



ONGC Petro additions Limited

SEZ-1, Z-1 Dahej Industrial Area,
Taluka – Vagra, Bharuch, Gujarat – 392310
Phone : 02641 – 666410, Fax : 02641 – 666110
CIN : U23209DL2006PLC155513

To,
Petroleum & Natural Gas Regulatory Board
[Kind Attention: Shri Arvind Kumar]
First Floor, World Trade Centre,
Babar Road, New Delhi-110001

Date: 25th Sep'17

AA/AR/12-383
28/9/17
28/9/2017
DA(MTA)

Subject: Application for laying Natural Gas Pipeline from Petronet LNG Limited till OPaL Dahej

Sir,

This is with reference to the letter No. Infra/NGPL/122/OPAL/POPL/17 Dated 20.09.2017 received from PNGRB on the captioned subject. OPaL is willing to install a dedicated pipeline from PLL header till OPaL Dahej. As per the information at point no. 2 of PNGRB letter Dated 20.09.2017, OPaL would like to clarify that OPaL intends to apply under regulation 19(2).


It may be noted that OPaL earlier applied under regulation 4(1) which had a provision of application fee of INR 10,000/-. OPaL paid the application fee of INR 10,000 on 11.09.2017 via UTR Code SBIN117254773462 to PETROLEUM AND NATURAL GAS REGULATORY BOARD.

OPaL is resubmitting its application under the regulation 19(2). In this regard, OPaL (through Engineers India Limited) has prepared a Detailed Feasibility Report for the PLL-OPaL Natural Gas pipeline which includes all the relevant details of the said line which is required under Regulation 19(2).

Since there is no fee applicable for application under Regulation 19(2) therefore it is requested to refund the amount of INR 10,000/ paid by OPaL on below account details:

Name of the Beneficiary- **ONGC PETRO ADDITIONS Ltd-Oper.&Maint//A/c**
Name of the Bank- **State Bank of India**
Account Number- **32842956889**
IFSC Code- **SBIN0009996**

Submitted for your kind consideration and approval to proceed further with the proposal of PLL-OPaL NG Pipeline.


(Manoj Srivastava)
President- OPaL

CC: MD-OPaL

Encl:
Detailed Feasibility Report of PLL-OPaL NG Pipeline

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ONGC Petro additions Limited

**FEASIBILITY REPORT
 FOR NATURAL GAS PIPELINE FROM PETRONET LNG
 TERMINAL TO OPaL DAHEJ TERMINAL**

SEPTEMBER 2017

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
0	08.09.2017	ISSUED AS FEASIBILITY REPORT	<i>SYG</i> SYG	<i>SRG</i> SRG	<i>MSG</i> MSG

1.1 INTRODUCTION

ONGC Petro additions Limited (OPaL), an integrated grass root Petrochemical complex, has been set up in the Special Economic Zone (SEZ) at Dahej, Dist. Bharuch, Gujarat. OPaL has established Captive Power Plant (CPP) for supporting power and steam requirement of its petrochemical complex. OPaL requires NG/RLNG to be used as fuel gas for its CPP unit. The power and steam requirement for OPaL petrochemical plant would be supplied from the CPP. CPP equipment is designed to operate on Natural gas or Naphtha. But considering reliability, O&M cost and economics, CPP operation on Natural gas is economical compared to Naphtha as per the present market rate of Natural Gas. Naphtha will remain as back up fuel. Fuel Gas is also required in DFCU as emergency fuel back up during plant start-up and plant disturbances.

To ensure uninterrupted plant operations and reliability it becomes essential to have own reliable arrangement for transmission of Natural Gas to OPaL complex therefore Installation of Dedicated NG Pipeline from M/s PLL header till OPaL complex is being explored.

M/s ONGC Petro additions Limited (OPaL) intends to install 12" NB, approximately 17 km long pipeline for transportation of natural gas from Petronet LNG Terminal to OpaL Dahej Petro Chemical Complex. The pipeline shall comprise of Despatch Terminal at Petronet LNG at Dahej & Receipt Terminal at OpaL Dahej Petro Chemical Complex for transportation of Natural Gas.

1.2 NEED AND BASIS OF PIPELINE

As M/s GSPL has exclusive rights for Gas Transmission and related infrastructure development in Dahej, SEZ therefore OpaL had awarded contract to M/s GSPL for development of Natural Gas Transmission network in OpaL premises from nearest source Petronet LNG at Dahej . OpaL is purchasing RLNG on monthly spot basis since Aug'14 and transmission is being carried out through M/s GSPL network.

Transmission with existing arrangement has its own constraints and intricacies. This mode of Gas Transmission cannot be considered reliable and seamless. The plant output will adversely affect in the absence of adequate RLNG supply which will have an adverse effect on the operating margins and consequently on financial performance.

Installing a dedicated Pipeline from PLL header till OPaL will eliminate recurring expenses payable towards Gas transmission Services. It will also ensure uninterrupted RLNG supply. The Indian spot gas market has limited liquidity due to constraints in availability of re-gas capacity for spot cargos and limited number of RLNG suppliers. Further, unanticipated variations in global LNG demand (summer/winter & other seasonal factors) also affect the availability of cargos in Indian market. In past also OPaL has faced such situation and unexpected shut down due to unavailability of RLNG in market. Therefore it is prudent to enter a medium term or long term RLNG contract as these are highly reliable as the RLNG supplier typically has the back-to-back supply tie-up with the upstream LNG suppliers for the entire duration of contract and there are adequate provisions to compensate the buyer for any supply disruption. Once OPaL has its own transmission platform then Medium Term or Long term RLNG contract may also be finalized.

1.3 PIPELINE PROCESS PARAMETERS

Description	Natural Gas Pipeline
Main line, Outside Diameter, mm (Inches)	323.9 (12")
Products	Natural Gas
Maximum Flow (MMSCMD)	3.32
Design Pressure (kg/cm ² g)	49
Max. Operating Pressure (kg/cm ² g)	40
Max. Design Temperature, (°C)	
▪ Above Ground section	▪ - 29 to 65
▪ Under Ground section	▪ - 29 to 45
Operating temperature, °C	25 to 50
Design Code	ASME B31.8 & OISD-226
Economic Design Life, Years	30
Corrosion Allowance, mm	0.5

1.4 EXISTING SET UP & PROCESS PARAMETERS REQUIRED

Presently, a 14" header connected to Captive Power Plant (CPP) for RLNG transmission from GSPL skid. The Natural Gas/ RLNG is required to be used as fuel gas for CPP unit.

During normal Operation, fuel gas is produced in the DFCU&AU. However, due to internal consumption of fuel gas in DFCU&AU, in some cases the unit may fall short of fuel gas.

During start-up, trip of furnace or turndown operation, Ethane is used as backup fuel when there is no/ insufficient generation of fuel gas in DFCU&AU.

As Ethane is an expensive feedstock therefore it was decided to utilize Natural Gas as a substitute backup fuel. Hence in normal and some other cases of operation, there is an export of fuel gas from the DFCU & AU to the fuel gas system but in emergency situation NG/RLNG is essential in DFCU.

The normal and maximum RLNG requirement of CPP and DFCU&AU is tabulated below:

Unit	Gas Requirement	
	Normal (MMSCMD)	Maximum (MMSCMD)
CPP	1.5	1.78
DFCU	0.034 (At lower load)	1.54 (during CGC trip case)
Total	1.534	3.32

The proposed natural gas pipeline has to be designed for below process parameters:

- Pressure and Temperature at PLL header: 90 kg/cm², Ambient Temp.
- Line Length: Approx. 17 KM
- Pressure and Temperature required at CPP end: 40 kg/cm² and 10⁰ C.
- Maximum and Minimum Flow Rate: **3.32 and 1.53 MMSCMD**.

1.5 PIPELINE ROUTE

The entire pipeline route has been surveyed by Owner. Owner has got the available survey details along entire route verified for the obstructions & availability of land and re-confirmed the pipeline route.

The pipeline takes off from Petronet LNG Terminal at Dahej and almost the whole stretch is covered with clay soil & terrain is almost flat.

Most of the area is free from restriction. The major portion of the pipeline route passes through GIDC corridor/ SEZ for which permission is to be acquired from GIDC. The proposed route has been kept clear off the Industrial developments and non-agriculture areas.

The salient features along the pipeline routes are as given below:

S. No.	Description	Unit	Total
1	Length	km	17 (Approx.)
2	Railway Crossing/ NH/ State Highway	Nos.	NIL
5	Road	Nos.	27
6	River/ Canal	Nos.	NIL
8	Nala / Drain	Nos.	17

S. No.	Description	Unit	Total
9	S.V. Stations	Nos.	NIL
10	Pipeline Crossings	Nos.	43
11	Terminals	Nos.	2

The above information has been construed based on the recent/ past pipeline projects carried on the same/ existing pipeline corridor.

1.6 PIPELINE ALIGNMENT

Pipeline from Petronet LNG to Opal Dahej Complex shall be laid in existing GIDC, SEZ & Reliance Corridor. The Width of existing ROU is 10 m for the entire route. The Existing ROU of C2, C3 C4, Naptha & LPG (Future) pipeline of Opal is already being laid & occupied.

Majority of this pipeline will be passing through existing Piping Corridor made for OPAL however details will be worked out during the engineering stage.

In that event, additional ROU acquisition is required.

ROU survey is being done and it seems feasible as most of the land comes under SEZ and GIDC. Once all necessary approvals and ROUs are obtained, tendering process shall be finalized.

1.7 TERRAIN & SOIL FEATURES

The terrain along the pipeline route is almost flat/ slightly undulating and passes through mostly GIDC corridor/ SEZ/ Reliance Corridor.

1.8 PIPELINE DESIGN

Pipeline shall be designed in accordance with requirements of ASME B 31.8 for pipelines and pipeline design shall also meet requirement of OISD 226 (as applicable). The pipeline shall be buried and hence fully restrained.

Pipeline and its associated facilities shall be designed using the applicable design code and as modified below.

Pipelines shall be designed to meet the Location Class as defined in ASME B31.8/ OISD 226, except as modified below.

Location Class	Type of Facility	Design Factor
All	Station Piping	0.5
All Classes	Crossings	
	• Drilled/ Bored/ Inaccessible/ open cut	0.72
	• HDD	0.72
	Cased/Uncased Crossings or Parallel Encroachments on ROW of Hard Surfaced Roads, Public Streets and Highways	0.72

The pipeline shall be buried with a minimum cover of 1.2 meter except road/ canal/ water crossings where cover shall be as given below or as per the requirements of statutory/ local authorities whichever is more stringent. Increased cover shall be provided at critical locations and at crossings.

The pipeline, in general shall be laid underground with minimum cover as given below:

Sl. No.	Location	Minimum Cover (m)
1.	Rocky Terrain	1.0
2.	Minor Water Crossing/ Canal/ Drain/ Nala/ Stream	1.5
3.	HDD Crossing (Below lowest level)	4.0
4.	Open Cut Water body Crossings (Below Scour Depth)	2.5 (For normal soil) 1.5 (For rocky strata)
5.	Cased/Uncased Road Crossing/ Station Approach/RCC road	1.2
6.	Drainage, Ditches at Road Crossings	1.2
7.	Marshy Land/ Creek Area	1.5

Notes:

- The depth of cover shall be measured from the top of the pipe coating to the top of the undisturbed surface of soil or the top of graded strip, whichever is lower
- The cover shall be measured from the top of road.
- Wherever the pipeline is running below drain (along the road), minimum cover of 1.2 m shall be provided also PCC/ RCC drain shall be provided.
- For existing utilities, minimum cover shall be 1.0 m from lowest level.
- For HDD crossings, pipeline cover shall be 4.0 m below lowest level for Lined/ Unlined Canal, Jetty, Pipeline corridor, Road & Highway Crossing.

Mainline Pipe (Metallurgy)

The line pipe conforms to API 5 L specifications for line pipe. The pipe conforms to API 5L having specified minimum yield strength 65,000 psi. The selected wall thickness is adequate for the given design conditions.

i.	API 5L Grade	:	X-65 PSL-2
ii.	Pipeline size (OD)	:	323.9 mm (12")
iii.	Wall thickness	:	6.4/7.1 mm
iv.	Method of manufacture	:	HFW
v.	Service	:	Natural Gas
vi.	Rating	:	300#

Pipeline Coating

The pipeline is protected against corrosion by a combination of 3 Layer poly-ethylene external coating and Cathodic Protection System. For Field Joint Coating, Heat Shrink Sleeve shall be provided. All above ground piping shall be painted to prevent atmospheric corrosion.

Valves and Shut Down System

Full bore ball valves, conforming to API 6D in main pipeline, at the terminals, to allow for isolation of the pipeline sections in the event of emergency. The ball valve details are as below:

Sr. No.	Pipeline OD mm (inch)	Product	Design Pressure Kg/cm ² g	Ball Valves Rating as per ANSI Class
1.	323.9 (12")	Natural Gas	49	300#

Insulating Joints

Insulating joints shall be provided to electrically isolate the buried pipeline from above ground pipeline. Insulating joints shall be monolithic type and shall allow smooth passage of pigs. Insulating joints shall be installed in above ground portion of the pipeline, immediately after the buried/aboveground transition at the scraper stations.

Wherever pressure/ temperature transmitters are used on cathodically protective pipeline the same shall be electrically isolated by providing insulating joints/ flanges.

Seismic Considerations

Company has got seismic analysis carried out for entire pipeline and the pipeline has been found safe against Seismic analysis.

CROSSINGS

It is intended that all road/ drain/ nala/ canal/ existing pipelines shall be crossed using Nondestructive crossing method such as HDD & Boring.

Road Crossing

Road crossings are complying with the requirements of API RP 1102 and the requirements of the concerned road authorities. Cased crossings shall be provided for National Highway (NH)/ State Highway (SH). The casing pipe is three nominal pipe sizes larger than carrier pipe. The casing pipe is installed by Boring/ Jacking method. Metal roads other than NH/ SH that broadly include Major District Roads (MDRs), Other District Roads (ODRs) and Village Roads (VRs) are considered to be crossed by open cut method. However, at locations, where it is not feasible to cross the road by open-cut method, Boring/ Jacking Method shall be used. No casing pipe is considered at such crossings.

Rivers / canals / Nala Crossings

Crossings of rivers/ streams/ canals shall be by Open Cut/ Boring/ Trenchless Technology methods. Horizontal Directional Drilling Method (HDD) or any other method shall be used for crossing of major rivers.

Pipeline Crossings

Precautions shall be taken to prevent damage to existing pipelines at all pipeline crossings. In addition to such measures a concrete slab 200 mm above the proposed pipeline (below, where existing pipeline is below the proposed pipeline) shall also be provided.

WELDING

Welding is carried out in accordance with API 1104, specification for welding. All butt welds for process piping are 100 percent radiographed for ensuring better quality of welding and reducing risk of weld failure during operation of pipeline.

CATHODIC PROTECTION WORKS

Temporary Cathodic Protection (TCP)/ Permanent Cathodic protection works (PCP) will be carried out by different agency under different contract while the pipeline laying works are going on.

The pipe laying contractor shall be responsible for coordination with and providing all necessary assistance to TCP /PCP contractor especially to ensure that the works related

to TCP/ PCP such as connection to the pipeline for cables for cathodic protection system (for anodes of TCP, measurement cables, etc.), laying of reference cell, ER probes, polarization coupon etc. can be completed by TCP / PCP contractor before backfilling of the trench by pipeline contractor. Similarly the pipeline contractor shall coordinate with TCP/ PCP contractor for pipeline portion laid in cased crossings so that TCP/ PCP contractor provides the CP protection before laying of pipeline in cased crossing.

The pipeline contractor shall also coordinate and get himself associated with TCP/PCP contractor during close interval potential logging (CPL) survey longitudinally along the pipeline and lateral potential measurement survey and when conducting other tests as may be required for identification of coating defects/ holidays and for current drainage survey. The contractor shall be responsible for physical verification and repair of all coating defects that may be detected during such surveys at no extra cost to Company.

The pipeline contractor shall also provide approximately 10-12 m of pipe material (may be in pieces of 500 to 1000 mm length) to TCP/ PCP contractor for fabrication of polarization coupons and ER probes.

HYDROSTATIC TESTING

Hydrostatic testing of mainline shall exclude valves at, terminals, SV's (if any) and facilities that are to be installed as a part of the scraper stations. Temporary test headers shall be provided and the mainline shall be hydrostatically tested between the temporary test headers only. The pipeline shall be hydrostatically tested to the minimum test pressure as specified below:

Pipe Size Inch (mm)	Wall Thickness (mm)	Hydrostatic test Pressure (kg/cm ² g)	Class
12 (323.9)	6.4/7.1	1.5 X 49 = 73.5	All Classes

The highest point of the test section shall be subjected to the minimum test pressure as specified above. The entire pipeline shall be tested in one stretch with a pressure of 73.5 Kg/cm² (g).

However the maximum hydrostatic test pressure at any location in the pipeline during testing shall not exceed the pressure required to produce hoop stress equal to 95% of SMYS of pipe material based on the minimum wall thickness in the test section. The test duration shall be 24 hrs. Hydrostatic test shall be done with corrosion inhibitor dosed water only.

All materials required for the fabrication of the test headers shall be provided by the Contractor at no extra cost to Company. After successful completion of hydrostatic testing, the Contractor shall de-water the pipeline as per the directions of Engineer-in-charge.

CONSTRUCTION

Pipeline construction work is carried out as per ASME B31.8, OISD 226, API 1104 and API RP 1102.

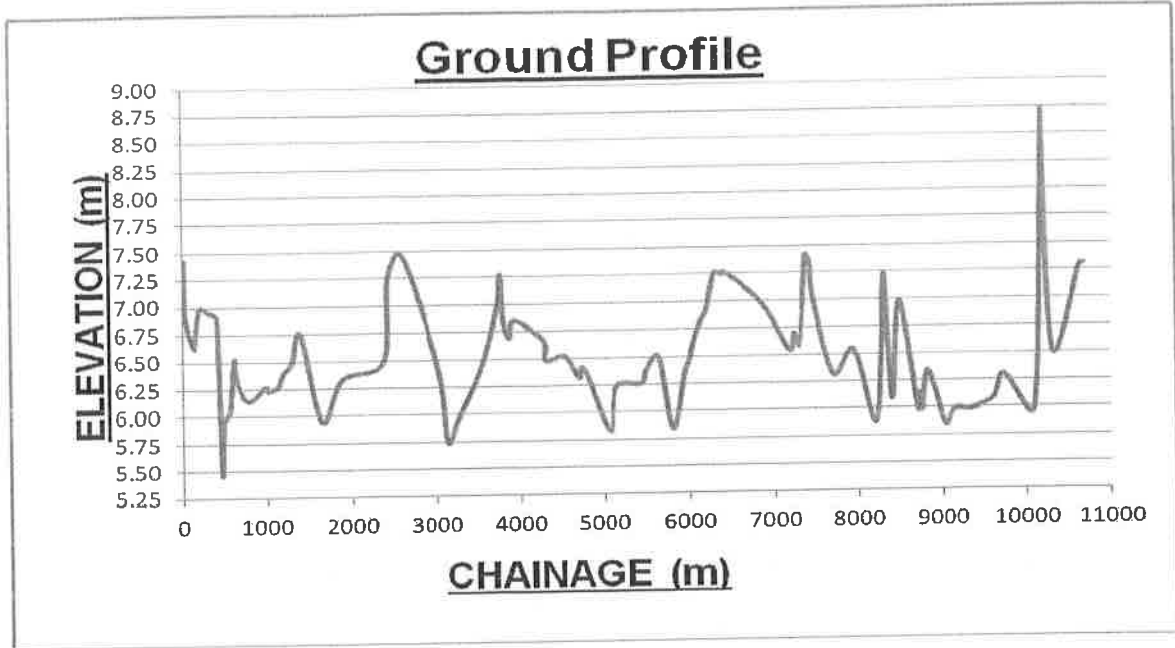
ASME B 31.8	: Gas Transmission and Distribution Piping Systems.
OISD 226	: Natural Gas Transmission Pipelines and City Gas Distribution Networks
OISD 138	: Inspection of Cross Country Pipelines - Onshore
OISD 141	: Design and Construction Requirements for Cross Country Hydrocarbon Pipelines
API RP 1102	: Steel Pipelines Crossing Railways & Highways
API Std. 1104	: Standard for Welding Pipelines and Related Facilities

2.0 Assessment

Dedicated PLL- OPaL NG Pipeline	Notes / Comments
Description	It requires laying a 17 km NG pipeline from PLL header till OPaL complex.
Option Evaluation Criteria	
Alignment with Desired Business Objectives	Primary Business objective is to receive Gas hassle free and at an optimized cost. Own dedicated pipeline enables OPaL to reduce recurring expenses made towards Gas transmission and ensures seamless, continuous operation.
Technical Fit	RLNG is already being distributed through GSPL and GAIL networks in Dahej SEZ area. These pipeline networks are already established and operating smoothly. Same Pipeline network will be developed by OPaL for better reliability and continuous operation along with cost effectiveness. Majority of this pipeline will be passing through existing Piping Corridor made for OPaL however details will be worked out during the engineering stage.
Impact	
Potential Risks that impact the ability to Deliver Desired Business Outcomes	The said project shall be executed with due diligence. All statutory and Regulatory norms will be complied for laying this Natural Gas Pipeline. Therefore any potential risk shall be mitigated during execution stage itself.
Rationale for Rejection or for Recommending further Analysis	None
Overall Feasibility	Feasible

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GROUND PROFILE: NATURAL GAS PIPELINE



This Natural Gas Pipeline has to be designed as per the OISD standards. Refer the Schematic Diagram for the proposed line.

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OVERALL INDICATIVE PIPELINE ROUTE MAP

