Incoming panel

No 251

Date 17-Jul-12

House Service panel

No 252

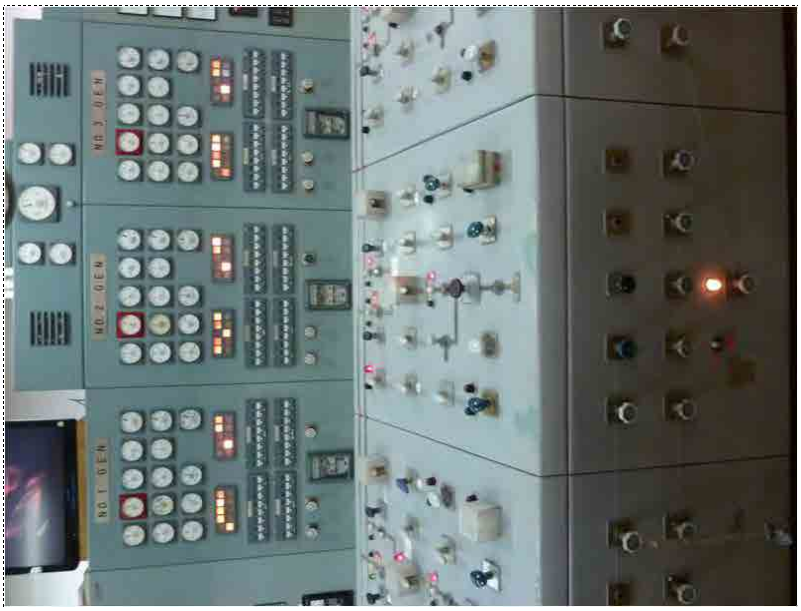
Date 17-Jul-12

House Service panel

No 253

Date 17-Jul-12

House Service panel



No 311

Date 17-Jul-12

GEN 2 panel (Control panel)

No 312

Date 17-Jul-12

GEN 2 panel (Control panel)

写真

No 313

Date 17-Jul-12