Scope of the Project

(Annexure no.1)

Project Report

Introduction

The transport of LPG by truck has already put tremendous pressure on the highway networks. Presently, LPG is being transported through road from BPCL's Uran bottling plant and HPC/BPC Mumbai Refineries to HPC/BPC/IOC LPG Bottling Plants at Chakan and Shikrapur in Pune district resulting in congestion of highways along with other environmental issues related to pollution, risk and hazard. To overcome these issues, HPCL proposes to lay 164.632 km long 12" dia. underground pipeline from Uran (near Mumbai) to Chakan-Shikrapur (near Pune) for transporting LPG. The route traverses entirely in the state of Maharashtra. The design capacity of the pipeline shall be 1.0 MMTPA.

The tap-off points for marketing installation are proposed at Village Bamboli (near Chakan, Pune) with a spur line of length of 9 km to HPC LPG Plant and at Village Kalus (near Chakan) for spurline of length of 4.2 km to IOC LPG Plant. The pipeline is proposed to be terminated at BPC LPG Plant at Shikrapur (near Pune). The facilities will be constructed within the existing marketing installations for the receiving the LPG.

Project Proposal

The proposal of laying of 164.632 km long cross-country pipeline (Uran-Chakan-Shikrapur) would provide an assured outlet for evacuation of LPG from BPCR/HPCR to narrow the demand supply gap in the consumption centers in the state of Maharashtra. The cost of the pipeline project is being share on 50:50 basis with BPC and project and pipeline operations will be carried out by HPC.

This pipeline is an extension of proposed LPG pipeline from BPC/HPC, Mumbai Refinery to BPCL LPG plant at Uran. The sub-sea pipeline between BPCR/HPCR to BPCL, Uran has already been accorded EC from MoEF. This pipeline section shall be executed & operated by BPCL whereas the Uran-Chakan-Shikrapur pipeline section shall be executed & operated by HPCL.

The breakup of total pipeline length i.e. 164.632 km is as under:

Main Uran-Chakan-Shikrapur Pipeline	:	150.063 Km
Station piping inside BPCL Uran bottling plant	:	00.70 Km
Spur line from Tape-off (I) to HPCL Chakan bottling plant	:	09.00 Km
Station piping inside HPCL Chakan bottling plant	:	00.58 Km
Spur line from Tape-off (II) to IOCL Chakan bottling plant	:	04.289 Km
Total Length	**:**	**164.632 Km**

Need for the Project

Uran-Chakan pipeline is of great strategic importance to the nation for supply of LPG from Mumbai Refineries of HPC and BPC and Receipts from ONGC and imports at BPC LPG

Scope of the Project

(Annexure no.1)

Plant, Uran to the various parts of Maharashtra. The pipeline is used to transport the LPG produced in HPC and BPC refineries and also the LPG received at BPC Uran (both from ONGC and Imports) to their respective bottling plants at Chakan and Shikrapur respectively.

Further pipeline transportation is the most suitable transportation option for transporting LPG over long distances with nil pollution, low energy requirements, economical, least environment risks and available even in case of natural calamities. The pipeline provides flexibility for LPG supplies to various markets of both HPC and BPC around Pune. The economics of pipeline transportation and flexibilities in product sourcing would ultimately result in better services to the customers. Following local specific benefits will be accrued due to the above project.

- Drastically reduce bulk road transport on the Ghats between Mumbai & Pune and Reducing/ Eliminating road accidents,
- Enhanced safety in and around Mumbai and Pune areas.

PROJECT DESCRIPTION

The salient features of proposed Uran-Chakan LPG pipeline has been summarized in Table-E-1.

Table: E-1 - Salient Features of the Project

Name	Uran Chakan & Shikrapur LPG pipeline
Transport material	LPG
Pipeline length	164.632 Km, including spur lines length : 13.2 km
Take-off Point	Main Line – Existing LPG Plant at Uran of BPCL – 00 Km,
Tap-off Points	HPCL Chakan - 114.496 Km IOCL Chakan - 132.486 Km.
Terminal	BPCL Shikrapur – 150.063 Km for Main line and HPC Chakan (9.0 km) and IOC Chakan (4.2 km) for spurlines.
SV Stations	05 Nos.
Block Valves	18 Nos.
ROU	18-m & 10-m all along the pipeline route (10 m for forest areas)
District en-route	Two districts viz. Raigad and Pune in the State of Maharashtra.
List of Crossings	
Total No. of Crossings	268
National Highway	3 Nos. (NH-4, NH-17 & NH-50)
Expressway	1 No. (Mumbai-Pune)
State Highway	9 Nos.
Other roads	75
Railway	5 Nos.
Rivers/Creek	8 no's; Karanja, Patalganga (2 times), Pej, Ulhas, Bhama (2

	times) & Bhima and other small streams. Maximum length of river crossing is 270-m (River Karanja).
Canals / Drains/Nalas	145 nos.
Other Pipelines	22 Nos ; (GAIL: 5 ; Reliance ;11, CIDCO :4, HPCL : 1 & Others:1)

Project Costs & Schedule:

Total estimated capital cost for the project: Rs. 309.82 Crores and revised to Rs 462 Crores

Project Schedule: The proposed project facilities are expected to be completed in 24 months (mechanical completion) from the obtaining statutory approvals viz., Environmental Clearance.

PIPELINE ROUTE

The proposed underground LPG pipeline shall originate from BPCL Uran bottling plant located near Bhendkhal village under Uran tehsil of Raigad district of Maharashtra. The pipeline shall give tap offs to HPCL Chakan LPG plant near village Mahalunge Ingle and IOCL Chakan LPG plant near village Bhose. Both these bottling plants are located in Chakan & fall under Khed tehsil of Pune district. The pipeline shall terminate in the LPG plant of BPCL at Shikrapur which falls under Shirur tehsil of Pune district of Maharashtra.

The minimum elevation of the pipeline is 1.92 m near Karanja Creek. The pipeline turns south east and skirts Koproli & Dighati villages, then crosses the Patalganga river, NH-17 (Mumbai-Goa) the Railway Line (Mumbai-Goa) near Kharpada village and goes along SH-81 road in the North-eastern direction for 21 kms, it then passes along Rasayani Industrial Estate and the 1st Sectionalizing valve station is located at Chainage 28 km, and then it crosses Mumbai Pune Expressway near Masgaon village.

The pipeline goes in north-east direction and crosses NH-4 at Vavandhal Village & crosses the Mumbai-Pune railway line near Palasdhari Railway station. The SV station-2 is located at Chainage 66 km. The pipeline then travels in the north-eastern and eastern direction and experiences a sudden elevation of 720 meters height at Bhivpuri Ghat, near Malvade village at chainage 69 km.

The Pipeline after climbing Bhivpuri Ghat generally follows highly undulating & falling terrain and runs along the south-eastern direction skirting the Andhra Lake. Sectionalizing Valve station-4 is located at chainage 82 km near Inglun village.

The SV station-5 is located at chainage 114 kms, in the MIDC area and a tap-off is provided for HPCL LPG Plant, at Chakan. The 10 inch spur line runs for 9 kms along the internal roads of MIDC and enters HPCL's LPG Plant at Chakan from the Western side. The SV-5 has facility for launching temporary pig.

Scope of the Project

(Annexure no.1)

The pipeline goes to SV station-6 located at chainage 132 kms, where a tap-off is provided for IOC LPG Plant which also has facility for a temporary pig launcher for the 4.28 km long 10 inch diameter spur line to IOC LPG Plant at Bhose village.

The main line after SV-6 crosses the Bhima River and then runs along the SH 55 road ROW and terminates at BPC LPG Plant at Shikrapur.

The pipeline will not pass through areas which are environmentally sensitive such as low lying marshy lands, breeding places, wild life sanctuary, national parks, etc.

The main pipeline encounters Expressway - 1 no., National Highway - 3 nos., State Highway - 9 nos., Other Pipe lines -21, Canals - 27 nos., other Roads - 70 nos., Rivers - 7 nos., Railway line - 4nos., Nala/Drain - 118 nos. & the spur line encounters Canal - 1 no., other Roads - 3 no., River - 1 no. and Nala/Drain - 3 nos.

Geographically, the take-off point of the proposed pipeline is located at longitude $72^0$58'35" East and latitude $18^0$52'39" North at Uran and the terminal point is located at longitude $74^0$04'42" East and latitude $18^0$41'34" North at Shikrapur. The proposed pipeline gives two tap-offs and one provision for one tap-off for HPCL's USAR bottling plant at 17.473 Km. the proposed tap-off's are for HPCL's Chakan bottling plant at 114.496 Km and for IOCL's Chakan bottling plant at 132.486 Km in between Uran & Shikrapur. The HPCL's Chakan bottling plant is geographically located at $73^0$47'19" East and $18^0$44'45" North whereas IOCL's Chakan bottling plant at $73^0$54'34" East and $18^0$44'29" North. All the four terminals are located in the industrial area and well connected with infrastructural facilities. The nearest airport to the take-off point is located in Mumbai and that to Chakan and Shikrapur terminals are located in Pune. The nearest railway station to take-off point is at Panvel and that to Chakan & Shikrapur is at Pune.

Pipeline and Station Details

Type of stations: summary of station details including type of station and their chainage are given as follows:

Station	Station Type	Ch.(km)
Uran	BPC LPG Plant, Uran. Originating pumping station	0.0
Bhamboli Village	Sectionalising Valve station –SV5 and tap-off to HPC LPG Plant at Chakan	114.496
Khalumbre	Terminating point for spur line from SV5 and Marketing Terminal	Spur line length:9 km
Kalus Village	Sectionalising Valve station –SV6 and tap-off to IOC LPG Plant at Chakan	132.486
Bhose Village	Terminating point for spur line from SV6 and Marketing Terminal	Spur line length: 4.2 km
Shikrapur	Terminating point for Main line and Marketing Terminal	150.06

Scope of the Project

(Annexure no.1)

Pipeline Route Selection Criteria

Route selection is a process of identifying constraints, avoiding undesirable areas and maintaining the economic feasibility of the pipelines. Diversion of pipeline around obstacles can be very costly. The ideal route, of course, would be a straight line from the origin to the terminal point. However, physiographic, environmental, design & construction constraints usually alter the route. The proposed underground pipeline route has been selected away from major developments and developing areas. Every effort has been made to minimize forest land, low lying areas, difficult-to-construct areas etc.

Geographical location of originating and terminating station

Table: E-2

Point ID	Latitude (N)	Longitude (E)	District	State	Place
TP-0	18°52'36.64"	72°58'5.77"	Raigad	Maharashtra	Take off point at BPCL (Uran)
TP-419	18°41'42"	74°4'28.52"	Pune	Maharashtra	End Point at BPCL (Shikrapur)

STATION PARAMETERS

Detail of stations parameters is summarized below in Table E-3 and E-4:

Table: E-3

DISPATCH STATION PARAMETERS

Location	Uran
Supply Temp., ^{0}C	5/50 (Min/Max)
Supply Pressure	74 Kg/cm^{2}g
Flow Rate	313m^3/hr
Facilities envisaged	LPG Booster Pumps, Filtration skid, Metering skid, Pressure Control Valves, Mainline Pump and Pig Launcher

Scope of the Project

(Annexure no.1)

Table: E-4

RECEIVING STATION PARAMETERS

Location	**HPCL, Chakan**
Supply Temp., ^{0}C	5/50, (Min/Max)
Battery Limit Pressure,	12 Kg/cm^{2}g (min) at station inlet
Max. ambient temp., ^{0}C	5/50 (Min/Max) based on Pune IMD Data
Facilities envisaged	Filtration skid, Metering skid and Pressure Control Valves. SCADA RTU terminal for monitoring of the pipe line integrity. Emergency control centre. Temporary Pig launcher at SV-5 and Pig receiver at HPCL, Chakan
Location	**IOCL, Chakan**
Supply Temp., ^{0}C	5/50, (Min/Max)
Battery Limit Pressure,	12 Kg/cm^{2}g (min) at station inlet
Max. ambient temp., ^{0}C	5/50 (Min/Max) based on Pune IMD Data
Facilities envisaged	SCADA RTU terminal for monitoring of the pipe line integrity Temporary Pig launcher at SV-6 and Pig receiver at IOCL, Chakan
Location	**BPCL, Shikrapur**
Supply Temp., ^{0}C	5/50 (Min/Max)
Battery Limit Pressure,	12 Kg/cm^{2}g (min) at station inlet
Max. ambient temp., ^{0}C	5/50 (Min/Max) based on Pune IMD Data
Facilities envisaged	SCADA/RTU terminal for monitoring of the pipe line integrity, Pig receiver

Scope of the Project

(Annexure no.1)

PIPELINE PARAMETERS

Summary of the physical, construction and operational parameters of the proposed pipeline are given in Table: E-5.

Table E-5

Summary of Pipeline Parameters

Item	**Details**	
Length, Km	Overall Length	164.632 Km
	BPCL Uran to Tap-off for HPCL Chakan	114.496 Km
	Tap-off HPCL Chakan to Tap-off IOCL Chakan	18 Km (Approx.)
	Tap-off IOCL Chakan to BPCL Shikrapur	18 Km (Approx.)
	Length of Spur line to HPC and IOC LPG Plants	13.2 km (approx..)
	Piping within Terminals	1 km (approx.)
Line Size & thickness	12“ Dia. & 8.38 mm / 7.14 / 6.35 mm thickness for the Main line 10” Dia & 7.09 mm / 6.35 mm thickness for the spurline	
Pipeline material & grade	Carbon Steel Grade: API 5L Gr. X-60 / X-52 PSL 2 depending upon the section	
ROW (m)	18 m all along pipeline length, 10 m width near Forest lands, Developed areas.	
Throughput	1.0 MMTPA	
Burial depth (m)	1.2 m for normal terrain, 2.5 m for cased railway crossings, 5.0 m HDD for river crossings	
Pipeline design basis	ASME B 31.4, OISD 214 & OISD 141.	
Methods for rail/ road/ river/ canal crossings	Rail, road, river/ canal crossings shall be designed to withstand superimposed loads by using heavy wall pipe, concrete coating, additional cover, or by using other measures to ensure adequate distribution of all superimposed loads. The crossing is done by Horizontal boring / Directional drilling. Other roads, canals, non –perennial river crossings by open cut method. Specification for above will be as per API 1102.	
Pipeline Corrosion Protection measures	The pipeline would be coated outside with a 3 layer PE coating and provided with impressed cathodic protection.	
Cathodic Protection (CP) details	Temporary CP during construction. After construction, permanent impressed cathodic protection with CP stations at every SV station is provided.	
Sectionalizing Valve	There will be 05 nos of Sectionalising valve stations are	

Details	provided. This is in line with guidelines of ASME B 31.4, OISD 214.
Communication System	Three types of communication systems have been envisaged for proposed pipeline 1) Optical Fibre Communication System 2) Satellite Communication System, and Mobile Communication System.
Leak Detection & Protection System	On-line Real time externally based leak detection systems/ extrinsic leak detection system. The system shall be online real time, based on external non- intrusive principle & capable for detecting & locating ground intrusion, ground movement & pipeline leak. The temperature based system shall be considered for leak detection. Acoustic based intrusion detections shall be considered for intrusion detection. The Leak detection system & APPS shall be software based computational pipeline monitoring (CPM) as per API 1130 leak detection using algorithmic tools. In emergency situations, SCADA system enables shut down by closing operations in orderly manner
Inspection & Patrolling System	Regular Patrolling in the pipeline route would be followed.
Pipeline useful life	The pipeline shall be designed for a service life of 35 years

Technical Report

UTILITIES

Power Supply

SCADA & APPS System at SMCS : 230 V AC UPS ± 10%.Hz ± 3%
Motorised Operating valves : 415 V AC ± 10%.Hz ± 5%
RTUs at all locations : (-) 48 V DC (Positive Grounded) ± 15%

Requirement of power shall be met from Maharashtra State Electricity Board (MSEB).

Water Consumption

Insignificant quantity of water shall be required at SV Stations which would be only at the rate of 0.2 m^3/day at each station and shall be met from tube wells to be dug within SV Stations.

SCADA & APPS System Instrumentation & Control

PC-PLC based control system shall be provided at SV stations and terminals for the process interlocks/ shutdown logic/ MOVs operation and station monitoring. The entire cross country pipeline shall be monitored and controlled by SCADA using APPS system and controlled centrally from SCADA Master Control Station (S & CS) at BPCL, Mahul Refinery with

repeater at HPCL Mahul Refinery & Emergency Master Control Station at HPCL Chakan. Use of APPS package would ensure the accuracy of leak detection upto 2% within 15 minutes time and within a distance of ± 3 Km.

Telecommunication System

A dedicated Optical Fibre Communication (OFC) based Digital telecommunication system in synchronous Digital Hierarchy with direct dialing, Conferencing facility, voice communication, video conference, facsimile facilities, Hotline facility, VSAT systems, network management system, CCTV system and low & high speed data communication system etc. is proposed to be implemented to meet the operation and maintenance requirement of the proposed pipeline.

UPS power supply: 230 VAC, 50 HZ, 1 phase power supply at control room.

Corrosion Protection System

The pipeline shall be protected against external corrosion by three layered polyethylene (PE) coating and 3 layered polypropylene for crossings and additionally by impressed current cathodic protection system.

Fire Protection Facilities

As per requirement of OISD-117, fire protection facilities will be provided at all the SV stations. However, Take-off and Receiving Stations are having adequate facilities to combat fire in case of any emergency. CO_2 flooding shall also be provided at all stations.

Safety, Health & Environment Policy

LPG is a highly inflammable gaseous mixture of propane & butane. As per the stipulations of MoEF, Inspectorate of Factories, Department of Explosives, OISD & Shri MB Lal's Committee recommendation etc, to ensure safe handling and accident prevention measures, an emergency preparedness plan is essential to combat any disaster by providing suitable measures to contain the incident and minimize the after effects. HPCL has thus formulated its own corporate policy on environment and safety which is followed in all its installations.

Scope of the Project

(Annexure no.1)

An emergency preparedness plan is listed below in Table - E-5:

Table: E-5

Emergency Preparedness Plan

Details of Emergency Contact Nos. of HPCL	Emergency Contact number will be displayed on the pipeline warning sign post along the pipeline route.
Copy of Mutual Aid Agreements	Will be provided before commissioning of the cross country pipeline.
Any other emergency communication facility	Three independent modes of communication viz., OFC, VHF Radio & Landline/Mobile Telephones are adequate for communication during an emergency.
List of Safety Equipments Available at Site (e.g., Fire Entry/ Proximity Suits, SCBAs, First Aid, etc.)	Safety equipments like breathing apparatus, safety helmets, rubber gloves, fire extinguishers, fire entry/ proximity suits, first aid box will be made available at all control locations including SV stations before commissioning as per OISD guidelines.
Details of Emergency Control Centre & Standby Locations	Pipeline control station at the respective locations is designated to act as emergency control centre.

Land requirement

There are about 89 villages through which pipeline ROU is passing in Raighad and Pune districts of Maharasthra. The cadastral surveys for all the 89 villages have been completed. The cadastral records including LAQ statement for 89 villages have been submitted to MOP & NG for 3 (1) notification and further course of action.

The total land requirement for this project is 69.8643 hectares in district Raigad, out of this 9.5830 hectares ROU is passing through Forest lands.

CONCLUSION

The overall impact of the proposed project is beneficial as impacts on air, noise, water, land and ecological environments are insignificant and the socio-economic benefits are predominantly positive. Economy output and other related facilities viz., employment, health, education, communication and transportation including human settlements will definitely improve the overall quality of life. All the relevant safety norms with latest technology have been incorporated in the pipeline system. Hazard and associated Risk w.r.t safety and security provision for the proposed project appears to be acceptable. In view of the above, it may be opined that the proposed project is environment friendly.