

**HALF YEARLY COMPLIANCE REPORT TO THE
CONDITIONS OF ENVIRONMENT CLEARANCE
(2 X 660 MW COAL BASED THERMAL POWER PLANT)
(UNIT 3 & 4)**

**ODISHA POWER GENERATION CORPORATION LIMITED
BANA HARAPALI, JHARSUGUDA, ODISHA**



SUBMITTED TO

**Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhawan
Jor Bagh,
New Delhi,
India - 110003**

ODISHA POWER GENERATION CORPORATION LTD.



(A Government Company of the State of Odisha)

CIN: U40104OR1984SGC001429

2X660MW Thermal Power Project Office: Resource Centre,
Ib Thermal Power Station, PS.: Banharpali, Dist.: Jharsuguda – 768234, Odisha,
Ph.:06645-222212 Web: www.opgc.co.in

LTR No: OPGC II – MOEF &CC – 2016 – 0029

Date: 30.05.2016

To,

The Director (Thermal),
Ministry of Environment, Forests & Climate Change
Indira Paryavaran Bhawan
Jor Bagh Road
New Delhi - 110 003

Sub: Submission of half yearly compliance report to the conditions mentioned in the Environment Clearance granted to Expansion of existing coal based thermal power plant of OPGC by addition of 2 X 660 MW (unit 3 & 4) at Banharpali in Jharsuguda district of Odisha.

Your Ref.: MoEF Letter No J-13011/59/2008-IA.II (T) dated 04.02.2010

MoEF Letter No J-13011/59/2008-IA.II (T) dated 22.01.2014

MoEF Letter No J-13011/59/2008-IA.II (T) dated 16.01.2015

Dear Sir

Kindly find the attached Compliance report to the conditions mentioned in Environment Clearance granted to Expansion of existing coal based thermal power plant of OPGC by addition of 2 X 660 MW (unit 3 & 4).

Thanking you,

Yours Faithfully,

Ron McParland

(Executive Director, Construction, Unit 3 & 4)

Enclosure: Environment Clearance Compliance Report

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CC:

1. The Director(s), Govt. Of India, Ministry of Environment, Forest & Climate Change. Eastern Regional Office, A/3, Chandrasekharpur, Bhubaneswar-751023
2. Member Secretary, State Pollution Control Board, Odisha, Paribesh Bhawan, Nilakantha Nagar, A/118, Unit -8, Bhubaneswar-751012
3. Regional Office, State Pollution Control Board, Odisha, Plot No- 370/5971, At- Babubagicha, (Cox Colony) St. Merry Hospital Road, Po- Industrial Estate, Dist- Jharsuguda-768203
4. The In charge, Eastern Zonal Office, Central Pollution Control Board, Southernnd Conclave, Block 502, 5th & 6th Floors, 1582 Rajdanga Main Road, Kolkata - 700 107 (W. B.)

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MoEF EC COMPLIANCE REPORT (Oct 15-March 16)

Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
4. (i)	It shall be ensured that natural drainage in the area is not disturbed due to any activity associated with operation or development of the power plant.	<ul style="list-style-type: none"> Natural drainage in the project area is not being disturbed and will not be done in future.
4. (ii)	The height of the existing ash pond shall not be increased to accommodate fresh disposal of ash slurry.	<ul style="list-style-type: none"> The height of existing ash pond will not be increased to accommodate fresh disposal of ash slurry from the subject project (unit 3 & 4). Separate site has been identified for disposal of ash from Unit 3&4.
4.(iii)	Wildlife conservation plan prepared in consultation with the office of the concerned Chief Wildlife Warden shall be implemented before any expansion activity is undertaken. The status of implementation shall be submitted to the Regional Office of the Ministry within six months and from time to time.	<ul style="list-style-type: none"> The Site Specific Wild Life Conservation Plan (SSWLCP) for the power plant got approved by PCCF (WL)/ CWLW, Odisha on 12th June, 2014. The payment for execution of SSWLCP was done on 18.07.2012 to Odisha CAMPA account. Receipt submitted as annexure previous EC compliance report dated 10th Dec, 2014.
4. (iv)	Hydro-geological study of the area shall be reviewed annually and results submitted to the Ministry and concerned agency in the State Govt. In case adverse impact on ground water quantity and quality is observed, immediate mitigating steps to contain any adverse impact on ground water shall be undertaken.	<ul style="list-style-type: none"> Hydro-geological study of the Ash Pond and nearby areas was studied by SGS India Pvt Ltd during April 2014. The comparison of the ground water samples near the existing ash pond & nearby surrounding villages' shows that the concentration of heavy metals is within the permissible limits of IS standard 10500 and WHO permissible limits. The ground water reservoir is substantial in the area. The report was submitted before State Pollution Control Board, Odisha. This study shall be conducted on annual basis covering plant area & results shall be submitted before the regional office & SPCB. Report submitted as annexure previous EC compliance report dated 10th Dec, 2014. A review study has been conducted by IIT Chennai for ensuring the quality of ground water and surface water in 2015. Copy of the report is attached as Annexure-1 For 2016, we have initiated action to carry out a more comprehensive hydro geological study through an MOEF authorised consultant under the supervision and guidance of team from IIT Madras. Piezometers have been installed in existing ash pond and periodic monitoring is being taking place.
4. (v)	A twin flue stack of 275 m height shall be provided with continuous online monitoring equipments for SOx, NOx	<ul style="list-style-type: none"> The design requirements have already been incorporated in the plant design specifications.

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	and RSPM (PM2.5 & PM10). Exit velocity of flue gases shall not be less than 22 m/sec. Mercury emissions from stack shall also be monitored on periodic basis.	<ul style="list-style-type: none"> Mercury emission if any will be monitored periodically on commissioning of the Plant. Application for this done on 01.12.2015 via letter no 3534 and application is attached as Annexure-2.
4. (vi)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm ³ .	<ul style="list-style-type: none"> The ESP is designed with all fields in service at BMCR WC firing. The selected ESP is guaranteed for an outlet emission of 50 mg/Mm³ at 100% BMCR worst coal firing condition with collection efficiency of ESP at 99.938%. There are 4 electrostatic precipitators of size FAA - 10 X 45M - 2 X 116150 - 2 per boiler. Each ESP is provided with 4 hoppers arrangement across the flow directions. Each ESP is provided with 40 numbers of hoppers. These ash hoppers are located directly beneath the fields and receive the fly ash dislodged from the collecting electrode and emitting system.
4. (vii)	Adequate dust extraction system such as cyclones/ bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided.	<ul style="list-style-type: none"> The design requirements have already been incorporated in the plant design specifications.
4. (viii)	Utilisation of 100% Ash generated shall be made from 4th year of operation of the plant. Status of implementation shall be reported to the Regional Office of the Ministry from time to time.	<ul style="list-style-type: none"> Ash Management plan furnished as Annexure -3.
4. (ix)	Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry form. Mercury and other heavy metals (As, Hg, Cr, and Pb etc.) will be monitored in the bottom ash as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area.	<ul style="list-style-type: none"> The design requirements have already been incorporated in the plant design specifications. Effluent emanating from the existing ash pond is being recycled and reused for fresh slurry making. No ash pond effluent is being discharged outside. The heavy metal in ash and nearby ground water being monitored periodically. Ash generated from the plant will be disposed only in designated area.
4. (x)	Ash pond shall be lined with HDP/LDP lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached.	<ul style="list-style-type: none"> The design requirements will be incorporated in the design specifications of ash pond. A comparative study of Bentonite clay lining and HDP/LDP lining. Study Report provided showing the various factors in favour of HDPE/ LDPE is attached as Annexure-4

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
4. (xi)	For disposal of Bottom Ash in abandoned Manohar mines it shall be ensured that the bottom and sides of the mined out areas are adequately lined with clay before Bottom Ash is filled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity.	<ul style="list-style-type: none"> The design requirements will be incorporated in the design specifications. State Pollution Control Board will be informed in advance before undertaking filling of mine using ash.
4. (xii)	Closed cycle cooling system with natural draft cooling towers shall be provided. The Effluents shall be treated as per the prescribed norms.	<ul style="list-style-type: none"> Considering the ambient conditions, the plant is being designed with induced draft cooling tower. This deviation request was submitted to Director(Thermal), MoEF vide letter No.565 dated 8 -March-2010 Considering our request, MoEF has granted its permission for use of Induced Draft Cooling System via EC Amendment dated 22/01/2014. <p><u>Reason for choosing IDCT over NDCT</u></p> <ul style="list-style-type: none"> Flexibility of O&M (In IDCT partly shut down can done) Cost Effectiveness, Flexible water Loading, Compact design space compared to NDCT Air flow almost constant regardless ambient air temperature RH and wind velocity are one of governing factor for performance of NDCT whereas IDCT is negligible parameter of this. IDCT have air discharge velocity from 3 to 4 times higher than the air entrance velocity thus there is no tendency for a reduced pressure zone to be created at the inlet of air inlet by the action of fans as in case of NDCT. The potential for recirculation on an IDCT is not self-initiating and therefore can be more easily quantified on the basis of ambient wind condition.
4. (xiii)	COC 5.0 will be adopted.	<ul style="list-style-type: none"> The design requirements have already been incorporated as COC 6.0 to minimize the water consumption.
4. (xiv)	The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary except during monsoon. Arrangements shall be made that effluents and storm water do not get mixed.	<ul style="list-style-type: none"> The design requirements have already been incorporated in the plant design specifications. Reusability of effluent water accounted in the Water Balance Diagram. The diagram is attached as Annexure-5.
4. (xv)	A sewage treatment plant shall be	<ul style="list-style-type: none"> Sewage will be treated in existing sewage

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	provided and the treated sewage shall be used for raising greenbelt/plantation.	<p>treatment plant. Treated sewage will be used for raising greenbelt/plantation.</p> <ul style="list-style-type: none"> Now the existing 1 MLD sewage treatment plant is operating at 22 % load. With the proposed expansion activity additional 24% load will be added and it is conveniently accommodated in the existing STP capacity.
4. (xvi)	Rainwater harvesting should be adopted. Central Groundwater Authority/ Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished.	<ul style="list-style-type: none"> The detail study on rain water harvesting technology has already been completed in May-2012 and the report is already finalised. The same was submitted to Central Ground Water Board for review and advice vide letter No. 1612/WE dated 28-June 13. CGWB authority via letter no. 613 dated 06/07/2013 has asked to comply on certain points. The compliance report submitted vide letter no 580 with enclosure on 17.02.2014.
4. (xvii)	Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	<ul style="list-style-type: none"> The design requirements have already been incorporated in the plant design specifications. Details of Fire protection arrangement at coal yard is attached as Annexure -6.
4. (xviii)	Storage facilities for auxiliary liquid fuel such as LDO and/ HFO/LSHS shall be made in the plant area in consultation with Department of Explosives, Nagpur. Sulphur content in the liquid fuel will not exceed 0.5%. Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil.	<ul style="list-style-type: none"> Storage Facilities for auxiliary liquid fuel shall be made in consultation with Dept. of Explosive. As regards to Sulphur content, EAC (Thermal) in its monthly meeting held on 18th/19th November 2013 has accorded its consent for the use of commercially available fuel oil. Disaster management plan shall be prepared before going for storage and handling of the oil.
4. (xix)	Regular monitoring of ground water (especially around ash pond and plant areas) shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely	<ul style="list-style-type: none"> Hydro-geological study of the Ash Pond and nearby areas was studied by SGS India Pvt Ltd during April 2014. The comparison of the ground water samples near the existing ash pond & nearby surrounding villages' shows that the concentration of heavy metals is within the permissible limits of IS standard 10500 and WHO permissible limits. In 2015, a review study has been conducted by IIT Madras for ensuring the quality of ground water and surface water. Copy of the report is attached as Annexure-1

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	affected due to the project.	<ul style="list-style-type: none"> Geotechnical Department, IIT, Madras has conducted a preliminary survey to decide the locations of sampling wells and piezometers inside plant and around ash ponds. Piezometers have been installed in existing ash pond and periodic monitoring is being For 2016, we have initiated action to carry out a more comprehensive hydro geological study through an MOEF authorised consultant under the supervision and guidance of team from IIT Madras.
4. (xx)	Monitoring surface water quantity and quality shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	<ul style="list-style-type: none"> Surface water and ground water quality monitoring is being done regularly. Once the Hydro geological study is completed, the points for monitoring in the direction of flow of ground water will be decided and monitoring will be done regularly.
4. (xxi)	Green Belt consisting of 3 tiers of plantations of native species around plant and at least 100 m width shall be raised. Wherever 100 m width is not feasible a 50 m width shall be raised and adequate justification shall be submitted to the Ministry. Tree density shall not less than 2500 per ha with survival rate not less than 70 %.	<ul style="list-style-type: none"> The requirements are addressed in the drawing number D-56 (already submitted on 30th November 2011). Now existing green cover is 34% of the plant area. This year, we have identified some of the vacant areas and some of thin green covers within the plant premises for augment our green cover. We have made a year wise plan for carrying out plantation. 6000 nos of saplings in 2015-16 , 8000 nos of sapling in 2016-17 , 10000 in 2017-18 & 20000 in the last stage of project construction .
4. (xxii)	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	<ul style="list-style-type: none"> Well-equipped first aid/sanitation facility is being provided at the project site.
4. (xxiii)	Noise levels emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 75 dBA. For people working in the high noise area, requisite personal protective equipment like earplugs/ear muffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc shall be periodically examined to maintain audiometric record and for treatment for any hearing loss	<ul style="list-style-type: none"> The design requirements for control of noise in the work areas have already been incorporated in the plant design specifications. PPE is being provided in OPGC for all personnel exposed to work in noisy area. Periodic health check has already been implemented in OPGC.

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	including shifting to non-noisy/less noisy areas.	
4. (xxiv)	Regular monitoring of ground level concentration of SO ₂ , NO _x , RSPM (PM _{2.5} & PM ₁₀) and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company.	<ul style="list-style-type: none"> In OPGC ground level concentrations are being monitored at six locations as agreed with SPCB and monthly periodic reports are submitted to SPCB. Ambient air is also being monitored on continuous basis by four online ambient air monitoring station & result of analysis are transmitted to SPCB server on real time basis. Periodic reports are being submitted to the Regional Office of MoEF.
4. (xxv)	A good action plan for R&R (if applicable) with package for the project affected persons be submitted and implemented as per prevalent R&R policy within three months from the date of issue of this letter.	<ul style="list-style-type: none"> R & R plan is not required as there is no displacement of people due to OPGC Unit 3&4.
4. (xxvi)	An amount of Rs 24.36 Crores shall be earmarked as one time capital cost for CSR programme. Subsequently a recurring expenditure of Rs 4.87 Crores per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation.	<ul style="list-style-type: none"> A list of projects amounting to Rs. 26.52 Crores has been approved by the CSR Committee in its 10th Meeting dated 24th February 2016 and subsequently ratified by BoD of OPGC in its 187th meeting dated 06 April 2016. A soft copy of the list of projects is attached for information and record. Once the project work is over action plan for spending 4.87 Crores per annum will be developed based on people's needs and local development priorities.
4. (xxvii)	As part of CSR programme the company shall conduct need based assessment for the nearby villages to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such programme. Company shall provide separate budget for community' development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self employment and jobs.	<ul style="list-style-type: none"> Need based assessment have been conducted by CSR team of OPGC which was followed by a Baseline Survey taken up by a professional agency. The agency has submitted its final draft report. The project list of Rs. 26.52 Crores provides the details of projects to be undertaken for development of local people. The list may be modified on the basis of findings of proposed Baseline Survey.
4. (xxviii)	The project proponent shall also adequately contribute in the development	<ul style="list-style-type: none"> This is high on OPGC's agenda. The approved project list throws adequate light

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	of the neighbouring villages. Special package with implementation schedule for providing fluoride free potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	on how OPGC has planned elaborately to provide lasting sustainable water solutions to people of nearby villages. A scientific Hydrology Study has been conducted to guide the process of project implementation.
4. (xxix)	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	<ul style="list-style-type: none"> Adequate space for construction of labour colony has already been earmarked outside the plant boundary. Infrastructure for provision of water supply and electricity has already been made. Other infrastructural requirement is being provided by the construction contractor.
4. (xxx)	The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in .	<ul style="list-style-type: none"> Complied. Published in Sambad (Odiya) & New India Express (English) in March 2010.
4. (xxxi)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, ZilaParisad / Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions/representations, if any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	<ul style="list-style-type: none"> Complied in March 2010.
4. (xxxii)	A separate Environment Management Cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.	<ul style="list-style-type: none"> A separate Environment Management Cell with qualified staff has already been functioning for the purpose.
4. (xxxiii)	The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal	<ul style="list-style-type: none"> The status of compliance is being uploaded in Website and reports are also being sent to the said offices.

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	Office of CPCB and the SPCB. The criteria pollutant levels namely, RSPM, SO ₂ , NO _x (ambient levels as well as stack emissions) shall be displayed at a convenient location near the main gate of the company in the public domain.	
4. (xxxiv)	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well by e-mail) to the respective Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB.	<ul style="list-style-type: none"> Reporting already commenced since October 2010.
4. (xxxv)	The environment statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.	<ul style="list-style-type: none"> Form V submission and web-hosting will be commenced on commissioning of Plant.
4. (xxxvi)	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of compliance of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests.	<ul style="list-style-type: none"> Reporting already commenced since October 2010. The compliance report is being sent to Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board, State Pollution Control Board and the Regional Office, OSPCB. Web hosting of EC Compliance status is being done.
4. (xxxvii)	Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring. Project proponent will up-	<ul style="list-style-type: none"> Reporting already commenced since October 2010. Web-hosting of compliance of stipulated in the EC conditions being done. Criteria pollutants levels NO_x (from stack & ambient air) will be displayed at the main gate of the power plant on commissioning of Plant.

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Clause No.	Environmental Clearance Conditions	OPGC II Compliance Status
	load the compliance status in their website and up-date the same from time to time at least six monthly bases. Criteria pollutants levels including NO _x (from stack & ambient air) shall be displayed at the main gate of the power plant.	
4. (xxxviii)	Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.	<ul style="list-style-type: none"> The project cost includes the provision for implementation of environmental protection measures as required.
4. (xxxix)	The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant.	<ul style="list-style-type: none"> The financial closure of the project was done on 23rd November, 2012. NTP was issued to BHEL and BGRE on 26th March, 2014.
4. (xxxx)	Full cooperation shall be extended to the Scientists/Officers from the Ministry / Regional Office of the Ministry at Bangalore / CPCB/ SPCB who would be monitoring the compliance of environmental status.	<ul style="list-style-type: none"> It is being done.

Additional Recommendations to OPGCL by MoEF in EC amendment dated 22.01.2014		
S. No	Recommendations	Compliance status
a	A long term study of radio activity and heavy metals contents on coal to be used shall be carried out through a reputed institute. Thereafter, mechanism for an inbuilt continuous monitoring for radio activity and heavy metals in coal and fly ash (including bottom ash) shall be put in place.	<ul style="list-style-type: none"> The study shall be conducted once the source of the coal to be used will be defined.
b	Continuous monitoring for heavy metals in and around the existing ash pond area shall be immediately carried out by reputed institutes like IIT Kanpur.	<ul style="list-style-type: none"> The monitoring has been periodically carried out through reputed and accredited agency M/S SGS India Ltd. The same monitoring shall be carried out through IIT, Madras. Reports attached.
c	Harnessing solar power within the premises of the plant particularly at available roof tops shall be undertaken	<ul style="list-style-type: none"> Shall be complied.

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Additional Recommendations to OPGCL by MoEF in EC amendment dated 22.01.2014		
S. No	Recommendations	Compliance status
	and status of implementation shall be submitted periodically to the Regional Office of the Ministry.	
d	Fugitive emissions shall be controlled to prevent impact on agricultural or non-agricultural land.	<ul style="list-style-type: none"> Adequate dust suppression measures like water sprinkling is being done at the construction site. However sufficient sprinklers will be installed to suppress fugitive dust from vehicular movement and coal handling area.
e	No ground water shall be extracted for use in operation of the power plant even in lean season.	<ul style="list-style-type: none"> Ground water is not being used.
f	Minimum required environmental flow suggested by the Competent Authority of the State Govt. shall be maintained in the Channel/ Rivers (as applicable) even in lean season.	<ul style="list-style-type: none"> Minimum required environmental flow is being maintained as per the water agreement with Water Resource Department.
g	No water bodies including natural drainage system in the area shall be disturbed due to activities associated with the setting up/operation of the power plant.	<ul style="list-style-type: none"> No water bodies are being disturbed due to project or will be disturbed due to operation.
h	Fly ash shall not be used for agricultural purpose. No mine void filling will be undertaken as an option for ash utilization without adequate lining of mine with suitable media such that no leachate shall take place at any point of time. In case, the option of mine void filling is to be adopted, prior detailed study of soil characteristics of the mine area shall be undertaken from an institute of repute and adequate clay lining shall be ascertained by the State Pollution Control Board and implementation done in close co-ordination with the State Pollution Control Board.	<ul style="list-style-type: none"> Ash Management plan to be furnished is attached as Annexure – 3.
i	Three tier green belts shall be developed all around Ash Pond over and above the Green Belt around the plant boundary.	<ul style="list-style-type: none"> Green belt already exists all along the plant boundary. For Ash Pond, SPCB Odisha advised not to go for any plantation on the ash pond dykes looking towards the risk of dyke failure due to tree root channelling. However, OPGC will re-examine the risk involved through and expert agency and do the needful in consultation with Regional office MoEF and SPCB.
j	A common Green Endowment Fund shall be created and the interest earned out of it shall be used for the development and management of green cover of the area.	<ul style="list-style-type: none"> Shall be complied.

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Additional Recommendations to OPGCL by MoEF in EC amendment dated 22.01.2014

S. No	Recommendations	Compliance status
k	It shall be ensured that in-built monitoring mechanism for the schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time.	<ul style="list-style-type: none"> Baseline study has been recently conducted by Sutra Consultancy Services, BBSR and the final report is awaited. Schemes are currently under execution and appropriate time to get them evaluated by an external agency is not yet ripe. This point will be executed in due course. However an internal monitoring mechanism is already in place.
l	An Environmental Cell shall be created at the project site itself and shall be headed by an officer of the company of appropriate seniority and qualification. It shall be ensured that the head of the Cell shall directly report to the Head of the Organization.	<ul style="list-style-type: none"> A separate Environment Management Cell with qualified staff has already been functioning for the purpose.
m	The project proponent shall formulate a well laid Corporate Environment Policy and identify and designate responsible officers at all levels of its hierarchy for ensuring adherence to the policy and compliance with the conditions stipulated in this clearance letter and other applicable environmental laws and regulations.	<ul style="list-style-type: none"> OPGC has got well formulated Corporate EHS Policy and it is annexed as Annexure - 7.



DEPARTMENT OF CIVIL ENGINEERING
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1st February 2016

To
Mr. Umakanta Pahi
EHS, IB Thermal Power Station
Banaharpali, Jharsuguda
Odisha-768324, India


Dear Sir,

Subject: Chemical Analysis of water samples reg

With reference to the above we have analyzed water samples provided by you, for their chemical properties. The results obtained from various chemical analyses are presented in the following (table 1 and 2). Please let us know if you need any further clarification.

Thanking you

Yours sincerely,

 11/2/2016

Dr. DALI NAIDU ARNEPALLI
Assistant Professor
Geotechnical Engineering Division
Department of Civil Engineering
Indian Institute of Technology Madras
Chennai-600 036, Tamil Nadu, India.

Table 1. Chemical Analyses of OPGC water samples (Batch:1 Provided on 25/04/2015)

S. No.	Sample ID	pH	Concentration of element (ppm)							
			Cd	Cu	Cr	Fe	Mn	Pb	Sr	Zn
1	Tube well water sample, Sargipali	8.1	---	---	0.023	0.016	0.004	---	0.034	0.055
2	Open well water sample, Kantitakra	7.9	---	---	0.020	0.019	0.001	---	0.071	---
3	Ash pond 'A' adjacent reservoir water sample	7.5	---	---	0.022	0.020	0.001	---	0.085	---
4	Ash pond 'B' adjacent reservoir water sample	7.6	---	---	0.024	0.019	0.001	---	0.056	---
5	Tube well water sample, Baragarh	7.7	---	---	0.025	0.070	0.001	---	0.184	0.004
6	Ash pond 'A' water sample	7.5	---	---	0.028	0.020	---	---	0.101	---
7	Open well water sample, Baragarh	7.3	---	---	0.024	0.016	0.001	---	0.059	0.058
8	Tube well water sample, Kantitakra	7.6	---	---	0.024	0.258	---	---	0.683	---
9	Tube well water sample, Rengali	8.2	---	---	0.027	0.016	0.027	---	0.328	0.285
10	Combined effluent water sample	7.9	---	---	0.024	0.023	0.001	---	0.086	0.003
11	Tube well water sample, Saradhapali	7.7	---	---	0.024	0.016	0.001	---	0.083	---
12	Open well water sample, Rengali	7.7	---	---	0.026	0.089	0.001	---	0.077	0.047
13	Tube well water sample, Budapali	8.1	---	---	0.029	0.011	0.001	---	0.146	---
14	Open well water sample, Budapali	7.7	---	---	0.028	0.018	0.001	---	0.056	---

--- Below the detection level of the instrument (< 0.001ppm)

Each concentration is the average of the results obtained from six independent analyses

Table 2. Chemical Analyses of OPGC water samples (Batch 2: Provided on 12/12/2015)

S. No.	Sample ID	pH	Concentration of element (ppm)							
			Cd	Cu	Cr	Fe	Mn	Pb	Sr	Zn
1	Open well water sample, Rengali	6.9	---	---	0.001	0.018	0.006	---	0.053	0.015
2	Ash pond 'A' PST sample	5.9	---	---	0.001	0.277	0.255	---	0.085	0.075
3	Tube well water sample, Baragad	7.5	---	---	0.004	0.052	0.009	---	0.083	0.032
4	Open well water sample, Baragad	6.5	---	---	0.001	0.021	---	---	0.037	0.015
5	Combined effluent water sample	7.3	---	---	0.005	0.018	---	---	0.106	0.012
6	Tube well water sample, Rengali	7.5	---	---	0.007	0.020	0.036	---	0.165	1.251
7	Ash pond adjacent water sample, towards Budapali	7.5	---	---	0.010	0.020	---	---	0.048	0.029
8	Open well water sample, Saradhapali	6.9	---	---	0.011	0.022	---	---	0.069	0.005
9	Tube well water sample, Kantitakra school (Saradhapali)	7.7	---	---	0.012	0.024	0.114	---	0.078	0.144
10	Tube well water sample, Budapali	7.4	---	---	0.020	0.068	0.001	---	0.079	0.053
11	Ash pond 'A' adjacent water sample	7.2	---	---	0.018	0.021	0.001	---	0.006	0.018
12	Raw water sample	7.3	---	---	0.020	0.020	---	---	---	---
13	Filter backwash water sample	7.2	---	---	0.021	0.040	0.032	---	0.012	---

--- Below the detection level of the instrument (< 0.001ppm)

Each concentration is the average of the results obtained from six independent analyses



ODISHA POWER GENERATION CORPORATION LTD.

(A Government Company of the State of Odisha)
CIN U40104OR1984SGC001429

Regd. Off. : Zone-A, 7th Floor, Fortune Towers, Chandrasekharapur, Bhubaneswar - 751023, Odisha
Ph. 0674-2303765 - 66. Fax : 0674-2303755 / 56
Web www.opgc.co.in.

Letter No: OPGC/3534

Date: 01-12-2015

To
The Director (Thermal-IA)
Ministry of Environment, Forests and Climate Change
3rd floor, Vayu Block
Indira Paryavaran Bhawan, Jor Bagh Road
Aliganj, New Delhi-110003

Kind Attention: Shri B. B Barman

Sub: Expansion of existing Coal Based Thermal Power Plant by addition of 2X660 MW (Unit 3 & 4) at village Banharpalli, in Jharsuguda District in Odisha by M/s Odisha Power Generation Corporation Limited- Request for amendment of clause no. 4 (v) of the Environment Clearance dated 04.02.2010.

Ref: 1. Environment Clearance (EC) issued vide MoEF letter no. J-13011/59/2008-IA.II (T) dated 04-02-2010.
2. Amendment of EC issued vide MoEF letter no. J-13011/59/2008-IA.II (T) dated 22.01.2014.
3. Extension of validity of EC issued vide MoEF letter no. J-13011/59/2008-IA.II (T) dated 16.01.2015.

Sir,

With reference to the subject cited above, it is to intimate that in Clause no. 4(v) of the EC dated 04.02.2010, it is inadvertently mentioned that a twin flue stack of 275m height shall be provided with continuous online monitoring equipments for measurement of RSPM (PM_{2.5} & PM₁₀). As per the environmental norms, RSPM (PM_{2.5} & PM₁₀) is normally monitored for ambient air and stack flue gas is being monitored online for particulate matters.

Hence you are requested to kindly amend the clearance suitably.

Your kind support & communication is highly solicited.

Yours faithfully,

[Signature]
11/12/15

Senior Manager (Mechanical)

CC: The Director (S), Ministry of Environment, Forests and Climate Change, Govt. of India, Eastern Regional office, A/3, Chandrasekharapur, Bhubaneswar-751023

ANNEXURE-3
TENTATIVE FLY ASH UTILISATION PLAN

Unit -

000' MT

Sl. No	Utilization Heads	1st Year	2 nd Year	3rd Year	4th Year
1	Captive ash bricks/blocks manufacturing	15	15	15	15
2	Outside Bricks plants	20	20	25	30
3	Construction in nearby highway projects, other road projects & Land development.	250	250	250	200
4	Cement plants.	120	120	120	120
5	Ready -Mixed Concrete.	10	10	10	10
6	Ash Export	120	150	150	150
7	Back filling in nearest mine void / concurrent backfilling in captive mine void	535	719	1035	1615
8	Unutilized Fly Ash disposal to Ash Disposal Area.	1070	856	535	Nil
Qty of Fly Ash Utilization		1070	1284	1605	2140
% of Fly Ash Utilization		50%	60%	75%	100%
Expected Qty of Fly Ash generation per annum		2140	2140	2140	2140
Expected Qty of Bottom Ash generation per annum		540	540	540	540
Expected Qty of Ash generation per annum		2680	2680	2680	2680

ANNEXURE - 04

Sl. No.	BENTONITE CLAY LINING (IMPERVIOUS CLAY LINING)	HDPE/LDPE LINING
1	Hydraulic conductivity is more and hence less suitable	Hydraulic conductivity is less and hence more suitable
2	Subject to deterioration from differential settlement, desiccation and freeze-thaw action of soil in long run	Not affected by these soil factors
3	Material consistency and quality control is difficult as it is ensured at site	Material consistency and quality control is easy as it is monitored during manufacturing process in factory
4	Cost is less if clay is locally available	Cost is more as compared to clay liner
5	Suitable quality of clay is generally not available in nearby borrow areas	Easily available in market
6	Thickness of lining is more (generally 0.5 to 1.0m) and hence can not be punctured easily	Susceptible to puncture damage and lateral squeezing & thinning during construction due to less thickness (generally 10mm to 20mm)
7	Time of construction is more due to difficulty in construction thereby affecting the project schedule	Time of construction is less due to ease & speed of installation

```

graph TD
    CMB[CENTRAL MONITORING BASIN] -- 200 cum/hr --> DMF[DUAL MEDIA FILTER 3X50%]
    DMF -- 270 cum/hr --> DMF_BW_PUMP[DMF BACK WASH PUMP]
    DMF_BW_PUMP -- 270 cum/hr --> DMF
    DMF -- 2X100 cum/hr --> AC[ACTIVATED CARBON FILTER 3X50%]
    AC -- 64 cum/hr Intermittent --> DMF
    AC -- 2X200 cum/hr --> CF[CARTRIDGE FILTER 2X100%]
    CF -- 1X200 cum/hr --> RO[REVERSE OSMOSIS 1X100%]
    RO -- 60 cum/hr --> ROST[RO REJECT WATER STORAGE TANK]
    ROST -- 70 cum/hr --> DMF
    ROST -- 70 cum/hr --> AS_SUMP[ASH SLURRY SUMP]
    ROST -- DMF Backwash --> DMF
    DMF --> CW_TANK[CLARIFIED WATER TANK]
    CW_TANK -- 165 cum/hr --> CW_TANK
    CW_TANK -- 1 X 140 cum/hr --> ROPWST[RO PERMEATE WATER STORAGE TANK]
    ROPWST -- 165 cum/hr --> CW_TANK
    ROPWST -- pH CORRECTION DOSING --> ROPWST
    ROPWST --> CW_TANK
    
```

ABINEXURE-06

POWER PROJECTS DIVISION

IB THERMAL POWER STATION
2 X 660 MW UNITS 3 & 4



OPGC
Power for Progress


ODISHA POWER GENERATION CORPORATION LIMITED



DEVELOPMENT CONSULTANTS PVT.LTD.
CONSULTING ENGINEERS
KOLKATA - INDIA



BGR ENERGY SYSTEMS LIMITED
CHENNAI - INDIA

	NAME	SIGN		DATE	SHEET SIZE A0	NO.OF VAR. N.A.	
ORN.	T.PERUMAL	SD/-		26.04.2014			
PRP.	SANTOSH	SD/-		26.04.2014			
CHO.	A.SANKARALINGAM	SD/-		26.04.2014			
APPD.	L.SAI SHANKAR	SD/-		26.04.2014			
DEPT.	UNTOLO DMS.		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE	C/M/F		1:3000	N.A.	N.A.	N.A.	N.A.

APPROVED

TITLE
COMPOSITE LAYOUT FOR
HYDRANT & SPRAY SYSTEM

CARD
CODE
-NA-

DRAWING NO.
GID-208-ME-SGA-XM-1709
OWNER'S DRAWING NO.
BOP-SG-DWG-M-0597
SHEET No. 1 OF 9

REV.
3



Health, Safety and Environment Policy

OPGC Project Management believes that everyone has a right to a safe workplace and a duty to protect our environment, and incorporates health, safety and environmental management as an integral part of the business thus enhancing the performance of OPGC 2x660MW Supercritical Coal Fired Power Plant to a World Class performer.

The health & safety and wellbeing of all persons, including employees, contractors, visitors and members of local communities, are the first consideration at OPGC. Safe behavior and concern for the environment are considered essential measures of performance at all levels.

All occupational accidents are considered to be preventable, and each individual is responsible for their own safety as well as the safety of their workmates and other persons affected by their work activities. Everyone has the right to stop work in case of imminent danger to human health.

The OPGC Project Management is committed to implement its health, safety and environmental policy in the following manner:

- To ensure that adequate resources are allocated and appropriate responsibilities are identified, sufficient to meet the requirements of its Health, Safety and Environmental Plan.
- By the establishment and implementation of programs and best practices "for conducting safe, healthful, and environmentally sound operations.
- Being in full compliance with or exceeding applicable India health, safety and environmental laws and regulations, permits requirements and shareholders requirements.
- By taking into consideration other international health, safety and environmental standards and guidelines, as appropriate.
- Making the necessary efforts for the prevention of environmental pollution, and will seek to effectively and efficiently utilize natural sources.
- The project will improve its health safety and environmental performance continuously by setting and reviewing objectives and targets with the required performance measurements and assessments.

Ron McParland

Executive Director (Construction)

Reviewed On 31st December 2015