UNFCCC Secretariat
Martin-Luther-King-Strasse 8
D-53153 Bonn
Germany

Att: CDM Executive Board

DET NORSKE VERITAS
CERTIFICATION AS
International Climate Change Services
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NO-1322 Høvik
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Tel: +47-6757 9900
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http://www.dnv.com
NO 945 748 931 MVA

Your ref.:	Our ref.:	Date:
CDM Ref 0987	MLEH/KCHA	23 May 2007

Response to request for review

Energy efficiency through alteration of fuel oil atomizing media in coal fired thermal power plant (0987)

Dear Members of the CDM Executive Board,

We refer to the issues raised by the requests for review by three Board members concerning DNV's request for registration of the project activity "Energy efficiency through alteration of fuel oil atomizing media in coal fired thermal power plant" (0987) and would like to provide the following initial response to the issues raised by the requests for review:

It is unclear whether the steam enthalpy for the baseline emission calculations (91 kg/cm² and 510ºC) is correct. If a low pressure turbine was previously installed and used for steam tapping, then the emission reductions may be overestimated. A diagram of all turbines showing the complete watersteam cycle of the power plant including all parameters e.g. steam pressure, temperature, and enthalpy is required to verify that no low pressure turbine exists where the steam needed for fuel atomization could be tapped.

DNV Response:

We reiterate that during the validation DNV assessed relevant documentation and plant records for assessing the baseline of the project activity.

The project involves modification of the burner assembly in the existing plant of CESC, Titagarh unit for utilizing air as the atomizing media instead of steam. As mentioned in the validation report, section 3.3, the generating station comprised of 4 independent boilers connected to 4 turbine units each of 60 MW capacities.

The project applies the approved baseline methodology AMS II D, version 08, "Energy efficiency and fuel switching measures for industrial facility". As per the methodology, "*In the case of replacement, modification or retrofit measures, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted*". In the project prior to modification of the burner assembly steam at 10 kg pressure and 180 ^{0}C was used as the atomizing media. The auxiliary steam used for oil atomizing was let down from the main steam header which is at a pressure of 91 kg and 510 ^{0}C. Line diagram, Drawing number: TGS/B/5.22, showing the lineup of atomizing steam from the main steam header is enclosed herewith **(Attachment – I)**. The "Operating and Maintenance Manual" of Titagarh generating station provided by the detail engineering concern M/s Development Consultants Private Limited clearly indicates that the

generation level of steam in the main steam header is at 91 kg and 510 ^{0}C and the auxiliary steam, section 2.03.03, is let down from the main steam header and utilized in the burner atomizers. Excerpts from the manual are enclosed herewith **(Attachment-II).**

The Titagarh generating station comprises of 4 boilers each of which generate steam at 91 kg and 510 ^{0}C. The serial numbers of the boilers installed in the project plant are WBL-10920, WBL-10917, WBL-10930 and WBL-10961. The statutory clearances for each of the boilers are enclosed herewith **(Attachment- III).** The steam generated from these boilers is individually fed to 4 Nos. turbines of 60 MW capacity each. The machine numbers of the turbines installed in the project plant are 4368, 4369, 4370 and 4371. These turbines are supplied by M/s Nei Parsons Limited and the instruction manual of M/s Nei Parsons Limited is enclosed herewith **(Attachment – IV).** Design data of the turbines, chapter 01 of the instruction manual, as provided by the OEM indicates that the inlet steam pressure at the turbine inlet is 89 kg and 510 ^{0}C. The difference in steam pressure at the generation level and the turbine inlet is due to pressure drop in the line from boiler to the turbine house. The instruction manual is common for all the 4 turbines as all the units are identical in nature. Steam and water balance for one of the turbines is enclosed herewith as requested for (**Attachment- V**)

The steam and water balance diagram and the instruction manual from the original equipment manufacturer (OEM) indicates that there is no low pressure turbine in the existing set up of CESC limited, Titagarh unit. All the boilers in the project plant generate main steam at 91 kg/cm^2 and this high pressure steam is used in turbine for power generation. Thus there is no low pressure steam source which could be used in the project plant and baseline energy consumption determined.

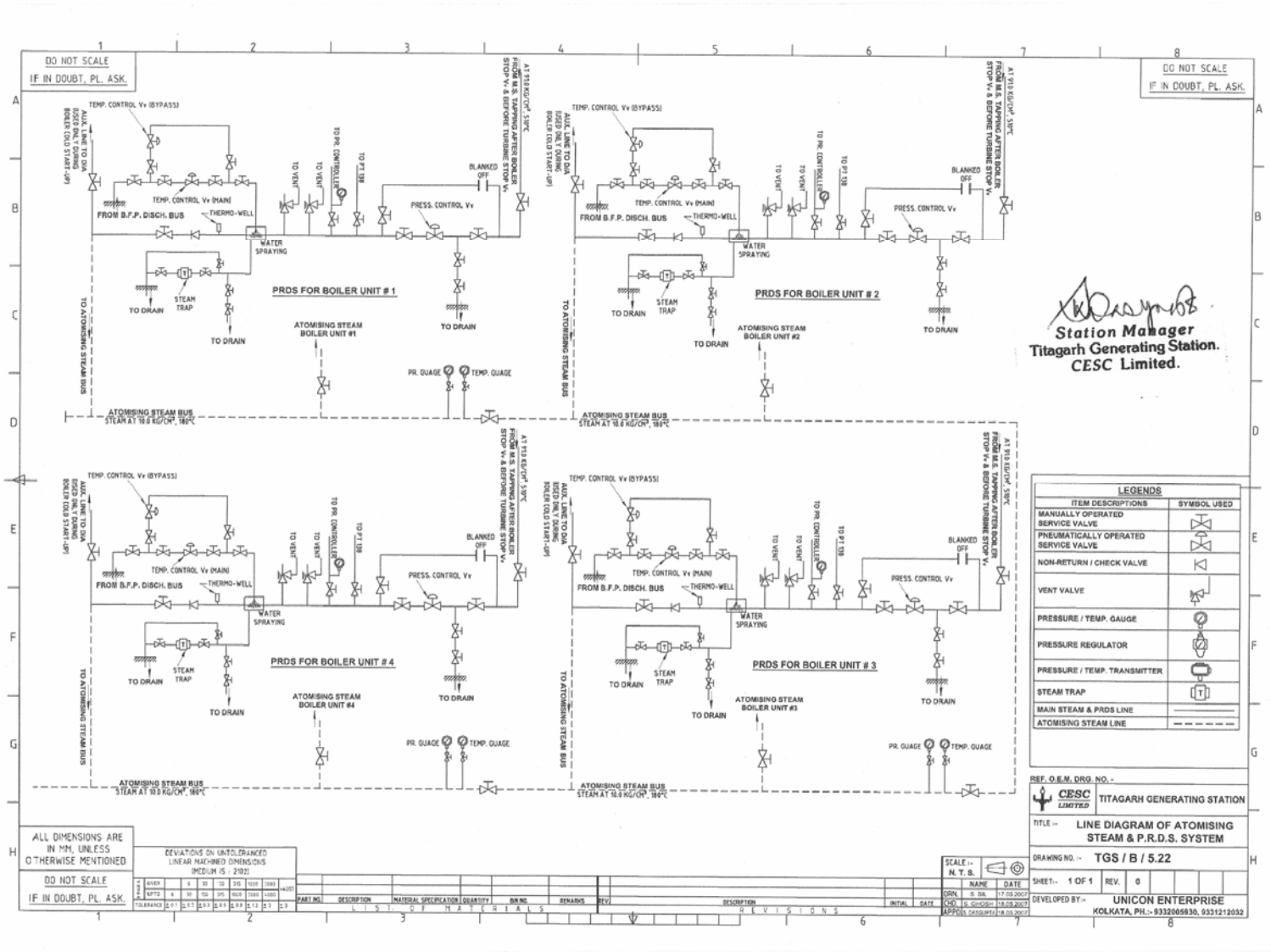
We sincerely hope that the Board accepts our aforementioned explanations.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

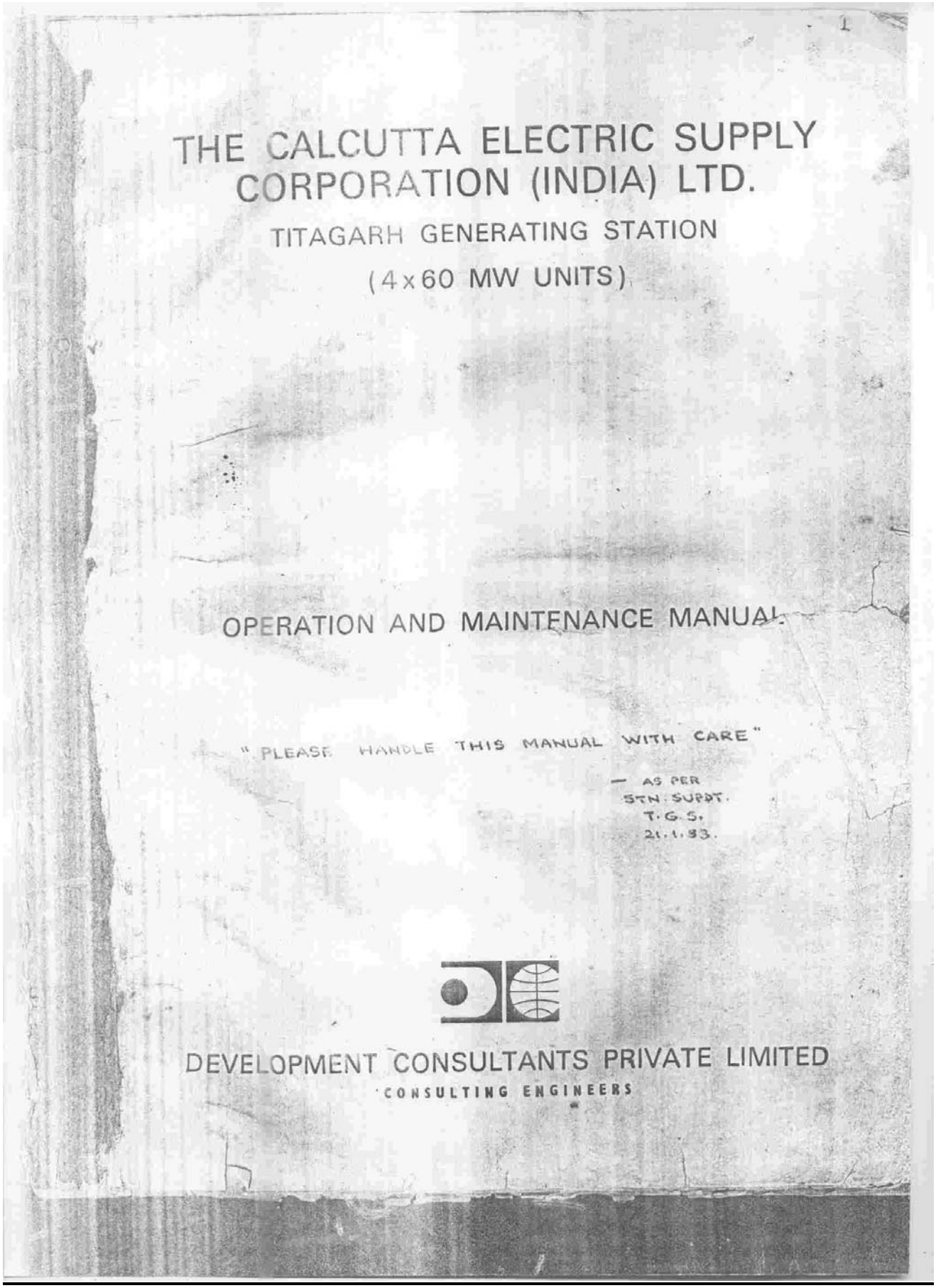
Michael Lehmann
Technical Director
International Climate Change Services

C Kumaraswamy
Manager – South Asia
Climate Change Services

Attachment I



Attachment- II



of site that the coal handling system will be started soon and to clear out from the equipment and after which all the equipment in the selected path shall be ready for sequence starting. The operator has to start up the plant within the next 6 to 9 minutes . If all the equipment are not started within within this time (adjustable) after the control bus is energised the control bus and the corresponding lamp the conveyors/equipment not started within that time could not be started unless shall automatically get denergised. Presses the plant warning push button and start remaining equipment/conveyors after energisation of control bus. The equipment already started would however continue to run. If after pressing the plant warning push button the operator decides not to run the route, he should press the 'warning cancel' push button which would stop the hooters and reset them for another operation.

2.03.00 STEAM CYCLE

The design of the power cycle is based on the modern unit concept where a unit consists of a steam generator with its independent firing systems, tied to a steam turbogenerator.

The steam generating unit, radiant, single drum, pulverized coal fired, dry bottom, is equipped with Ball and Race type milling plant. Coal bunkers with 24 hour storing capacity are provided to feed coal to the mills. The steam generator is designed for a continuous rating of 272 Tonnes/hr (max) at a pressure of 91.5 Kg/cm^2 and temperature of 515°C.

The steam generator supplies steam to a condensing steam turbine with five non-regulated extraction points of steam for heating the condensate and feed water.

For convenience, steam cycle can be broadly classified into four main divisions :

1. Main steam
2. Auxiliary steam
3. Extraction steam
4. Turbine gland sealing steam

2.03.01 Main Steam

Saturated steam from the Boiler drum is led to the superheater cage inlet box and then to the primary superheater horizontal bank by a number of tubes thus forming the roof of the boiler. Steam from this bank enters the primary pendent superheater and from there to secondary pendent superheater. The attemperator is located between the outlet box of the primary pendent superheater and inlet box of secondary superheater. Final steam temperatureis controlled by injecting water of requisite quantity in the attemperator.

Main steam from the secondary superheater outlet at a pressure of 91.5 Kg/cm^2 and a temperature of 515°C flows through a 350 mm M.S. pipe bifurcating into two 300 mm pipes before entry to the E.S.V. Two steam chests are provided, one on each side of the machine, and each chest contains a combined emergency stop valve and two governor valves. Steam expands in two cylinders i.e. H.P. and L.P. and finally flows to the condenser.

Steam is cooled by circulating water in the condenser. Condensate thus formed is taken to the deaerator with the help of 2 nos. 100% condensate extraction pumps. On its way to the deaerator, condensate is heated in L.P. heaters no. 1 & 2, heating being done by drawing

Non return valves located in extractions 5 and 4 are quick closing type operated electrically through a solenoid receiving impulse from turbine tripping. In case of tripping of the turbine, quick closing valves are also closed automatically a nd prevent the back flow of the trapped steam to the turbine, thereby preventing turbine overspeeding. Extraction 3 is connected to the deaerator. A second steam supply to to the deaerator is provided from the final feedheater bled steam tapping for light loads operation to maintain the pressure within the deaerator at or above 20 psia at all loads.

2.03.03 Auxiliary Steam

Steam from the main steam line is passed through a pressure reducing control station to a desuperheater where the steam temperature is tempered by a spray of condensate from main condensate system. The quantity of condensate spray in controlled by an automatic arrangement which senses the temperature of the steam going out of the desuperheater. A constant pressure of 12 Kg/cm^2 at 278°C is maintained in the auxiliary steam bus.

Auxiliary steam thus obtained from the outlet of desuperheater is supplied to burner atomisers, fuel oil heaters etc.

Steam supply to hogging ejector and the two main steam ejectors is taken from the steam manifold through an isolating valve, strainer and an orifice plate. The orifice plate is provided with a bypass and isolating valve to enable the ejectors to operate at low boiler ~~pre~~ pressure. The main ejectors and hogging ejector are designed for a steam pressure of 28 kg/cm^2 at 482°C temperature. Steam from the main ejectors is condensed by main condensate.

Annexure-III

Government of West Bengal
Labour Department
L.W. Branch
Writers' Buildings, Kolkata .

No. 1018 - L.W./6C- 13 /2006 . Dated :18.12. .2006

O R D E R

In view of emergency and in exercise of the power conferred by sub-section (2) of Section 34 of the Indian Boilers Act, 1923 (5 of 1923), the Governor is pleased hereby to exempt the Boiler Registration noted in the Schedule below belonging to **Titagarh Generating Station of C.E.S.C.Ltd.**

from the provisions of sub-section (3), (4) and (5) of Section 8 of the said Act for the period noted against the said boiler .

The exemption is hereby granted at the entire risk of the user .

The exemption shall cease to be in force on the following conditions :-

(i) on the expiry of the period for which it is granted ; or
(ii) when any accident occurs to the boilers ; or
(iii) when any structural alteration, addition or renewal is made in or to the boiler ;
(iv) when any repair is carried out to any part of the boiler without prior sanction to the Chief Inspector of Boilers, West Bengal .

S C H E D U L E

Boiler No.	Economiser No.	Exemption period .
WBL - 10930		From 4.12.06 to 3.6.07 .

By Order of the Governor ,
B. Chakraborty
(B.Chakraborty)
Assistant Secretary to the
Government of West Bengal .

No. 1018/1(2) - L.W. Dated :18.12.2006 .

Copy forwarded for information and necessary action to :-

1) The Chief Inspector of Boilers, New Secretariat Buildings, (8th floor), 1, Kiron Shankar Roy Road, Kolkata - 700 001 with reference to his letter No. **L/1949 Dt.4.12.2006.**

2) **The Addl.Chief Engineer(Gen.),C.E.S.C.Ltd.,Statesman House, 4,Chowringhee Square,Kolkata with reference to his letter No.ACE(G):9917 dated 25.10.2006.**

B. Chakraborty
(B.Chakraborty)
Assistant Secretary .

No. 1880

FORM V.

[REGULATION 381 (C)]

Provisional Order under Section 9 of the Indian Boilers Act of 1923

Titagarh Generating Station W.C.E.S.C. Limited.
P.O. Titagarh D.T. N 24 Parganas

are hereby permitted to use the Water tube Boiler (Registry No. W.B. 10917

Boiler Rating 6019 (CM). made by

and bearing Maker's Number

at a maximum pressure of 102·65 kg. per square cm. ~~lb. per square inch~~ pending the issue or refusal of a certificate within six months from the date hereof 13.2.07 after which period this order will become void.

Dated 13.2.07

By Director.
Inspector of Boilers,
West Bengal.

N.B.—This order must be produced on demand by any authorised person and surrendered to the Chief Inspector on receipt of orders.

GOVERNMENT OF WEST BENGAL
LABOUR DEPARTMENT
L.W. BRANCH
WRITERS' BUILDINGS, KOLKATA-700001.

No.62-L.W./6B-07/2003 Date : 29.01.2007

O R D E R

In view of emergency and in exercise of the power conferred by sub-section (2) of Section 34 of the Indian Boilers Act, 1923 (5 of 1923), the Governor is pleased hereby to exempt the Boiler Registration noted in the Schedule below belonging to Titagarh Generating Station of C.E.S.C. Ltd. from the provisions of sub-section(3),(4) and (5) of Section 8 of the said Act for the period noted against the said boiler.

The exemption is hereby granted at the entire risk of the user.

The exemption shall cease to be in force on the following conditions :-

(i) on the expiry of the period for which it is granted ; or
(ii) When any accident occurs to the boilers ; or
(iii) When any structural alteration, addition or renewal is made in or to the boiler;
(iv) When any repair is carried out to any part of the boiler without prior sanction to the Chief Inspector of Boilers, West Bengal.

S C H E D U L E

Boiler No.	Economiser No.	Exemption period.
WBL-10920(Unit-2)		From 3.1.2007 to 2.7.2007

By order of the Governor,

Sd/-

Assistant Secretary to the
Government of West Bengal.

No.62/1(2)-L.W. Date : 29.1.2007

No. 1869

FORM V.

[REGULATION 381 (C)]

Provisional Order under Section 9 of the Indian Boilers Act of 1923

....Titagarh Generating Station C/o C E S C Limited.....
P. O. Titagarh . D.T. N 24 Parganas.
.....

are hereby permitted to use the Water Tube .....Boiler (Registry No. WBL 10961

Boiler Rating.....6019 (M) .....made by.....~~B & W~~ Indian ACC-Babcock Ltd Durgapur

.....and bearing Maker's Number.....

at a maximum pressure of.....102·65.....kg. per square cm./~~lb. per square inch~~ pending the issue or refusal of a certificate within six months from the date hereof.....28.11.06.....after which period this order will become void.

Dated.....28.11.06.....

Deputy Director.
Inspector of Boilers.
West Bengal.

N.B.—This order must be produced on demand by any authorised person and surrendered to the Chief Inspector on receipt of orders.

Attachment –IV

NEI PARSONS LIMITED

INSTRUCTION MANUAL

for

60MW TURBINE-GENERATOR

and

ASSOCIATED CONDENSING, FEED
HEATING AND AUXILIARY PLANT

Supplied to the order of

CALCUTTA ELECTRIC SUPPLY CORPORATION (INDIA) LIMITED

Installed at

TITAGARH POWER STATION

Machine Nos. 4368-71

TURBINE

LIST OF CONTENTS

DESCRIPTION

OPERATION

MAINTENANCE

Issue 1-5/82

Titagarh

1 DESIGN DATA

Econcomical and maximum continuous rating	60 MW
Steam pressure at emergency/stop valve	89 Kg/cm^2
Steam temperature at emergency/stop valve	$510^{o}C$
Absolute pressure at exhaust	0.088 Kg/cm^2
Rotational speed	3000 r.p.m.
Tripping speed	3375 r.p.m.

Issue 1-5/82

Titagarh

Attachment- V