

# Annexure-VII

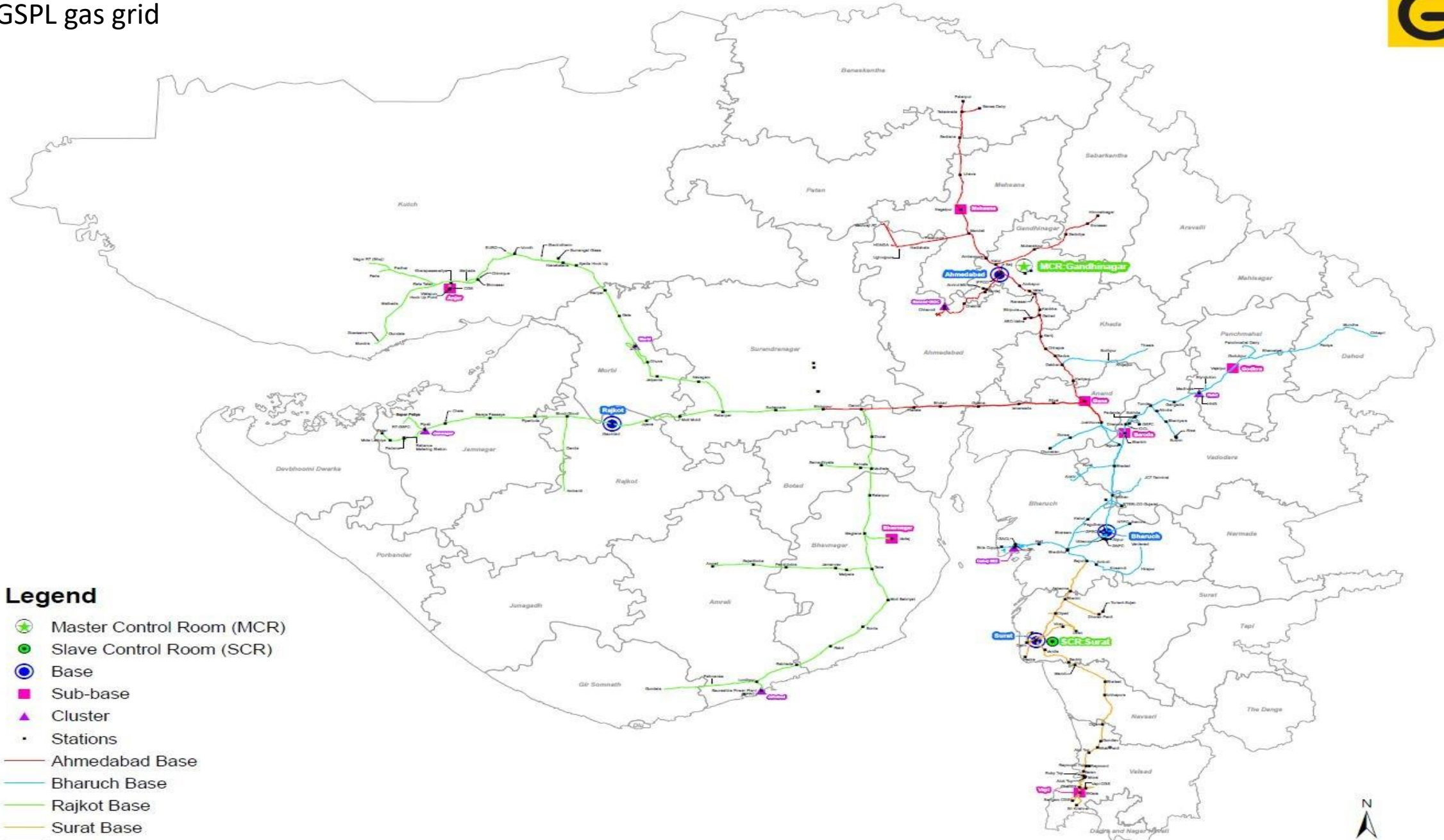
# GSPL Presentation on Capacity Determination



# Introduction

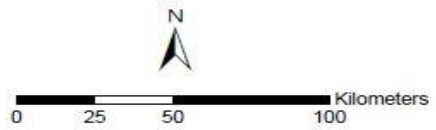
- ❖ GSPL is a part of midstream activity in Oil and Gas sector. GSPL Operations has dependence and impact from upstream and downstream activities so advance planning of transmission capacity is done inclusive of sufficient margin for peak demand.
- ❖ GSPL operates 2 bi-directional pipeline networks in Gujarat:
  - HP-grid
  - LP-grid
- ❖ GSPL is certified for Integrated Management System
  - ISO 9001:2015
  - ISO 14001:2015
  - ISO 45001:2018
- ❖ Average transportation of GSPL gas grid is approximately 30 MMSCMD which consists of both HP and LP networks of Gujarat.
- ❖ The company has signed gas transmission agreements with various industries for the transportation of natural gas from various supply sources in Gujarat.

# GSPL gas grid



## Legend

- ★ Master Control Room (MCR)
- Slave Control Room (SCR)
- Base
- Sub-base
- ▲ Cluster
- Stations
- Ahmedabad Base
- Bharuch Base
- Rajkot Base
- Surat Base
- District Boundary



## Year-wise Capacity of HP-grid

<b>Financial Year</b>	<b>Capacity (MMSCMD)</b>	<b>Commissioning of new source/Compressor</b>
<b>2017-18</b>	28.29	Nil
<b>2018-19</b>	29.62	GIGL Palanpur and Gana Compressor
<b>2019-20</b>	32.13	Nil
<b>2020-21</b>	35.22	GLL Mundra
<b>2021-22</b>	35.21	Nil
<b>2022-23</b>	34.17	Nil
<b>2023-24</b>	34.17	Nil

## Year-wise Pipeline network of HP grid

<b>Financial Year</b>	<b>Operational Length of GSPL HP Grid (km)</b>	<b>Length considered in Simulation (km)</b>
<b>2017-18</b>	2468.43	2351.00
<b>2018-19</b>	2578.00	2455.66
<b>2019-20</b>	2627.64	2500.93
<b>2020-21</b>	2643.69	2500.93
<b>2021-22</b>	2645.65	2500.93
<b>2022-23</b>	2646.08	2500.93
<b>2023-24</b>	2646.08	2500.93

Note: Difference between Operational lengths and simulated data is because pipelines after let down skid have not been considered including Torrent Spur & Dahej Sez pipeline. This difference in pipeline length bear no impact on capacity determination exercise as they are pressure controlled pipelines and all the customers of those pipelines have been included in simulation file.

# Typical Gas quality parameters in GSPL Pipeline

2022-23											
		Carbon Dioxide (CO2)	Methane	Ethane	Propane	I - Butane	n- Butane	I - Pentane	n- Pentane	C6+	Nitrogen
Sr no.	Entry Point	percent	percent	percent	percent	percent	percent	percent	percent	percent	percent
1	Petronet	0.0000	97.1757	1.9001	0.4266	0.0706	0.1035	0.0038	0.0007	0.0000	0.3189
2	RGTIL	0.2251	98.8625	0.3427	0.1917	0.0471	0.0354	0.0189	0.0071	0.0421	0.2274
3	ONGC	0.1708	97.8733	0.2271	0.0053	0.0059	0.0000	0.0000	0.0000	0.0000	1.7176
4	Mundra LNG	0.0000	92.4291	6.8256	0.5142	0.0867	0.0715	0.0019	0.0004	0.0000	0.0706
5	GIGL Palanpur	0.0198	84.1700	10.5537	3.0096	1.0323	0.6036	0.1710	0.1121	0.0739	0.2540

## Year wise GSPL pipeline length:

<b>Financial Year</b>	<b>Length of GSPL pipeline (km)</b>	<b>Major pipeline</b>	<b>Commissioning date</b>
<b>2017-18</b>	2518	-	-
<b>2018-19</b>	2621	(1) Amboli-Vantevad	25-03-2019
		(2) Anjar Mundra	22-03-2019
		(3) Chromeni spur	22-03-2019
<b>2019-20</b>	2682	Pipavav-Gundala	17-01-2020
<b>2020-21</b>	2700	-	-
<b>2021-22</b>	2703	-	-
<b>2022-23</b>	2704	-	-
<b>2023-24</b>	2704	-	-

# GSPL data Overview

## ❖ Design Basis:

- GSPL design basis is as per PNGRB regulations and the codes and standard stipulated in them.

## ❖ MAOP:

- MAOP of GSPL gas pipelines have not been changed and same has been provided in excel sheets attached with other submitted files.
- In the mainline GSPL MAOP is either 95 Barg or 98 Barg whereas for spulines existing downstream of pressure control valves they vary around 50 Barg or less.

## ❖ Ambient temperature of Soil:

- 30°C as per PNGRB recommendation.

## ❖ Efficiency factor:

- Efficiency factor has been considered as 0.9 & 0.95 as per PNGRB recommendations.

# GSPL data Overview

## ❖ Gas equation:

1. Panhandle -A Module for  $\leq 24'' \text{ } \emptyset$  pipelines
2. Panhandle -B Module for  $> 24'' \text{ } \emptyset$  pipelines

## ❖ Velocity of gas in pipeline:

- Velocity is less than 20 m/s in pipeline at all locations.

## ❖ Future supplier connectivity: 2 suppliers are envisaged to be added in existing GSPL network:

1. Chhara LNG:
  2. Swan LNG:
- Above suppliers will connect to GSPL pipeline at Jaffarabad.

# PNGRB regulation for capacity determination section 5.a

Sr. no.	PNGRB regulation for capacity determination section 5.a	Remarks
1	The entire pipeline system shall be configured in the selected software package operating offline. The steady state condition of the pipeline hydraulics with contractual flow parameters (pressure, temperature and flow) at entry and exit points shall be simulated in the selected software package.	Complied
2	At the originating point and at intermediate points in the direction of flow, set the pressure as a fixed parameter corresponding to the maximum allowable operating pressure (MAOP) or available compression facilities and compute the maximum pressure at all exit points with contractual flow.	Complied: PIL has been taken as the first source.
3	Thereafter, assuming gas at the entry point (single source of gas) is unlimited, the selected software will be run till any customer connected to the system reaches limiting condition of pressure required at the respective exit point or maximum flow capacity is reached at entry or intermediate compressor stations (if installed in the system) or the velocity of natural gas reaches limiting value as defined in these regulations. The capacity at this juncture would be the maximum system capacity achievable in the pipeline system and the customer at the exit point where pressure becomes limiting shall be the critical customer.	Complied
4	Now simulate the flow from any other source considering the entry should take place at the pressure marginally higher than the available at that section. The exercise carried above shall be repeated to get threshold pressure limit at any location to calculate the flow exiting from each point in the entire pipeline system and the sum total of these flows shall be the pipeline capacity as determine by the approved flow equation and selected software. This would be the system capacity for multi source pipeline system.	Not Complied: Justification: If the pressure at different sources are kept marginally higher as given in PNGRB regulation the overall capacity of GSPL HP grid will come out to be lesser than the actual. Therefore, flow from other entry points instead of taking marginally higher pressure; contractual pressure that is the maximum pressure which can be provided by supplier has been considered as a reasonable endeavor keeping the goal of the exercise in mind.
5	The section wise capacity of the pipeline system shall be computed between an entry point and exit points. In case of multi entry, the section wise capacity may also be determined taking into account flow from each of the input points. Thus the first section is from first entry point to first exit point and second section shall be from first entry point to second exit point and another section and so on. This exercise shall be repeated for each of the entry point. However, in a real time working, the effect of each source will have to be workout on the pipeline capacity and the flow parameters at intermediate points shall not be allowed to reduce the system or section capacity. The procedure mentioned above shall be applicable for determining the capacity of specific section of the pipeline.	Not Complied: Justification: The complexity in GSPL networks makes it implausible for the estimation of sectional capacities as per PNGRB definition. With many sources and many users, the number of sections in the sense of PNGRB document is very large and the list will depend upon which source is designated as first and in what order the other sources are brought into consideration while defining successive sections for simulation and capacity determination. However, GSPL will provide the section wise flowrate in the same simulation scenario of overall capacity that has been submitted.

# PNGRB regulation for capacity determination section 5.a

Sr. no.	PNGRB regulation for capacity determination section 5.a	Remarks
6	In a real time model of pipeline system, the flow at specific entry point shall be the actual available flow from that source. The gas supply from various sources at entry points and delivery at exit points shall be scheduled to optimize the pipeline system capacity.	This is not a capacity determination exercise.
7	The obligatory or contractual requirement of pressure at any exit point shall determine the possible capacity within a particular section serving that exit points. Provided further that maintainability of a particular steady state hydraulics condition at any exit point shall be mutually determined between capacity determining authority and the transporter within the flexibility available in the system. The section wise capacity thus calculated with single or multiple entry and exit points shall be run with the approved flow equation and selected software package offline in the steady state operation of the system to arrive at capacities of various sections.	Not complied:  Justification given against point number 5.
8	This exercise shall be continued for computing section wise capacity of the pipeline system including the spur lines. In case of spur lines the tap off point shall be designated as the source point or entry point for spur line and computable (to be fed to the flow computing formula) or contractual hydraulics shall be allowable pressure at that point after accounting for the pressure drop from the tap off point to the consumer point of the spur line or branch line.	Not complied:  Justification given against point number 5.
9	For determining, de-rated MAOP of an existing pipeline, results based on the Instrumented pig survey shall be considered to calculate de-rating factor. In absence of results of the intelligent pig survey (IPS) in any pipeline, hydro testing shall be carried out to establish MAOP of that pipeline as per provisions in the relevant regulations on Technical Standard and Specifications including Safety Standards. Provided that in absence of hydro testing the entity may put up proposal for de-rating based on random thickness survey of the pipeline. Board reserves the right to check such survey data.	Complied
10	The entity shall submit the details of maximum achievable system capacity and section wise capacity of the natural gas pipeline so determined, under the steady state simulation with the details of variable 13[and] constant parameters, to the Board in the specified format at Schedule A along with the hydraulic gradient and system flow diagram for the pipeline system including compressor stations, metering and regulating stations as applicable.	Complied

## ❖ Expectations:

- PNGRB may introduce the methodology of capacity determination exercise with source being kept at contractual pressures instead of keeping it marginally higher pressure than existing gas pipeline pressures in case of multiple source pipelines
  - PNGRB may also introduce of interconnecting other operator pipelines without any impact on capacity. This interconnection will help in case of any emergency. As natural gas is an essential commodity providing energy lifeline to the country these interconnections will ensure uninterrupted gas supply to the consumers all over the country by utilization of other operator's pipeline capacity.
- ❖ We would like to thank the honourable board and EIL team for giving GSPL opportunity to put up our viewpoints and would like to have a long & fruitful relationship with all parties involved to achieve the ambitious targets of government of India to raise the share of natural gas in energy mix to 15% in 2030 making natural gas the fuel of the future.