Part - I

1

HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-927[illegible]/
444/BOT/OV/16/[illegible]
26 April 2017

Please examined/ put-up
26/4/17

DED-II(Oil) For information at desk stage please.
26/4/17

ED (Oil)

To: **Mr. Ishtiaq ul Haq**
Deputy Executive Director (Oil)
Oil & Gas Regulatory Authority

Subject: **Issuance of Pipeline License for FOC-1**

1. In reference to above mentioned subject, we are submitting following documents for the subject case:

		Annex
a.	Affidavit from Directors of FOC-1	"A"
b.	Bank Draft of 2 Million in favor of OGRA	"B"
c.	Undertaking of FOC-1 operation and other functions	"C"
d.	Undertaking of operating pipeline on commercial basis	"D"
e.	Memorandum of Association	"E"
f.	Director names and details	"F"
g.	Feasibility report of the subject project	"G"

2. We have submitted our application to Survey of Pakistan for exact coordinates of Route map of the subject project, and we will submit as soon as it is received..

3. You are requested to expedite the subject case on fast track basis.

GSO-II(BOT)
(Major Abdul Majid)

OIL & GAS REGULATORY AUTHORITY
26 APR 2017
ISLAMABAD

Executive Director (Oil)
Date 26/4/17 Time 1:05 pm

R545977

2

AFFIDAVIT BY FRONTIER OIL COMPANY 1

To:

Oil & Gas Regularity Authority (OGRA)

54 West, A.K.M. Fazl-ul-Haq Road,

Islamabad 44000

We, Muhammad Afzal (Director FOC-1), Syed Waqar Hasnain (Director FOC-1), Sardar Salman Sher Qaisrani (Director FOC-1), Amir Khan (Director FOC-1) on behalf of Frontier Oil Company-1 solemnly affirm and undertake that:

a. We are not disqualified or in-eligible to become or remain a Director of the company under the provisions of the Ordinance, 1984 (XL VII of 1984).

b. We have not failed to pay any bank advance or load or any installment thereof or interest and mark-up thereon;

c. We are not directly or indirectly involved in any criminal case of default of bank advance or loan; and

d. No case is pending against us in national or international courts or tribunals or such other forums howsoever called or designated for recovery of bank loan or advance.

Name	Signature
Lt. General Muhammad Afzal	
Brig Waqar Hasnain	
Mr. Sardar Salman Qaisrani	
Mr. Muhammad Amir Khan	

DATE 21 April 2017

ATTESTED

Muhammad Imran
Oath Commissioner
Advocate High Court

7

Annex E

A023371

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

Company Registration Office
1st Floor SLIC Building No.7, Blue Area,
Islamabad

CERTIFICATE OF INCORPORATION

[Under Section 32 of the Companies Ordinance, 1984 (XLVII of 1984)

Corporate Universal Identification No. **0102416**

I hereby certify that **FRONTIER OIL COMPANY 1 (PRIVATE) LIMITED** is this day incorporated under the Companies Ordinance, 1984 (XLVII of 1984) and that the company is **limited by shares.**

Given under my hand at **Islamabad** this **Twenty Second** day of **September,** Two Thousand and **Sixteen**.

Fee Rs. **1000/-**

(Faisal Lateef Khawaja)
Joint Registrar of Companies

Frontier Oil Company 1 (FOC-1)

HQ Frontier Works Organisation
No.....
Date.....

17.7.25

We, whose names and addresses are subscribed herein below, are desirous of being formed into a Company in pursuance of this Memorandum of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company, as set opposite our respective names:-

Sr. No.	Name & Surname (present and former in full)	NIC No.	Father's Name in full	Nationality (ies) with any former Nationality	Occupation	Residential/ Registered address in full	Number of Ordinary Shares taken by each Subscriber	Signatures
1.	M/s Frontier Works Organization (FWO) Through Sardar Salman Sher Qaisrani	35201-9945895-7	Sardar Rashid Ahmed Qaisrani	Pakistan Pakistani	Company Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	997	
2.	Muhammad Afzal	34202-2385058-5	Adalat Hussain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1	
3.	Syed Waqar Hasnain	37201-1659988-5	Syed Dildaar Hasnain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1	

4.	Muhamad Amir Khan	17301-0699294-7	Muhammad Khalid Khan	**Pakistani**	**Business**	**Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi**	**1**	
	Total Shares						1000 (One Thousand)	

Dated: 3rd day of September, 2016

WITNESS to above signatures:

National Institutioral Facilitation Technologies Pvt. Ltd

5th Floor, AWT Plaza I.I Chundrigar Road, Karachi, Pakistan

We, whose names and addresses are subscribed herein below, are desirous of being formed into a Company in pursuance of this Memorandum of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company, as set opposite our respective names:-

Sr. No.	Name & Surname (present and former in full)	NIC No.	Father's Name in full	Nationality (ies) with any former Nationality	Occupation	Residential/ Registered address in full	Number of Ordinary Shares taken by each Subscriber	Signatures
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	Total Shares						1000 (One Thousand)	

Dated: 3rd day of September, 2016

WITNESS to above signatures:

National Institutional Facilitation Technologies Pvt. Ltd

5th Floor, AWT Plaza I.I Chundrigar Road, Karachi, Pakistan

SCHEDULE - I
PART E
[See rule 23]

APPLICATION FOR GRANT OF LICENCE FOR CONSTRUCTION AND OPERATION OF NEW OIL PIPELINE

1. Name of the Company and address of its registered office Frontier Oil Company 1 (FOC-1), 509, Kashmir Road, RA Bazar, Rawalpindi.
2. Name of the Directors and their addresses, Nationality: ANNEX "F" 24 & 25/c
3. Certificate of Registration with registrar of Companies along with memorandum and articles of Association ANNEX "E" 7-23/c
4. Estimated cost of the project:

Cost	$ 769 Million
Equity	$ 15% = 115.35 Million
Debt	$ 85% = 653.65 Million

4 : Financial due diligence certification ANNEX "H" (To be provided)
(attach bank certificate)

5. Proposed route of the oil pipeline ANNEX "P" 178/c
(To be shown on a map issued or certified by survey of Pakistan and drawn to an appropriate scale)
6. Capacity of the proposed oil pipeline 9,000,000 MT / Annum
7. Proposed construction / completion schedule: December 2017 / 3 Years
8. Name of the products to be transported MOGAS & HSD
9. Economic feasibility along with details of per unit cost of transporting different products from terminal point to delivery point: ANNEX "G" To be provided
10. Details of terminals, storages, pumping stations and their location ANNEX "I" 138/c
11. Main design features of the pipeline including ancillary facilities along with specifications for the material ANNEX "J" 140-159/c
12. Operating parameters of the pipeline ANNEX "K" 160/c
13. Throughput commitment with the users ANNEX "L" 177/c
14. Details of HSE arrangements to be adopted. ANNEX "M" 161-176/c

I hereby **undertake that I shall provide** such other information or documentation as the Authorit may from time to **time, require, including** without limitation, supplementary information documentation required by the Authority to clarify the information contained in the application.

RAWALPINDI
Date and place.
18/05/2017

Name and signatures of the authorized signatory (ABDUL MAJID)

Annex-I

Details of terminals, storages, pumping stations and their location

Product Transfer & Storage Arrangement

The following pipeline transfer arrangements have been catered for as part of the system

- MOGAS import (Jetty-Pumping station-Buffer terminal-White oil storage facility-White oil pipeline network from Port Qasim to Mahmood Kot via Shikarpur-White oil pipeline extension form Mahmood Kot to Faisalabad-Thallian-Tarujabba
- HSD import (Jetty-Pumping station-Buffer terminal-White oil storage facility-White oil pipeline network from Port Qasim to Mahmood Kot via Shikarpur-White oil pipeline extension form Mahmood Kot to Faisalabad-Thallian-Tarujabba
- Buffer Oil terminal at Bin Qasim — 300,000 MT Capacity
- Bulk Oil Storage Shikarpur — 50,000 MT Capacity
- Bulk Oil Storage Mahmoodkot — 100,000 MT Capacity
- Bulk Oil Storage Faisalabad/Gatti — 50,000 MT Capacity
- Bulk Oil Storage Macheke — 100,000 MT Capacity
- Bulk Oil Storage Terminal at Thallian — 16,0000 MT Capacity
- Bulk Oil Storage Terminal at Tarujabba — 50,000 MT Capacity
- Supply to interim storages at Shikarpur-Mahmood Kot & Faisalabad
-

Dedicated pumps will be used for each product even if the pipeline is common

Overview of the Design and Pipeline Parameters of White Oil Pipeline-2

140

Annex-J

PIPELINE DESIGN

FACTORS INFLUENCING PIPELINE DESIGN

General Pipeline Design Considerations

The major steps in pipeline system design involve establishment of critical pipeline performance objectives and critical engineering design parameters such as:

Required throughput (volume per unit time for most petroleum products; pounds per unit time for petrochemical feedstocks);

- Origin and destination points;
- Product properties such as viscosity and specific gravity;
- Topography of pipeline route;
- Maximum allowable operating pressure (MAOP); and
- Hydraulic calculations to determine:
- Pipeline diameter, wall thickness, and required yield strengths;
- Number of, and distance between, pump stations; and
- Pump station horsepower required.

Safety

Safety in pipeline design and construction is achieved by the proper design and application of the appropriate codes and system hardware components. Metering stations and SCADA systems provide continuous monitoring oversight of pipeline operations. Training of pipeline operating and maintenance personnel is also a key ingredient in the ongoing efforts to insure system integrity and safety. Safe operations result from developing and strictly adhering to standard procedures and providing the workforce with adequate training, safety devices, and appropriate personal protective equipment. Standard operating procedures typically are developed with reference to government and standard industry practices, as well as corporate safety policies, experience, philosophy, and business practices. Regulations promulgated by the Occupational

Safety and Health Administration (OSHA) and by counterpart agencies at the state level specify the procedures and controls required to ensure workplace safety, including, in some instances, the performance of process safety analyses and the development of very specific procedures for activities thought to represent potentially significant hazards to workers and the public.

Pipeline Coating

Corrosion-resistant coatings are applied to the exteriors of most pipes to inhibit corrosion. These may be applied at the manufacturing plant or a pipe coating plant located separately. However, coatings are also sometimes applied at the construction site. Even for precoated pipe, field dressings of joints and connections are also performed at the construction site just prior to burial. For particularly corrosive products (including some crude oils with high total acid numbers), pipes are also sometimes coated on the inside for corrosion resistance. In addition to the resistance to corrosion they provide, some interior coatings are also designed to reduce frictional losses between the product and the interior walls of the pipe, thereby reducing the total amount of energy required to move the materials along the pipeline. Protective wrappings, followed by the application of tape to the edges of the spirally applied overlapping wrapping, are often installed on the exterior of the pipe to further assist in corrosion control, but also to primarily protect the pipe from mechanical damage at installation. Wraps and tape often are impregnated with tar or other asphalt-based materials and heated in place once applied, to ensure uniform coverage. Once cured, the exterior coatings are chemically stable and environmentally inert, resisting degradation by soil moisture and bacteria, yet remaining sufficiently flexible that they continue to provide a protective coating on the pipe throughout a wide temperature range. Likewise, wrapping materials and tape are stable and inert (including toward the material being transported in the pipeline) and do not pose a potential for adverse environmental impacts. Depending on local soil conditions, material of uniform size is sometimes imported to the construction site to form a bed on which the pipe is placed. The same material may also be installed around the sides and top of the pipe before the trench is filled with indigenous soils. Such bedding material serves two principal functions: protection of the pipe from mechanical damage during installation and trench filling, and stabilization of the pipe in the event of seismic shifts or frost heaves. Sands and gravels are typical bedding materials and are tamped in lifts of 12 to 18 inches per lift to ensure adequate compaction and avoid future subsidence. Bedding materials also assist in draining accumulated water from the vicinity of the pipe.

All newly coated pipe used to transport hazardous liquids must be electrically inspected prior to backfilling to check for faults not observable by visual examination. Material faults such as microcracks demonstrate a characteristic response to applied current when the detector is operated in accordance with the manufacturer's instructions and at the voltage level appropriate for the electrical characteristics of the coating system being tested.

Sizing

The dimensions of a pipeline — both the sizes and capacities of the various components — as well as the conditions under which the pipeline system operates dictate the system's capacity. Larger diameter pipes allow for higher mass flows of materials, provided other components of the pipeline system, primarily pumps and pressure management devices, are properly sized and positioned. In general, the longer the segment of mainline pipe between pump stations, the

greater the drop in line pressure. However, grade changes and the viscosity of the materials being transported can also have major influences on line pressures. Pipe specifications have to be API 5L PSL-2 grade x-65 or above minimum thickness 8mm or above depending on pressure in the pipeline, and pipe to have three layer polyethylene quoting from outside, pipe spiral welded or horizontal seam welded.

Pressure

Operating pressure of a pipeline is determined by the design flow rate vapor pressure of the liquid, the distance the material must be transferred, and the size of line that carries the liquid. Pipe operating pressure and pump capabilities and cost typically drive decisions on line size, the number of pump stations, and the like. Grades notwithstanding, line pressure follows a sawtooth curve between pump stations. The maximum and minimum line pressure that can be tolerated, together with the physical properties of the materials noted earlier, dictate the spacing of the pump stations and the motive horsepower of the pumps.

Product Qualities

As noted earlier, critical physical properties of the materials being transported dictate the design and operating parameters of the pipeline. Specific gravity, compressibility, temperature, viscosity, pour point, and vapor pressure of the material are the primary considerations. These and other engineering design parameters are discussed in the following sections in terms of their influence on pipeline design.

Specific Gravity/Density

The density of a liquid is its weight per unit volume. Density is usually denoted as pounds of material per cubic foot. The specific gravity of a liquid is typically denoted as the density of a liquid divided by the density of water at a standard temperature (commonly 60°F). By definition, the specific gravity of water is 1.00. Typical specific gravities for the distilled petroleum products gasoline, turbine fuel, and diesel fuel are 0.73, 0.81, and 0.84, respectively.

Compressibility

Many gases that are routinely transported by pipeline are highly compressible, some turning into liquids as applied pressure is increased. The compressibility of such materials is obviously critical to pipeline design and throughput capacity. On the other hand, crude oils and most petroleum distillate products that are transported by pipeline are only slightly compressible. Thus, application of pressure has little effect on the material's density or the volume it occupies at a given temperature; consequently, compressibility is of only minor importance in liquid product pipeline design. Liquids at a given temperature occupy the same volume regardless of pressure as long as the pressure being applied is always above the liquid's vapor pressure at that temperature.

Temperature

Pipeline capacity is affected by temperature both directly and indirectly. In general, as liquids are compressed — for example, as they pass through a pump — they will experience slight temperature increases. Most liquids will increase in volume as the temperature increases, provided the pressure remains constant. Thus, the operating temperature of a pipeline will affect its throughput capacity. Lowering temperatures can also affect throughput capacity, as well as overall system efficiency. In general, as the temperature of a liquid is lowered, its viscosity increases, creating more frictional drag along the inner pipe walls, requiring greater amounts of energy to be expended for a given throughput volume. Very viscous materials such as crude oils exhibit the greatest sensitivity to the operating temperatures of their pipelines. However, in the case of crude oils, the impacts are not only from increases to viscosity, but also due to the solidification of some chemical fractions present in the oils. For example, crude oils with high amounts of paraffin will begin to solidify as their temperature is lowered, and they will become impossible to efficiently transport via a pipeline at some point.

Viscosity

From the perspective of the pipeline design engineer, viscosity is best understood as the material's resistance to flow. It is measured in centistokes. One centistoke (cSt) is equivalent to 1.08 × 10–5 square feet per second. Resistance to flow increases as the centistoke value (and viscosity) increases. Overcoming viscosity requires energy that must be accounted for in pump design, since the viscosity determines the total amount of energy the pump must provide to put, or keep, the liquid in motion at the desired flow rate. Viscosity affects not only pump selection, but also pump station spacing. Typical viscosities for gasoline, turbine, and diesel fuels are 0.64, 7.9, and 5 to 6 cSt, respectively.

As the material's viscosity increases, so does its frictional drag against the inner walls of the pipe. To overcome this, drag-reducing agents are added to some materials (especially some crude oils). Such drag- reducing agents are large molecular weight (mostly synthetic) polymers that will not react with the commodity or interfere with its ultimate function. They are typically introduced at pump stations in very small concentrations and easily recovered once the commodity reaches it final destination. However, often, no efforts are made to separate and remove these agents. Drag reduction can also be accomplished by mixing the viscous commodity with diluents. Common diluents include materials recovered from crude oil fractionation such as raw naphtha. Diluents are used to mix with viscous crude feedstocks such as bitumen recovered from tar sands and other very heavy crude fractions to allow their transport by pipeline from production areas to refineries.

Pour Point

The pour point of a liquid is the temperature at which it ceases to pour. The pour point for oil can be determined under protocols set forth in the ASTM Standard D-97. In general, crude oils have high pour points. As with viscosity, pour points are very much a function of chemical composition for complex mixtures such as crude oils and some distillate products, with pour point temperatures being influenced by the precipitation (or solidification) of certain components, such as paraffins. Once temperatures of materials fall below their respective pour points, conventional pipeline design and operation will no longer be effective; however, some options still exist for keeping the pipeline functional. These include:

- Heating the materials and/or insulating the pipe to keep the materials above their pour point temperature until they reach their destination.
- Introduce lightweight hydrocarbons that are miscible with the material, thereby diluting the material and lowering both its effective viscosity and pour point temperature.
- Introduce water that will preferentially move to the inner walls of the pipe, serving to reduce the effective coefficient of drag exhibited by the viscous petroleum product.
- Mix water with the petroleum material to form an emulsion that will exhibit an effective lower viscosity and pour point temperature.
- Modify the chemical composition before introducing the material into the pipeline, removing those components that will be first to precipitate as the temperature is lowered. (This tactic is effective for crude oils, but is virtually unavailable when moving distillate products that must conform to a specific chemical composition.)

Waxy crude can be pumped below its pour point; more pumping energy is required, but there is no sudden change in fluid characteristics at the pour point as far as pumping requirements are concerned. However, if pumping is stopped, more energy will be required to put the crude in motion again than was required to keep it flowing. When flow is stopped, wax crystals form, causing the crude to gel in the pipeline. If gelling occurs, the crude behaves as if it had a much higher effective viscosity; consequently it may take as much as five to ten times the energy to reestablish design flows in the pipeline than it did to support stable continuous operation when the crude's temperature was above its pour point. For some products such as diesel fuels that still contain some waxy components (i.e., saturated, long-chain hydrocarbons), "gelling" may also occur as temperatures are lowered; however, such gelling problems are commonplace in storage tanks and vehicle fuel tanks where the fuel sits motionless for long period of time, but rarely materialize in pipelines where the materials are virtually in constant motion and where their passage through pumps typically imparts some amount of heat. Nevertheless, precipitation or gelling of products contained in pipelines can cause significant operational difficulties and may also result in environment impacts if pipeline ruptures occur during attempts to restart the flow, when a pressure well above design limits could result.

Vapor Pressure

The vapor pressure of a liquid represents the liquid's tendency to evaporate into its gaseous phase with temperature. Virtually all liquids exhibit a vapor pressure, which typically increases with temperature. The vapor pressure of water increases steadily with temperature increases, reaching its maximum of one atmosphere pressure (760 mm Hg, or 14.7 psi absolute [psia]) at the boiling point (212°F). Vapor pressures of petroleum liquids are determined using a standardized testing procedure and are represented as the Reid vapor pressure. Reid vapor pressures are critical to liquid petroleum pipeline design, since the pipeline must maintain pressures greater than the Reid vapor pressure of the material in order to keep the material in a liquid state. Blended (or "boutique") vehicle fuels, required over some periods of the year for air pollution control purposes in some parts of the country, have unique chemical compositions and unique Reid vapor pressures (as mixtures). Consequently, pipelines handling such fuels must constantly monitor their vapor pressure and adjust operating conditions accordingly. Pipelines carrying liquids with high vapor pressures can be designed to operate under a variety of flow regimes. Single-phase flow regimes intend for the entire amount of the material in the pipeline to be in the liquid state. Operators of single- phase liquid pipelines attempt to control pressure and flow to maintain a "full face" of liquids in the pipeline, minimizing the amount of volatilization that is allowed to occur. This maximizes system efficiency and also the longevity of system components. Failure to maintain a full face of liquids in a single-phase liquid pipeline can result in increased risks of fires and explosions. Single-phase liquid pipelines are the most common designs for petroleum liquids. However, pipelines can also be designed as two-phase systems in which both vapor and liquid phases of the material are expected to be present. The variation of flow regimes in such two-phase systems can range from bubbles of vapor distributed in liquid to droplets of liquid suspended in vapor. Typical vapor pressures for gasoline, turbine fuel, and diesel fuel are 15, 2, and 2 psia, respectively.

Reynolds Number

The Reynolds number, named after Osborne Reynolds, the scientist who first proposed its usefulness in studying fluid dynamics, is a dimensionless number that represents the ratio of the inertial force to the viscous force — that is, the ratio of the force moving a fluid to the force that attempts to resist that movement. In a pipeline, the inertial force is related to the fluid's velocity, which is a function of the force applied to it by the pumps. The viscous force is a product of the inherent viscosity of the fluid as well as the frictional drag created by interaction of the fluid with the interior surface of the pipeline. A low value for a Reynolds number (<2100) suggests that the fluid will be moved evenly, so-called laminar flow. Higher Reynolds numbers indicate that forces applied to a fluid are much greater than the forces resisting its movement; consequently its movement will be violent and turbulent. The Reynolds number representing the transition zone between laminar and turbulent flows is called the critical Reynolds number (Rcrit), which is typically assigned a value of 2320. The Reynolds number depends on the force applied by pumps, the material's viscosity at operating temperature, and the physical size and cross-sectional shape of the pipe through which the material is moving. Most pipeline designers select these components to establish operating conditions near Rcrit while still delivering the desired throughput.

Thermal Stresses

Except where local conditions prevent it, petroleum pipelines are typically buried. Burial depths vary with geographic location, but are typically designed to ensure that the entirety of the pipe is below the local frost line. At such depths, the ambient soil temperatures are relative constant with season, although some minor variations can occur. Despite predictably stable temperature environments, pipeline design also accounts for thermal stresses, both expansions and contractions for the pipe and other components. Expansion joints are employed, and, in some instances, trenches are made extra-wide to allow for lateral movements of the pipe with temperature. Thermal expansion joints, or loops, are also critical in locations where conditions require the pipe to be above ground, for example, at some river crossings. Thermal stress on pipeline components can also come from internal forces. The vapors of certain volatile hydrocarbon fuels will cause super cooling of the remaining liquids, if allowed to escape from the pipeline system at significant rates. Such super cooling can result in thermal cracking of pipes and pump housings.

Soil and Load Design Considerations

During the design and site preparation phases, soil samples are taken at many points throughout to determine mechanical and thermal stability, corrosivity, and electrical conductance. Soils and subsurface materials are also evaluated for their ability to support the weight of the pipeline support facilities at sensitive areas, such as river crossings. Soil properties such as seepage, slope stability, tensile strength, and soil structure are determined. In addition to engineering considerations, site characterizations regarding the presence of threatened or endangered plant species and soil organisms may also need to be conducted.

Vertical External Load

Under most conditions, the internal pressures imposed on the pipe by moving fluids far exceed the static pressures on the pipe from the weight of backfill and soil material above it. Consequently, vertical external loading is not typically a matter of serious concern to pipeline designers. However, there are some circumstances where vertical loading becomes critical, including when pipelines pass beneath rivers, railroads, or highways (also see the discussion below on dynamic vertical loads) or in areas with high snowfall or landslide potential.

Darcy Friction Factor

Named after the French engineer Henry Darcy, the Darcy friction factor is a dimensionless number that represents the linear relationship between the mean velocity of a moving fluid and the pressure gradient. The Darcy friction factor is critical in determining the necessary force capabilities of pumps as well as the spacing between pump stations to create the desired flow (and thus throughput) of a liquids pipeline.

Buoyancy

Burying pipelines beneath the natural water table creates unique problems and challenges. During periods of saturation of the aquifer, pipeline segments may become buoyant, even when filled with product. This results in a net upward force on the pipeline segment that could be sufficient to compromise the pipe's integrity. When such conditions are anticipated, special construction techniques need to be employed. Anchoring devices or concrete coatings over the corrosion coatings are installed to help the pipe resist the buoyant force. Mechanisms to reduce the hydraulic pressure of the groundwater in the local area of the pipeline can also be successfully applied.

Movements at Pipe Bends

When unusual internal or external forces are applied to the pipe, it is most likely to respond to such forces by moving at the apex of side bends, sag bends, and overbends. Forces that can cause pipe movement can include a net outward force generated by internal pressure, thermal expansions or contractions of the pipe due to temperature extremes, hydraulic pressures from groundwater, or seismic activity in the vicinity of the pipe. Natural resistances to such forces include the axial stiffness of the pipe itself, the bearing and shear resistance of backfill and overburden materials, and the extent to which those materials were compacted during construction.

Mine Subsidence

Areas where extensive longwall mining of coal or other resources has occurred represent an increased potential for surface subsidence if mine reclamation activities were inadequate or not performed. Although such mining can occur to depths greater than 1,000 feet, collapse of a mined cavity can affect all overlying strata, causing bending and sagging of each and ultimately forming a subsidence basin at the surface. Typically, the area covered by such subsidence basins is substantially larger than the collapsed mine cavity that caused it. The vertical displacement is greatest at the center of a subsidence basin, but is typically less than the original height of the collapsed cavity. Vertical displacement as well as tilting and shearing forces throughout the basin are of greatest concern for surface structures that lie within the basin's footprint. Forces on buried linear features within the basin's footprint are unique. The bending moments of the

sagging overburden strata result in horizontal forces that behave as tensile forces on the outer portions of the basin and compressive forces closer to the center of the basin. Depending on its exact location within the basin, a buried pipeline can be subjected to both forces. The strengths of these forces may be sufficient to buckle pipe or tear pipe connections apart.

Effects of Nearby Blasting

Blasting in the vicinity of a pipeline typically occurs as a result of mining or nearby construction activities. While normally an issue for existing pipelines, blasting effects may be considered for new designs if future land-use plans are known to include the construction of an adjacent pipeline or the development of mined areas. Pipeline stresses generated by nearby blasting can vary greatly, depending on local variations in site conditions, the degree to which the blast is confined, delays between multi-shot blasts, and the type of explosive used. Expressions for peak radial ground velocity (of the resulting pressure wave) and peak pipe stress are based on characterizing the blasting configuration as corresponding to either point or parallel-line sources.

Fluid Transients

Rapid changes in the flow rates of liquid or two-phase piping systems can cause pressure transients that generate pressure pulses and transient forces in the piping system. The magnitudes of these pressure pulses and force transients are often difficult to predict and quantify. Because of water hammer, an unbalanced impulsive force called a "thrust" load is applied successively along each straight segment of a buried pipe. This causes a pressure imbalance between consecutive bends. Such hammering actions, if sufficiently strong and continued over long periods of time, can compromise the pipe's integrity or introduce fatigue stress cracks.

In-Service Relocation

It is commonplace to relocate short pipeline segments without taking the pipeline out of service. The process involves careful excavation of the pipe, raising it out of its original trench, and placing it into a prepared parallel trench. Obviously, the new path for the pipeline must be located generally adjacent and proximate to the original path for this relocation to occur without the need of adding new pipe segments. Causes for such relocations include accommodating a new highway or rail crossing, performing over-the-ditch coating renovation, inspecting or repairing pipe submerged in shallow water, or avoiding encroachment. Even though the physical displacements of the pipe are minimal, the newly positioned pipe will be subjected to new longitudinal stresses during its move and thereafter.

Earthquakes and Landslides

Landslides involve the mass movement of native surface and subsurface materials in the uppermost portions of the soil mantle at a moderate to rapid rate (generally greater than 1

feet/year). Landslides that are characterized as catastrophic in their impacts typically involve mass movements that are many orders of magnitude more rapid. However, landslides can also involve slow creep of materials over a relatively long period of time to a point where adverse impacts result. In most instances, the movement is downslope because of gravitational forces, often aided by water. Landslides are initiated by a variety of forces and events, both natural (e.g., earthquakes, seismic activity, excessive saturation of surface and subsurface soils, and volcanism) and anthropogenic (e.g., nearby use of explosives, surface disturbances on steep slopes brought about by construction activities without appropriate mitigation, clear-cutting of vegetative cover, improper use of herbicides, improper management and release of precipitation). Potential earthquake and landslide impacts to buried pipelines include transitory strains caused by differential ground displacement and permanent ground displacement from surface faulting, lateral spread displacement, soil mass displacement, and settlement from compaction or liquefaction.

Scour at Stream Crossings and Suspended Rock Crossings

Pipelines buried beneath or adjacent to rivers can be compromised over time by the erosive force of the moving water. Scouring can occur that would displace the cover materials and expose the pipe, subjecting it to additional lateral forces and possibly even causing sufficient displacement to break the pipe. High velocities of water in rocky areas or watercourses with steep banks have the highest scouring potential. Areas prone to flooding can also experience excessive water flow velocities during those periods that can also result in scouring action. The typical response to traversing rivers or drainage ways with high scouring potential is to bury the pipe at greater depths or to suspend the pipe above these areas. In addition, major river crossings are required to be inspected every 5 years for indications of scour and/or exposed pipe.

Leak Detection

pipeline leak detection to conform their programs "Computational Pipeline Monitoring." Methods used to detect product leaks along a pipeline can be divided into two categories, externally based (direct) or internally based (inferential). Externally based methods detect leaking product outside the pipeline, and include traditional procedures such as ROW inspection by line patrols, as well as technologies like hydrocarbon sensing via fiber optic or dielectric cables. Internally based methods, also known as computational pipeline monitoring, use instruments to monitor internal pipeline parameters (i.e., pressure, flow, temperature, etc.), which are inputs for inferring a product release by manual or electronic computation. The method of leak detection selected for a pipeline depends on a variety of factors including pipeline characteristics, product characteristics, instrumentation and communications capabilities. Pipeline systems vary widely in their physical characteristics and operational functions, and no one external or internal method is universally applicable or possesses all the features and functionality required for perfect leak detection performance. Small leaks on large pipelines are very difficult to detect through these automated and measurement methods.

However, the chosen system should include as many of the following desirable leak detection utilities as possible:

- Possesses accurate product-release alarming,
- Possesses high sensitivity to product release,
- Allows for timely detection of product release,
- Offers efficient field and control center support,
- Requires minimum software configuration and tuning,
- Requires minimum impact from communication outages,
- Accommodates complex operating conditions,
- Is available during transients,
- Is configurable to a complex pipeline network,
- Performs accurate imbalance calculations on flow meters,
- Is redundant,
- Possesses dynamic alarm thresholds,
- Possesses dynamic line pack constant,
- Accommodates product blending,
- Accounts for heat transfer,
- Provides the pipeline system's real-time pressure profile,
- Accommodates slack-line and multiphase flow conditions,
- Accommodates all types of liquids,
- Identifies leak location,
- Identifies leak rate,
- Accommodates product measurement and inventory compensation for various corrections (i.e., temperature, pressure, and density), and
- Accounts for effects of drag-reducing agent.

Overpressure Protection

A pipeline operator typically conducts a surge analysis to ensure that the surge pressure does not exceed 110% of the maximum operating pressure (MOP). The pressure-relief system must be designed and operated at or below the MOP except under surge conditions. In a blocked line, thermal expansion is a concern, especially if the line is above ground.

Valve Spacing and Rapid Shutdown

The spacings of valves and other devices capable of isolating any given segment of a pipeline are driven by two principal concerns: (1) maintaining the design operating conditions of the pipeline with respect to throughput and flexibility and (2) facilitate maintenance or repairs without undue disruption to pipeline operation and rapid shutdown of pipeline operations during upset or abnormal conditions. Valve spacing and placement along the mainline are often selected with the intention of limiting the maximum amount of material in jeopardy of release during upset conditions or to isolate areas of critical environmental concern to the greatest extent possible. Valves designed to prevent the backward flow of product in the event of a pump failure (check valves) will also be installed in critical locations. Valves may also be required on either side of an exceptionally sensitive environmental area traversed by the pipeline. Finally, valves will be installed to facilitate the introduction and recovery of pigs for pipeline cleaning and monitoring. They also are required to be installed at river crossings over 100 feet wide. The design of these must comply with regulations and industry best practices.

Pumps and Pumping Stations

Desired material throughput values as well as circumstantial factors along the pipeline route are considered in designing and locating pump stations. Desired operating pressures and grade changes dictate individual pump sizes and acceptable pressure drops (i.e., the minimum line pressure that can be tolerated) along the mainline; grade changes also dictate the placements of the pump stations. Pump stations are often fully automated, but can also be designed to be manned and to include ancillary functions such as serving as pig launching or recovery facilities or serving as the base from which inspections of mainline pipe are conducted. Because there are a multitude of ways in which the desired operating conditions can be obtained and sustained, the outfitting and location of pump stations are also often influenced by economics, typically representing a compromise between few large-capacity pump stations and a greater number of smaller-capacity stations. The overall length of the pipeline (to its terminal destination) and the flexibility needed to add or remove materials along the course of the pipeline also dictate pump station placement.

At a minimum, pump stations include pumps (components that contact the fluids in the pipeline and provide kinetic energy) and prime movers (power sources that provide power, typically some form of mechanical energy) to the pumps. To facilitate maintenance and to prevent disruptions of pipeline operation because of equipment failure, most pump stations use several pumps

arranged in parallel fashion. Typically, all but one of the pumps can produce the desired operating pressures and throughputs, so some pump is constantly off-line and in standby. Pump stations also represent locations where ownership or custody of the material is transferred. For the sake of accountability, such pump stations are also equipped with flow monitoring devices. Pump stations typically also have co-located facilities that support pipeline operation or facilitate shutdowns or maintenance on pipeline segments. Thus, breakout tanks for temporary storage of materials or for use in managing line pressures and controlling product surges are also present at pump stations. Finally, pump stations are, in some instances, co-located with terminal or breakout tankage facilities.

Although certain pump designs are preferred for certain applications, all pumps require regular maintenance and are subject to failure from a variety of factors. Pump maintenance, therefore, is critical to continued safe performance of pipeline systems.

Pigging Devices and Pig Launching/Receiving Facilities

Pipeline pigs come in a wide variety of sizes and designs. Pigs are inserted into the pipeline while it is operational and are carried along by the fluid being pumped. Because they are solid devices constructed of various materials including metal, plastics, and rubber derivatives, pigs must be removed before reaching the next pump. Typically, pig traps, launchers, and recovery facilities are collocated with pump stations. Pigs are designed to perform a wide array of functions. Their basic purpose is threefold: (1) provide a way to clean debris and scale from the inside of the pipe, (2) inspect or monitor the condition of the pipe, (3) or act as a plug or seal to separate products in multi- product commercial pipelines or to isolate a segment for repair without depressurizing the remainder of the pipeline. Pigs designed to clean the pipe can use mechanical means (often called scraper pigs) or chemicals. Pigs that monitor the condition of the pipe are categorized as in-line inspection tools. Monitoring pigs, also sometimes called "instrument pigs" or "smart pigs," can perform a wide variety of functions. Geometry pigs check for deformation of the pipe (which can greatly influence throughput efficiencies, but can also be an early indicator of significant problems that could compromise pipeline integrity). Pipeline curvature, temperature and pressure profiles, bend measurements, corrosion detection, crack detection, leak detection, and product sampling represent some of the other major functions performed by smart pigs. Magnetic flux leakage and ultrasonic technologies are employed for some of these inspections. Another type of pig recently developed is the gel pig. As the name implies, gel pigs consist of a series of gelled liquids that are introduced for a variety of purposes, including serving as a separator between products in a multi-product pipeline, collecting debris (especially after initial construction or repairs that involved opening the pipeline, and dewatering the pipeline.

Distribution Terminals

Marketing and distribution terminals temporarily store products removed from the pipeline. There also may be loading racks and transfer operations. In most instances, terminals are proximate to, but not necessarily within the pipeline ROW, even if the terminal is owned and operated by the pipeline operator.

Pump Designs

Pumps of various designs are used in crude oil and petroleum product pipelines. Selection of pump design is based on desired efficiency as well as the physical properties of the materials being moved, especially viscosity and specific gravity. The pump's head pressure, or the pressure differential it can attain, is critical for selecting pumps that are capable of moving fluids over elevation changes.Two fundamental pump designs are in common use: centrifugal pumps and positive displacement pumps. Centrifugal pumps are preferred for moving large volumes of material at moderate pressure, while positive displacement pumps are selected for moving small volumes of material at higher line pressures. Centrifugal pumps consist of two main components: the impeller and the volute. The impeller, the only rotating component of the pump, converts the energy it receives from the force that causes its rotation into kinetic energy in the fluid being pumped, while the volute converts the kinetic energy of the fluid into pressure. Positive displacement pumps can be of various designs; however, two designs predominate in pipeline applications: reciprocating and rotating pumps. Rotating pumps are often the pump design of choice for viscous fluids such as crude oils. Unlike a centrifugal pump where power demands rise sharply with increasing fluid viscosity, the performance of rotating pumps is generally unaffected by variations in either fluid viscosity or line pressure.

Driver Selection

The component that provides power to the pump is referred to as the prime mover. A wide variety of primer movers are in use, including electric motors, gas turbines, and diesel internal combustion engines. In recent years, most long-distance transmission pipelines have begun using electric motors or gas turbines. Virtually any prime-mover pump design combination is possible, with decisions resting primarily on the physical properties of the fluids being pumped, the desired throughputs, operating pressures, and transport speeds for the pipeline and for logistical needs such as meeting operating parameters, availability of power or fuel for the prime mover, and compatibility with SCADA systems in use and the sensors they rely on. Initial costs and maintenance demands can also influence selection. In terms of initial costs, electric motors are far less expensive than any other option. Operating costs (measured as $/brake horsepower/year) are generally uniform across all options; however, overall efficiencies of electric motors are substantially better than other options. When maintenance costs are considered, times between major overhauls of prime movers vary, with electric motors and industrial turbines expected to require the fewest overhauls over time.

Measurement and Flow Control

SCADA

A typical SCADA system collects data from, and supervises control of, third-party programmable logic controllers at each of the pipeline's pumping stations, mainline valves, and other areas where monitoring of critical conditions takes place. Along the entire length of the pipeline, block valves are remotely monitored and controlled using advanced real-time SCADA processors designed to support complex remote applications. The communications for the system is typically over the Ethernet and fiber optic lines as the backbone, backed up by public switched telephone networks.

SCADA system designs vary widely, but there are elements common to all. Operational data for liquid pipelines must be gathered from locations that are distributed widely across large geographical areas. Measurement transducers are polled frequently. To efficiently perform basic functions, data must be accessible by operations personnel located in the field and at a central pipeline control center. Operations are monitored and controlled using SCADA systems that provide thousands of data signals to pipeline controllers and operators. Some data are provided at intervals of a few seconds, other data are provided at intervals of a few minutes, and still others on an hourly or daily basis. As data are updated, the superseded older data are normally stored for a period to support system audits, identify trends (both good and bad), and establish a historical operating record.

SCADA systems are configured with a variety of instrumentation. Electrical signals from measurement devices are typically converted to engineering units in computers, referred to as remote terminal units (RTUs), which are located at measurement sites. Communication links are provided by radio, cell phone, private microwave, leased line, or satellite. Polling frequencies can be predetermined or on-demand.

Data from a given area of operations are often concentrated in computers at field offices, which are distributed throughout the pipeline system. SCADA software running on these field computers provides operational data and control to local operations personnel. Central computers located at a company's pipeline control center, in turn, poll field computers. SCADA software runs on the central computers to provide pipeline controllers with displays of operational data and remote control capabilities.

With so much data available at such high frequency, the effectiveness of the SCADA system hinges on appropriate data presentation, analysis, and alarming. A variety of data presentations are used to transform basic data into information. Trends, schematics, and other graphics are used to convey large amounts of data, which vary over time, in a concise and informative format. Often operational data is superimposed on facility and pipeline schematics, permitting presentation of the data in an operational context. Alarms are used to indicate that operating

conditions are approaching or have exceeded prescribed tolerances. Attention can then be focused on problem diagnosis and appropriate actions. In addition to data collection and display, SCADA systems also often include data validation programs that seek to validate each piece of data before using it to support a calculation or represent a condition. Frequent and, in some cases, continuous data validation has been shown to greatly increase the sensitivity of the system while reducing incidents of false alarms.

SCADA systems at remote control centers provide operators with complete operational information about the pipeline system in one location. Typical information includes:

- Pipeline mimic/displays. The complete pipeline can be mimicked to provide the operator with instantaneous visual feedback on the status of any portion of the pipeline, including pumps, valves, tanks, etc. These visual schematics include overviews of the entire pipeline system or systems and drill-down screens that take the viewer to an individual location or piece of equipment.
- Pump, compressor, and other equipment status. Equipment operation can be displayed with status (on/off) and other critical parameters associated with a piece of equipment such as flow, discharge pressure, vibration, case temperature, etc.
- Valve status. Valve information can be displayed with valve positions (open/throttle/closed) depicted.
- Alarms and alerts. Alarms and other operational indications are immediately available for operator response where complete system status is known and, in many cases, can be displayed. These can alert the controller to an unusual or abnormal operating situation or remind the controller about upcoming operating changes that need to be initiated. Often, system configurations allow the operator to intervene to validate the alarm or to take the necessary corrective actions. When operator intervention does not occur with a prescribed time frame, the system will automatically initiate actions that have been predetermined as being appropriate, given the circumstances.
- Analytical tools. Trending history and other analytical tools and graphical aids are available to assist personnel in their decision making under routine, abnormal, and emergency conditions.

The SCADA system is the central feature of a remote control center. Because the flow of product in the pipeline is typically a 24-hour-a-day, 7-day-a-week operation, the remote control centers are staffed continuously in order to monitor and maintain this round-the-clock operation. Due to the data being transmitted from potentially many miles away, the operator oftentimes must respond to the alarm and direct a corresponding response from the remote control center based on the information depicted on the display provided by the SCADA system; however, in other cases, decisions are made in conjunction with personnel located in the field at the affected location(s).

Telecommunication Towers

In all SCADA systems, the master terminal unit (MTU) and RTUs communicate through a defined network of some type. The early systems utilized wired communications, either private hard-wired systems owned by the operator (usually practical only for short distances) or the public switched phone network. Today there are still many systems using public phone systems, encompassing both wire and fiber optics technology. These facilities allow remote monitoring of the pipeline and communication with valves, compressors, and personnel during operation.

Most new systems, and many retrofits, are using some form of wireless communications. Many pipelines own their own microwave infrastructure, including dedicated towers and radio frequencies licensed by the Federal Communications Commission. There are also systems using frequencies in the very high frequency (VHF) and ultrahigh frequency (UHF) ranges. These operators may own the communication towers or lease space on towers from other communication system operators. Many newer systems make use of low-power radio transmissions, such as spread-spectrum technology, to avoid the licensing requirements. Satellite communications are also used for long-distance and rugged-terrain communications.

SCADA systems can also operate on cell phone technology, such as the Cellular Digital Packet Data. This requires no dedicated lines or other infrastructure, such as an antenna tower. Some SCADA systems operate directly through the Internet, thus eliminating certain maintenance concerns for the operator, but also simultaneously introducing cyber security concerns.

Risk of Natural Hazards and Human Threats

Natural and man-made hazards, such as shaking from earthquakes, flooding, and even human chemical, biological, or nuclear attacks can cause harm to pipeline components, such as pump stations, pipelines segments, and storage tanks, etc.

COLOCATION ISSUES IN CORRIDORS

Colocation of energy transmission systems within designated energy ROWs may result in some interference between the systems or other hazards that would not exist except for the physical proximity of the two transmission systems. The paragraphs below identify some of the possible unique consequences of colocation of such systems within an energy ROW.

Fire Hazards

The proximity of pipelines carrying volatile materials raises the potential of a fire in one transmission system causing heating, stress, and/or rupture in another one. The normal distance between buried pipelines will probably prevent significant transfer of heat underground. However, care should be taken at locations where the pipelines exit the ground, such as at pump and compressor stations and road/river crossings, to ensure adequate separation of lines and

facilities or additional insulation and fire protection. In the event of a fire in a petroleum pipeline, overhead electricity transmission lines could be damaged if adequate distance is not maintained.

Coincident Construction

Coincident construction of two separate energy transmission systems within a designated corridor raises some potential problems if the construction activities are not well coordinated and well scheduled. Because of the proximity of two major construction activities, workers on one construction project may be exposed to hazards of the other. Logistics become quite complicated with both construction activities vying for the same transportation services and the same equipment laydown areas and using the same access roads to approach their respective construction sites with manpower and heavy equipment. On the other hand, with construction activities closely coordinated, impacts could be lessened, since opportunities are created for multiple uses of access roads, laydown areas, and other support systems that may be common to both construction processes.

Electrical Interference

The question of the impact of the colocation of metallic pipelines and high-voltage transmission lines can be framed by three broad concepts: (a) influence, (b) coupling, and (c) susceptibility. Other issues that add to the overall impact are identified and discussed below. Influence can be thought of as the sum of the magnetic induction and ground-return currents. Coupling can be thought of as the "distance" between the source of the magnetic induction (power line) and the objects being affected (pipelines). Susceptibility relates to the vulnerability of the induction element (i.e., the metallic pipeline) to induced and ground-return currents. Colocation may mean that the pipelines are located on an electric utility ROW directly underneath the power lines, usually buried in earth. This is the worse case for the coupling of magnetic induction currents, since the separation between the power line and the pipeline is very small. Thus, the full effect of the magnetic induction from the power line into the pipeline takes place. Alternating current (AC) induction will be reduced for power lines that parallel pipelines but are located to the right or left of the pipelines, rather than directly above. For example, the magnitude of the induced currents and voltages will be reduced by a factor that is inversely proportional to the distance from the centerline. As the separation between the power line and the pipeline increases, radically smaller values of current and voltage will be induced. In many cases, especially under ideal conditions, the induced currents and voltages would be minimal beyond 300 to 500 feet.

Each of the three broad concepts of influence, coupling, and susceptibility is highly variable for every situation, and each power-line and pipeline scenario must be considered separately. The system design, materials, and construction methods can themselves go a long way toward minimizing overall susceptibility of pipeline systems to magnetic induction and damage due to electrolysis and lightning.

Construction techniques can also greatly influence the extent of interference between power lines and buried pipelines. Pipeline segments are typically 20 feet long and connected to adjacent segments by rubber gaskets, effectively isolating each pipe segment and making the entire pipeline electrically discontinuous. As noted above, installation mechanisms that involve tightly wrapping the pipe and/or applying a continuous corrosion control coating can make the pipe more susceptible to interferences from induced currents of nearby power lines, since those techniques can prevent the pipeline from remaining at the same electrical potential as the ground (and as the neutral wire of the electricity transmission system). To overcome this problem, ductile pipe manufacturers recommend a loose wrapping of polyethylene that still provides sufficient path to ground to keep the pipe and the neutral ground wires of adjacent power lines at the same potential. Some mitigative techniques have been shown to not only reduce induced AC voltages effectively and economically, but to simultaneously provide cathodic protection for the pipeline. As noted earlier, the precise alignment of the electric field with respect to pipeline orientation is critical to the severity of the potential interference. PC-based software is available that allows for calculation of both steady- state and fault-induced voltages on pipelines paralleling high-voltage overhead AC power lines. Experience has shown that colocation of electricity transmission lines and buried metallic pipelines creates additional monitoring, testing, and/or preemptive actions by the pipeline operator, especially after certain events have occurred. The following The following conditions and potential problems are unique to colocated pipelines:

- Phase fault currents. Fault currents dumped to ground will naturally follow a path of least resistance involving the soil and the metallic pipeline. There can be many different scenarios depending on the resistance of the pipeline and the resistance of the surrounding soil.

- Lightning strike currents. Instantaneous lightning currents can be very high, in excess of hundreds of thousands of amperes. As a result, these currents can stress the electrical system such that breakdown and flashover occur at weak points, resulting in damage. If the damage is not repaired, there will be continued deterioration and ultimately system failure. An explosive effect may be associated with a direct lightning strike, which can cause significant damage not only to the electric system, but also to nearby buried pipelines. Thorough inspections of affected areas of the electricity transmission system, as well as nearby pipeline segments, are warranted after lightning strikes have occurred.

- AC-induced corrosion. AC-induced corrosion may result in significant metal loss and a significant threat to the integrity of the pipeline.

- Impacts on pipeline cathodic protection systems. Some pipelines are protected by an impressed-current cathodic protection system (CPS). A CPS is intended to minimize the loss of metal in the pipeline due to electrolysis. Because the currents applied in a CPS are typically quite low (in the milliamp range), nearby electromagnetic fields from electricity transmission lines can disrupt proper CPS operation. Interferences from nearby electricity transmission lines can be compounded where multiple pipelines exist, each with its own

CPS. Increased monitoring of CPS function is warranted for pipeline segments in close proximity to electricity transmission systems.

- Compromised insulating coatings and pipeline joints. There may be damage to the pipeline insulating coating as a result of induced voltage. This can happen at underground sections of pipeline, as a consequence of the application of an excessive voltage stress across the pipeline coating. Likewise, insulating joints used to electrically isolate aboveground pipeline segments from those belowground, or to electrically isolate separate CPSs serving adjacent pipeline segments, can also be compromised by induced voltage.

- Electrical shorts between carriers. Many times, there can be electrical shorts between the CPSs of adjacent pipelines. When two independent CPSs exist, special field techniques are required to monitor for such shorts.

- Polarized pipe. Metal pipelines in proximity to electricity transmission lines may become electrically polarized, requiring special techniques to reveal the electrical potential differences between the pipe and the soil with which it is in contact; this is a critical consideration in designing and implementing an appropriate CPS for the pipeline.

- Review, testing, and documentation of electrostatic or capacitive interference. When electromagnetic interference is possible, studies are warranted to ensure the safety of personnel and other pipeline assets and that a CPS is not adversely affected.

- Review, testing, and documentation of resistive or ohmic interference. When lightning strikes a transmission structure, or when there is a phase-ground fault, it is important to measure and document the severity of the ohmic interference that has resulted and to verify that adverse impacts to nearby pipelines have not occurred.

- Review, testing, and documentation of electromagnetic or inductive interference. Phase imbalances in nearby electricity transmission lines can result in inductive interferences in metallic pipelines that are close to and parallel with the transmission lines. Special investigations of adverse impacts to pipelines are warranted in the aftermath of such phase imbalance events.

- Review, testing, and documentation of contact voltages. Contact voltages may cause AC current to flow to ground through a person touching the line. Therefore, to ensure worker safety, measurements to identify the existence of such conditions must be routinely made and mitigative actions taken, when necessary.

Annex-K

Pipeline Parameters

- Pipe specifications have to be API 5L PSL-2 grade x-65 or above minimum thickness 8mm or above depending on pressure in the pipeline, and pipe to have three layer polyethylene quoting from outside, pipe spiral welded or horizontal seam welded.
- Operating parameters will depend upon the oil quantity to be pumped through the pipeline, with booster pumping stations at intervals of 200-250 kilometer.

HSE FOR WHITE OIL PIPELINE-2

Annex-M

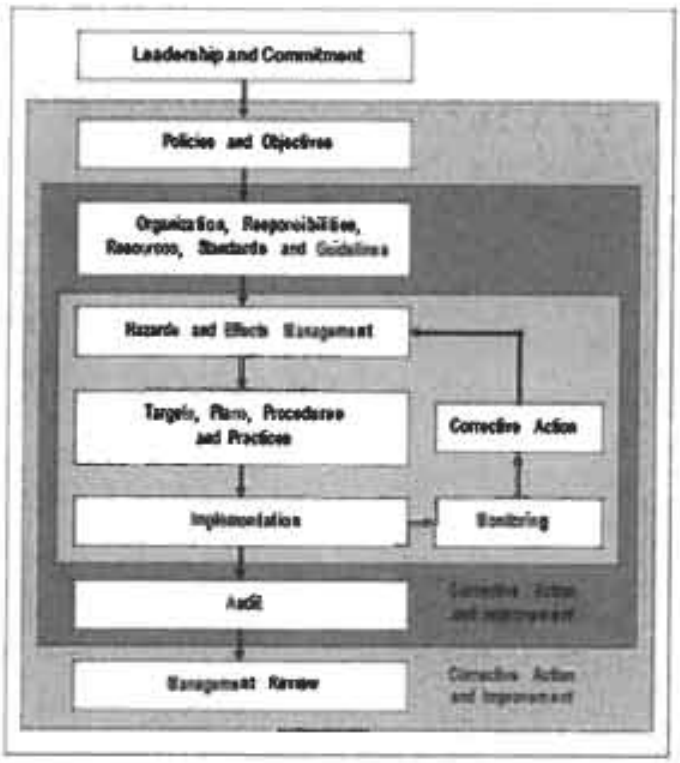
Safe and Clean Operation

The natural environment is essential for humans. Therefore, we incorporate care for people's lives and environmental protection into our mission. Upholding the principles of "people-centered, prevention-driven, full staff participation and continuous improvements", we endeavor to build ourselves as a resource-conserving, environmentally friendly and safely operating business with the goals of "zero injuries, no pollution and zero accidents". Work safety and environmental protection is a prerequisite which will secure our steady development. We attach great importance to health, safety and the environment (HSE), and give top priority to safety and environment in our operations, and reinforced our HSE system. By improving the management system and implementing stricter inspection of responsibility fulfillment, Frontier Oil Company-1 will closely monitor workplace safety results, strengthened hazard control, and endeavored to enhance HSE management performance. The Company will carry out system audits covering all units twice a year. The audit team will conduct on-site audits, make recommendations and rectify problems. Quantitative management of the HSE system, organized the preparation of *Criteria for Quantization Review and Evaluation of the HSE Management System* will be initiated which will help affiliates in benchmarking against advanced standards to improve their management level. Using the scoring system, the Criteria will not only include laws and regulations and the Company's system requirements, but also reflects the HSE best practices of outstanding enterprises. It will also combine priorities and weaknesses, including rated risk prevention and control, contractor management, risk control, and pollution reduction. To ensure HSE management keeps pace with our daily operations, we will carry out HSE standardization at the grassroots level, which will cover compliance with management and operation procedures, equipment integrity and worksite cleanliness. It will emphasize the importance of risk management & control, focused on the enhancement of execution capability, and standardized our procedures in order to ensure our staff at grassroots level pass the assessments, promote

advanced HSE management concepts and methods to them, and facilitate the continuous improvement of HSE at the grassroots level.

HSE Management System

Frontier Oil Company-1 's Health, Safety and Environment (HSE) management system (see Figure below) provides the framework for managing all aspects of the development.



The management system is a systematic approach, which is designed to:

- Ensure compliance with the law
- Demonstrate that all hazards are adequately managed
- Achieve continuous improvement in HSE performance

This framework facilitates the structured management of HSE hazards and an effect associated with the business, and ensures that mitigate methods are in place for properly controlling the hazards.

ISO BASIS

The management system is structured around the ISO standard framework of:

- plan
- do
- check
- provide feedback

SCOPE

An HSE plan for the White Oil Pipeline will be developed as the development progresses. The plan will include all activities that are within the context of the HSE management system.

LEADERSHIP AND COMMITMENT

Frontier Oil Company-1 believes that strong and visible management leadership is critical for promoting a culture conducive to reducing risks. FOC-1 senior management will provide a leading role towards constant HSE improvement through:

- visible leadership
- communicating the importance of HSE considerations in all business decisions
- communications with stakeholders

Management will work to foster the active involvement of employees and contractors in improving HSE performance by encouraging a positive HSE culture through the following key beliefs in safety:

- The health and safety of people has first priority.
- All injuries and occupational illnesses can be prevented.
- Top management must be committed to safety excellence through visible personal involvement.
- Safety is an integral part of every job and every employee has a responsibility for safety.
- FOC-1 will conduct employee surveys, and will request feedback on the company's ability to provide a safe and healthy workplace.

A solidly implemented HSE management system is an essential foundation for HSE performance. Continuous improvement will only be achieved when management fosters a culture in which business is conducted safely.

Policies and Objectives

Management will use policies to communicate its intentions and expectations to employees, contractors and stakeholders. Policies and commitments to the policies are mandatory for all FOC-1 business activities. Within Frontier Oil Company-1, these policies will be reviewed as part of the formal HSE management review. Examples of policies that will be used for the FOC's White Oil Pipeline include:

- Business Principles and Code of Ethics
- Commitment to Sustainable Development and HSE Policy
- Drug and Alcohol Policy
- Corporate Security Policy
- Respectful Workplace Policy

Objectives

Frontier Oil Company-1 will establish and maintain documented HSE objectives to reflect the company's short and long-term aspirations. These objectives will provide direction for setting targets and are articulated each year in the annual sustainable development report. HSE objectives that will be used for the White Oil Pipeline include:

- obtaining ISO registration for the operating facilities
- protecting soil and groundwater through programs to reduce the potential for spills or leaks
- demonstrating the capability of responding effectively to all emergencies
- avoiding adverse HSE impacts on communities through careful management

Plan Administration

Organization and Resources

The organization and associated resources will be developed to align with the requirements for each stage of the development. Any change to resource levels will be managed as part of the required change control procedure.

Responsibilities and Competency

Within the FOC-1 field organization, all HSE responsibilities will be clearly indicated and all personnel will have adequate training to fulfill their responsibilities. HSE will be a project and operations organizational responsibility, with corporate HSE professionals providing support and advice.

HSE competency for all workers will be developed through a structured process that covers a broad range of requirements. The project will use many of FWO's existing management and assurance processes that have been developed for similar assets, and worker competencies will be periodically reviewed to identify gaps. FOC-1 Operations Training System will be the foundation for training and managing competency during the Operations Phase.

Contractor Management

FOC-1 in HSE management will measure the performance of contractors, suppliers and others who work on the development and support the operations. FOC-1 will use a contractor HSE management system to ensure a high quality of HSE qualification, selection and management. The key steps of the process are:

- qualification
- selection
- pre-job activities
- work management
- post-job evaluation
- systems review

As part of the qualification step, FOC-1 will review each contractor's HSE-management system to ensure that it aligns with FOC-1 HSE management system. Expectations for, and clarity on, roles and responsibilities are critical to achieving an incident-free workplace. FOC-1 will work with local contractors to enhance their HSE management systems to enable them to meet FOC-1 HSE performance requirements and expectations.

Standards

FOC-1 HSE management system will require a number of standards be followed in implementing the plans. For the White Oil Pipeline, these standards include:

- Incident management
- emergency preparedness
- journey management
- task analysis
- risk management
- HSE safeguarding
- system integrity

Document Control

FOC-1 HSE management system will require that document management and control be followed in implementing the plans. The critical documents for the White Oil Pipeline will be the HSE cases and performance data. The HSE plan will address how to update the HSE cases' hazards and effects information as a result of:

- specified review cycles
- job hazard analysis
- emergency drills
- inspections
- incident analysis
- a change in control or procedure
- proactive safety measures

HAZARD AND EFFECTS MANAGEMENT

The HSE management system centres on identifying and managing all HSE hazards. The risk assessment process requires:

- the systematic identification of hazards
- an assessment of the associated risks
- an explicit determination of the controls necessary to manage those hazards and reduce the risks

FOC's hazard and effects management process (see Figure 11-2) is composed of the following steps:

1. Systematically identify hazards, threats and their effects.
2. Assess the risks against specified screening criteria and ensure that it is as low as reasonably practicable.
3. Record the significant hazards and effects in a risk register.
4. Implement suitable measures to reduce and control risks.
5. Plan for recovery if control is lost.

For the White Oil Pipeline, some of hazards that will be encountered are:

- extreme temperatures
- long periods of darkness
- travel, including by helicopter and road
- high-pressure hydrocarbons

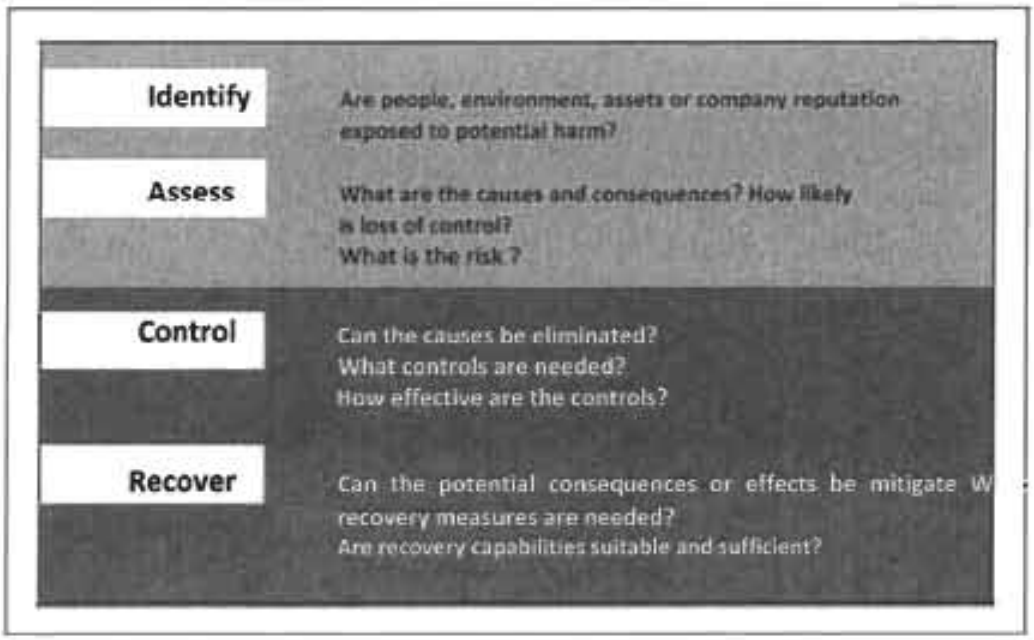


Figure 11-2: Hazard and Effects Management Process

Assessing the risks associated with these hazards:

- is fundamental to the management system
- will be addressed throughout the HSE plan
- will continue throughout the life of the project

FOC-1 will use different risk tools, depending on the phase of the project and the information available. The emphasis in applying these tools is on adopting, where practicable, an inherently safe and minimal environmental impact approach. Some typical assessment tools that FOC-1 will apply to the White Oil Pipeline are:

- HSE&SD assessments
- hazard identification (HAZID)
- environmental impact assessment (EIA)
- socio-economic impact assessment (SEIA)
- safeguarding analysis and review
- hazard and operability review (HAZOP)
- HSE cases

For any hazards assessed as significant, a detailed analysis of the risk will be undertaken. This will include identifying and assessing the controls necessary to reduce the risk to a level that is tolerable.

The final step of managing hazards and effects is identifying and implementing any recovery measures required if a control does not function as planned. Although the focus is to implement necessary controls to adequately reduce risk, contingency planning for recovery measures is a critical step in the management system.

A key deliverable of the HSE plan is the HSE case. The HSE case demonstrates that:

- there is an effective HSE management system in place
- the hazards and effects have been fully identified and are properly managed
- the asset has been designed and is being operated to meet specific health, safety and environmental standards

- the methods used to control hazards and manage the risks have been systematically identified, and appropriate knowledge, experience, controls and verification processes have been applied
- the identified controls and recovery methods are continually assessed and improved by a systematic program of performance monitoring, auditing and reviewing
- there is documentary evidence of all previous points

Figure 11-3 provides an example framework for an HSE case.

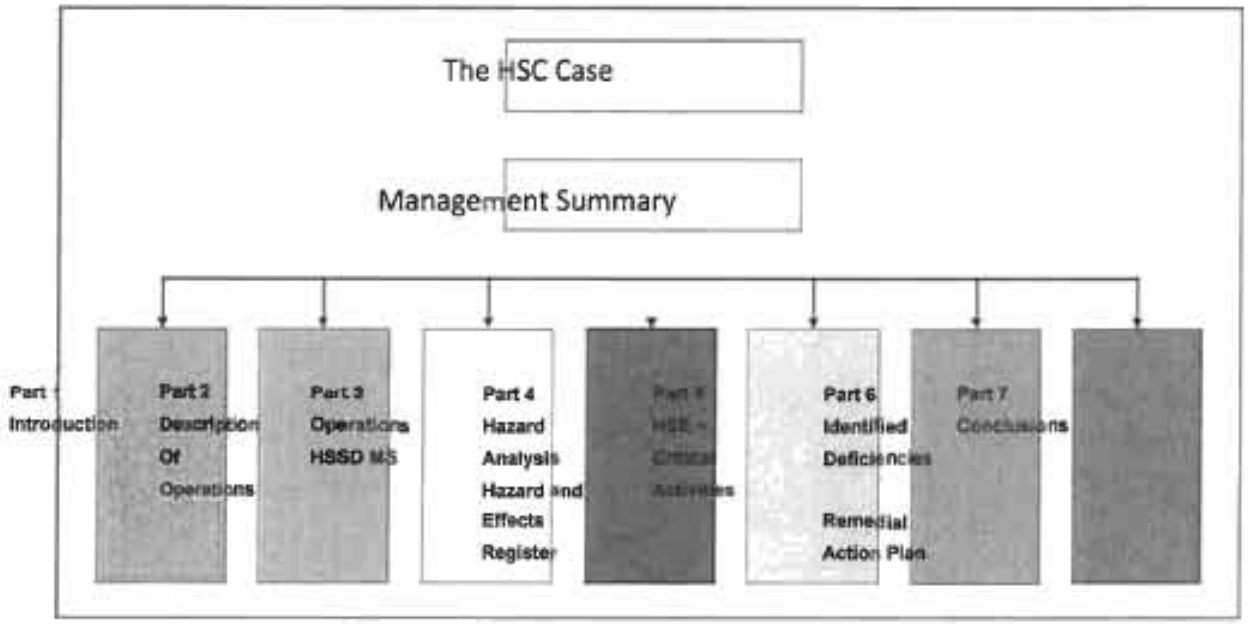


Figure 11-3: HSE Case Structure

For the White Oil Pipeline development, FOC-1 is committed to providing HSE cases for the following key risk activity areas:

- drilling
- construction
- operations

Construction HSE cases will be completed before field execution activities, which are currently planned for 2017. The operations HSE case will be developed on an ongoing basis throughout the design and construction activities and completed before initial operations, currently planned for 2018.

PLANS AND PROCEDURES

Purpose

As a part of the controls and recovery measures identified during the hazards and effects management process, specific plans and procedures will be developed.

These plans and procedures include process-related and management-related activities to address such items as:

- organization, roles and responsibilities
- communication requirements
- competence and training
- asset integrity
- change management
- engineering controls

They will also include task-related activities to address such items as:

- adequacy of personnel resources to do the work
- adequacy of equipment, tools and services for the work

- adequacy of time available to perform the work safely
- specific procedures and methodologies for performing the work safely

Many task level control requirements will be identified during the hazard assessments. The controls will be developed using knowledge and experience that FWO has developed for similar applications, and the best practices of the proven procedures used for other assets.

Contingency and Emergency Planning

Emergency response plans and procedures will be developed as part of the recovery step. FOC-1 will have a fully functioning system in place, for all its assets, that uses the following guiding principles to ensure effective emergency management:

- Create awareness of emergency situations, including the following details, and how they could arise from operations:
  - what hazards exist
  - what consequences can be expected
  - what level of response might be required
  - how operations can be returned safely to normal as soon as possible
- Develop an organization of teams and individuals that have clearly defined responsibilities for implementing an emergency response.
- Develop and define procedures that will deliver an effective and appropriate level of response, including mobilization and contingency plans for specific response situations.
- Conduct training, practice and review activities.

The emergency response plan for White Oil Pipeline will include the following:

- organization, responsibilities, authorities and procedures for emergency response and disaster control, including maintaining internal and external communications

- systems and procedures for preventing, reducing and monitoring environmental effects of emergency actions
- procedures for communicating with authorities, communities, relatives and other affected parties
- systems and procedures for mobilizing third-party resources for emergency support
- arrangements for training response teams and for testing emergency systems and procedures through developed scenarios and drills

The specific emergency response plans for White Oil Pipeline will consider all emergency situations, including:

- fire and explosion
- failure of key controls, such as loss of well control
- structural failures
- work-site injuries
- aviation incidents
- person overboard
- spills and loss of containment
- security breaches
- floods

Incorporated in the White Oil Pipeline design will be emergency response measures and equipment, such as:

- emergency shutdown systems
- fire-fighting devices
- spill clean-up systems and services
- specialist medical treatment available for remote locations
- emergency evacuation procedures

- rescue craft
- first aid equipment, and trained personnel available

Security Planning

For construction and operations, FOC-1 will implement a site security system that conforms to FWO's corporate security policy and procedures. This system will include the security of people and physical and intellectual property, and will be part of the site construction and operations procedures. Once the facilities are operational, they will be equipped with a security and surveillance system, and with appropriate remote monitoring and alarm capabilities.

MONITORING AND PERFORMANCE REPORTING

Monitoring

FOC-1 will develop and maintain procedures for monitoring relevant aspects of HSE performance and for establishing and maintaining records of the performance results. Monitoring includes:

- active monitoring, which includes:
  - information in the absence of any incident
  - progress against plans
  - reviewing the effectiveness of the HSE management system
  - proactive safety measures
  - job observation
- reactive monitoring, which provides information on incidents, including near miss incidents, and insights for future prevention

The monitoring aspects of the White Oil Pipeline HSE plan include:

- regularly monitoring progress towards objectives and targets

- regularly inspecting, according to specific performance criteria, the facilities, plant and equipment
- regularly analyzing discharges, emissions and waste disposal
- systematically observing the work practices and behaviours of workers to assess compliance with procedures and instructions
    - monitoring the health and medical condition of workers
    - monitoring HSE critical activities and processes in alignment with the HSE cases

Incident Reporting and Investigation

FOC-1 will maintain an incident database on HSE performance in alignment with Shell standards. The project will contribute to and use a database that will share relevant information from industry incidents to help avoid recurrences. All workers will be required to follow incident reporting standards and procedures. All HSE incidents and near misses with significant actual or potential consequences will be thoroughly investigated and reported. Any unsafe conditions or unsafe practices that are identified will be immediately stopped until corrected.

The immediate circumstances of the incident and the underlying management system's failures that caused, or contributed to, the incident will be identified in the incident investigation. The procedures for incident investigation are well developed within FOC. All incidents and high-potential-consequence near misses require an appropriate investigation and report to:

- ensure that the full requirements for investigating and reporting are met
- establish the root cause, and identify the required actions to reduce the chance of recurrence
- enable the action plan to be monitored to ensure that it is completed promptly
- provide a factual record of the incident and the recommended actions
- ensure that key findings are shared to prevent recurrence

AUDIT, MANAGEMENT REVIEW AND CORRECTIVE ACTION

Corrective action and improvement are critical components in verifying that the management system is working and identifying areas for improvement. The HSE plan will schedule formal audits, regular monitoring and measurement, and structured management reviews to ensure the continuing suitability, adequacy and effectiveness of the management system. These reviews and audits will incorporate any HSE concerns of employees, contractors and external stakeholders. FOC-1 will be scheduled in the regular internal HSE audit cycle, as these audits are valuable in providing input on key areas for improvement, leading to progressively better HSE management. A protocol will be developed for documenting audit results and remedial action plans that will be followed for FOC-1.

F828114

Annex-L

177

100 Rupees

۱۰۰ روپیہ

SHAKEEL A. SHAIKH STAMP VENDOR
Licence # 34, Shop # 30
Clifton Centre Block-5 Clifton Karachi.
S.No. 21945 Date.......
Issued With Address.......
Through With Address.......
Purpose....... Muhammad Sabir Advocate
Value Rs. 100 Attached... HC ...... Khi
Stamp Vendors Signature.......
(Not use for free will & Divorce Purpose)

04 FEB 2016

(RUPEES ONE HUNDRED ONLY)

UNDERTAKING BY HASCOL PETROLEUM LIMITED FOR THROUGHPUT GUARANTEE OF 3 MILLION METRIC TONS PER ANNUM IN FAVOR OF FOC-1 PIPELINE INFRASTRUCTURE.

It is to undertake that Hascol Petroleum Limited shall provide minimum throughput guarantee of 3 million Metrics Tons per Annum to FOC-1 for its proposed pipeline infrastructure being operated purely on commercial basis.

16/5/2017

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/1/
9TH August 2017

To: **Mr. Abdul Basit**
Registrar
Head Office OGRA
Islamabad
Ph: 051-9244296
Fax: 051-9244413

Subject: **APPLICATION FOR GRANT OF LICENCE FOR CONSTRUCTION AND OPERATION OF NEW OIL PIPELINES**

1. In reference to your letter no. OGRA-6(5)-FOC/2017 dated August 03 2017 on the subject project. Please find attached following information / documents:

		Anx
a.	Audited reports which can clarify the requisite availability of funds	A
b.	Feasibility report of the project (Consisting of 322 pages)	B

Finance Section

2. Regarding point 2 (b) of your letter, we are in negotiations with multiple banks regarding the loan arrangement for the subject project.

3. Forwarded for your information, please.

Major Abdul Majid
GSO-II(BOT)

For further necessary action please
11/8/17

D/R JAED

11 AUG 2017
Diary 1834
OIL & GAS ... ISLAMABAD

15/8

Frontier Works Organization (FWO)
Headquarters FWO 509, Kashmir Road, RA Bazar, Rawalpindi
PH: 92-519271847

HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/1/
8TH August 2017

To: **Mr. Abdul Basit**
Registrar
Head Office OGRA
Islamabad
Ph: 051-9244296
Fax: 051-9244413

Subject: **APPLICATION FOR GRANT OF LICENCE FOR CONSTRUCTION AND OPERATION OF NEW OIL PIPELINES**

1. We are submitting the details of the individual which will be resource person and be respobsible for all coordination and communication. The details of the resource person are as following:

Name: Major Abdul Majid
Mobile No: 03216969313
Email ID: majid313@hotmail.com

2. Forwarded for your information, please.

Frontier Works Organization BOT Dte

Salman Qaisrani
Sr. Director (BOT)

Hnx- B

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THE COMPANIES ORDINANCE, 1984

[PRIVATE] COMPANY LIMITED BY SHARES

MEMORANDUM OF ASSOCIATION

OF

FRONTIER OIL COMPANY-1 (PRIVATE) LIMITED

I. The name of the Company is **FRONTIER OIL COMPANY – 1 (PRIVATE) LIMITED**

II. The Registered Office of the Company will be situated in the province of Punjab.

III. The objects for which the Company is established are all or any of the following subject to the approval of the concerned authorities; which in each of the paragraphs shall be regarded as independent objects, and accordingly, shall in no way be limited or restricted (except where otherwise expressed therein) by reference to or inference from the terms of the any other paragraph, but may be carried out in as full and ample a manner and construed in as wide and liberal a sense, so as to widen and not restrict the powers of the company;

1) To act as a storage facility, depot, warehouse for oil and all kinds of petroleum and petroleum products there from and or acquire and take over the running or likely to be running business of alike nature with or without assets, liabilities, rights, privileges, goodwill, trade mark, registration, or any other.

2) To carry on the business of development of storage facilities of all kinds of petroleum products and oil or any other purpose under the applicable laws;

3) To apply for, tender, offer and accept purchase or acquire any contracts and concessions for or in relation to the project execution, carrying out improvements, management, administration or control of works relating to storage of oil and petroleum products.

4) To carry on all or any of the businesses and activities including provision of all infrastructure facilities for, building, owning, operating, maintaining or transferring the storage facilities for oil and petroleum products.

Frontier Works Organization BOT Dte

5) To carry on all or any of the businesses and activities as the company may from time to time determine in relation to the development, ownership, operation, maintenance and management of the storage facility for the purpose of oil and petroleum products or conducive to the attainment of such businesses and activities;

6) To do anything which a company supplying storage facility services for oil and petroleum products is empowered or required to do under or by virtue of or under a license or any authorization granted according to law and its implementing rules and regulations or any statutory or other instruments and to plan, survey, design, supply equipment, and carry out the planning, development, operation and maintenance.

7) To design, engineer, procure, construct, build, own, install, commission, operate, maintain, manage, transfer, lease, sub-lease the storage facilities with regards to the infrastructure and other incidental activities.

8) To carry on all or any of the businesses of storage facility of oil and petroleum products and all other forms of products or services associated therewith and of promoting their development, sale and market and to perform all other acts which are necessary or incidental to the business of storage facility of oil and petroleum products.

9) To locate, establish, construct, equip, operate, use, manage, and maintain storage facility of oil and petroleum products and or areas through utilizing resources including but not limited to, offices, residences, workshops, plants, printing facilities, warehouses.

10) To locate, establish, construct, equip, operate, use, manage and maintain jetties, ports, ship operations, transporting facilities, storage, loading and unloading facilities and terminals for oil, liquefied natural gas, liquefied petroleum gas, and all petroleum products;

11) To purchase, import, let on hire, exchange, alter, improve, prepare for market and/or otherwise deal in or distribute all kinds of plants, machineries, machine parts, tools, apparatus, raw materials and substances necessary or convenient for carrying on any of the above specified business or other allied marketable commodities;

12) To establish, provide, perform systems, construction services, related technical services, import of technical know-how in the field of planning, development, operation and maintenance of plants for storage facility of oil and petroleum products.

13) For the purposes of storage facility of oil and petroleum product's distribution, installation and of any required infrastructural items provided to

afford access to, support, encase, insulate, and protect from damage or tampering, the aforementioned facility, or to protect people and property from injury or damage, or to comply with any legal obligation and for other purposes associated with the supply of petroleum products and to install all such things and apparatus and items for the purposes of supplying, measuring and controlling light, heat, steam, gas, oil, water, hot water, air-conditioning, and refrigeration, and for associated purposes, including payment for these facilities;

14) To provide or procure the provision of such facilities and services as may be necessary or desirable to planning, development, operation and maintenance of storage facility of oil and petroleum products;

15) To comply with the safety requirements of such storage facility and services as may be necessary or desirable to planning, development, operation and maintenance of such operation for petroleum and its products;

16) To carry on all or any of the businesses of running, operating, managing, supplying and dealing in storing facilities of oil and petroleum products and to provide services, facilities and equipment ancillary to or for use in connection with the same;

17) To buy any raw materials and machinery in connection with the storage of oil and petroleum products installation, maintenance and up gradation;

18) To provide a range of services within the defined area, including;

a) to provide storage facilities of oil and petroleum products

b) to provide in-bonding and ex-bonding of oil and petroleum products

c) to meet the industrial and commercial needs of the country for comprehensive planning, development, operation and maintenance of the supply of oil and petroleum products;

19) To carry on businesses as facilitators of providing storage for oil and all petroleum products

20) To apply for, purchase or otherwise acquire, protect, prolong, extend or renew and to hold in any part of the world any patent rights, trademarks, licences, protections, concessions and intellectual property rights of whatever nature which may appear likely to be advantageous or useful to the Company, and to use and manufacture under or grant licences or privileges in respect of the same, and to expend money in experimenting upon and testing in improving or seeking to improve any patents, inventions or rights

Frontier Works Organization BOT Dte

which the Company may acquire or propose to acquire in relation to the oil storage and transportation;

21) To explore engaging in the design, development, use and maintenance of everything relevant to planning, development, operation and maintenance of machinery, plants and equipment relating to storage facility of oil and petroleum products:

a) Engage in all aspects of planning, development, operation and maintenance of machinery, plants and equipment relating to storage facility of oil and petroleum products

b) Engage in drawing up strategies, policies and methods of implementation thereof, in order to promote planning, development, operation and maintenance storage facilities of oil and petroleum products.

22) To carry on any business which may seem to the Company capable of being conveniently carried on in connection with the existing objects or any of them or calculated directly or indirectly to enhance the value of or render profitable any of the Company's property, rights or interests .

23) In order to achieve its objects, the Company shall exercise the following powers:

(i) To act as a wholly owned subsidiary company Frontier Works Organization;

(ii) To establish and incorporate under the applicable laws special purpose companies, as are required from time to time;

(iii) To finance, plan, develop, operate and maintain the storage facilities of oil and petroleum products or any other projects undertaken by the Company;

(iv) To finance, plan, develop, operate and maintain the storage facilities, oil village, oil depot of oil and petroleum products or any other projects undertaken by the Company

(v) To negotiate concession agreements, joint venture agreements, production sharing agreements, oil and petroleum products storage agreement sale and purchase agreements, insurance agreements, licenses, contracts for works, land lease agreements, land acquisition agreements, development agreements, lease agreements, engineering, procurement and construction contracts, operation and maintenance agreements, shared facilities agreements, financing agreements, transportation contracts, transmission agreements, project

Frontier Works Organization BOT Dte

agreements, public private partnership agreements, settlement agreements, deed of release, guarantee agreements, termination agreements, sale and purchase agreements, any other agreements required, necessary, ancillary and incidental to the objects;

(vi) To enter into concession agreements, products storage agreement, joint venture agreements, production sharing agreements, insurance agreements, sale and purchase agreements, licenses, contracts for works, land lease agreements, land acquisition agreements, development agreements, lease agreements, engineering, procurement and construction contracts, operation and maintenance agreements, shared facilities agreements, financing agreements, transportation contracts, transmission agreements, project agreements, public private partnership agreements, settlement agreements, deed of release, guarantee agreements, termination agreements, any other agreements required, necessary, ancillary and incidental to the objects;

(vii) To issue expression of interest, request for proposals, bidding documents, letter of interest, letter of award, letter of support, memorandum of understanding, comfort letters, support letters;

(viii) To obtain, maintain all the consents, approvals, authorizations, permissions, incentives, concessions, licenses required and obligatory from the public authorities under the law for the businesses and activities including development, operation and management of storage facility of oil and petroleum products;

(ix) To apply for and obtain necessary consents, permissions and licenses from any Government, Provincial, Local, Foreign, Multilateral or other authorities or entities for enabling the Company to carry any of its objects into effect or for extending any of the powers of the Company or for effecting any modification of the constitution of the Company or for any other purpose which may seem expedient, and to enter into arrangements with any Government or authorities, foreign, federal, provincial, municipal, local or otherwise, public or quasi-public bodies, or with any other persons, in any place where the Company may have interests that may seem conducive to the objects of the Company or any of them and to obtain from any such Government, authorities, or persons any rights, privileges and concessions which the Company may think fit to obtain and to carry out, exercise and comply therewith;

(x) To open accounts with any bank(s) and to draw, make, accept, endorse, execute, issue, negotiate and discount Cheques, promissory notes, bills of exchange, bills of lading, warrants, deposit notes,

debentures, letter of credit and other negotiable instruments and securities;

(xi) To create, establish, administer and manage funds including endowment fund conducive for the promotion of the objects of the Company;

(xii) To seek, appeal, solicit or accept sponsorship, equity, budget allocations from the government, aid, loans, advances, investments, profits, contributions, grants and, in cash or in kind, from local and/or international lawful sources including but not limited to banks, financial institutions, government, private partners, sponsors, oil marketing companies and to apply the same or income thereof for the objects of the Company;

(xiii) To borrow or raise money, with or without security, arrange local and foreign currency loans from scheduled banks, industrial banks and local and International Financial Institutions, including HBFC, required for the purposes of the Company, including purchase, manufacture, market, supply, export and import of machinery, construction of factory, plants, building and for the purpose of working capital or for any other purpose, upon such terms and in such manner as may be determined by the Company for the promotion of its objects, and in particular by:

(xiv) the issue of perpetual or redeemable and convertible or non-convertible PTCs, TFCs, debentures, or debenture stock (perpetual or otherwise), bonds, promissory notes, bills of exchange, and such other securities;

(xv) hypothecating, charging and mortgaging all or any of the properties and assets (both present and future) of the Company and creating pledge on such properties;

(xvi) furnishing and executing guarantee for and on behalf of the Company to secure its liability or of any associated company incorporated under the relevant provisions of the law in favor of any bank or financial institution and to offer the assets of the Company as security to the said bank or financial institution and to create a charge or lien against the assets of the Company making itself liable as a guarantor in the transaction of the said associated company with the banks or financial institutions;

(xvii) appointing attorneys, and giving them powers and authority for executing documents, registering documents, selling and managing the properties, undertaking any business of the Company and furnishing and creating such other securities as may be considered

expedient; and for the purposes aforesaid, or otherwise, execute, complete and deliver agreements and such other documents as may be required;

(xviii) To accumulate funds and to invest and deal with the surplus moneys of the Company not immediately required in such a manner as may from time to time be determined by the Company;

(xix) To execute directly, or by contributions or other assistance or particular, any works, undertakings, projects or enterprises, on the security whereof or any profits or emoluments derivable, the Company shall have invested money, encumbered capital, or engaged its credits;

(xx) To acquire, (whether by purchase, lease, concession, grant, hire or otherwise), charter, lease, take or let on hire, operate, use, employ or turn to account, build, equip, service, repair, maintain, and supply motor vehicles, railways locomotives, ships, barges, wagons, trucks, vessels, and craft of any description, engineering plants and machinery, and parts and accessories of all kinds, and to carry on the business of storage contractors, freight contractors, carriers by land, water and air of freight and passengers, forwarding agents, shipping agents and agents of any other kind, in so far as such activities are incidental to or necessary for the generation, transmission, transformation, supply and distribution of electricity;

(xxi) To acquire the goodwill of any business within the objects of the Company, and any land, privileges, rights, contracts, property or effects, held or used in connection therewith, and upon any such purchase to undertake the liabilities of any company, association, partnership or person;

(xxii) To purchase, take on lease or in exchange, hire, apply for or otherwise acquire and hold for any interest, any rights, privileges, lands, building, easements, obtain licenses, trademarks, patents, patent right, copyrights, or any secret or other information as to any invention which may seem capable of being used for any of the purposes of the Company, or the acquisition of which may seem calculated directly or indirectly to benefit the Company, or acquisition of machinery, plants, stock-in-trade, and any movable and immovable property of any kind necessary or convenient for the purposes of or in connection with the Company's business or any branch or department thereof and to use, exercise, develop, grant licenses in respect of or otherwise turn to account any property, rights, and information so acquired, subject to any permission required under the law, property of any description which the

Company may deem necessary or which may seem to the Company capable of being turned to account;

(xxiii) To acquire and carry on all or any part of the business or property of the Company and to undertake any liabilities of any person, firm, association or company's possession of property suitable for any of the purposes of the Company or carrying on any business which this Company is authorized to carry on and in consideration for the same, to pay cash or to issue Shares of the Company;

(xxiv) To purchase, sell, exchange, take on lease, dispose of on lease, hire or otherwise acquire lands or buildings, construct, maintain or alter any building and any other moveable or immovable properties or any right or privileges necessary or convenient for the use and purposes of the Company;

(xxv) To design, engineer, procure, construct, build, own, lease, install, commission, operate, maintain, manage power park comprising of disposal and storage facilities including for the storage of oil and petroleum products, common infrastructure facilities etc. and any other required infrastructure and facilities for storage of oil and petroleum products;

(xxvi) To sell, improve, manage, develop, exchange, pledge, mortgage (with or without power of sale), let out or otherwise grant license, easements, options, services and other rights over or in any other manner deal with or dispose of the undertakings, movable and immovable properties, assets, rights and effects of the Company, or any part thereof, for such consideration as may be thought fit, and in particular for equity funds and other funds, Shares, debentures, debenture stock or other obligations, or securities of any other company;

(xxvii) To acquire, take on lease, own, develop, licence, equip, maintain, or operate information technology, telecommunications technology or software independently of or in conjunction with any other party;

(xxviii) To nominate and send delegates, officers and advisors to represent the Company for training or specialization in any industry or at conferences, symposia, seminars, government bodies/entities and other gatherings throughout Pakistan and/or anywhere in the World in the interest of the Company;

(xxix) To carry out joint venture agreements with other companies, associations, organizations, Institutions or countries within the scope of the objects of the Company in the private sector, public sector or public private partnership basis;

(xxx) To enter into partnership, arrangement, to amalgamate, or merge movable with immovable and/or to buy on all interests, assets, liabilities, stocks, or to make any arrangement for sharing profits, union of interests, co-operation, joint-venture, reciprocal concession or otherwise, with any person, firm or company carrying on or proposing to carry on any business which this Company is authorized to carry on or which is capable of being conducted so as directly or indirectly to benefit this Company and to have foreign collaborations and to pay royalties/technical fees to collaborators subject to the provisions of the Companies Ordinance, 1984;

(xxxi) To enter into working arrangements of all kinds with other companies, corporations, firms, interests, persons, and also to make and carry into effect arrangements with respect to merger, union of or amalgamation, either in whole or in part, or any other arrangements with any other companies, corporations, firms, or persons;

(xxxii) To enter into arrangements with the government or any authority (supreme, municipal, local or otherwise) or any corporation, company, or persons that may seem conducive to the Company's objects or any of them and to obtain from any such government, authority, corporation, company or person any charters, contracts, decrees, rights, privileges, grants, and concessions which the Company may think desirable and to carry on exercise and comply with any such charters, contracts, decrees, rights, privileges and concessions;

(xxxiii) To carry on (except for the managing agent) and act as representatives, for any person, firm or company etc. and to undertake and perform sub-contracts, and also act in the business of the Company through or by means of agents, sub-contractors and to do all or any of the things mentioned herein in any part of the world and either alone or in collaboration with others and by or through agents, sub- contractors, or otherwise;

(xxxiv) To establish and maintain or procure the establishment and maintenance of any contributory or non-contributory pension or superannuation funds for the benefit of, and give or procure the giving of donations, gratuities, pensions, allowances or emoluments to such persons who are or were at any time in the employ or service of the Company, or of any company which is a holding company or subsidiary of the Company or is allied to or associated with the Company or with any such subsidiary or affiliate company, or who are or were at any times Directors of officers of the Company or of any such company as aforementioned, and the wives, widows, families and qualified dependents of such persons, and to establish,

promote or assist in establishing or promoting, subsidize and subscribe to institutions, associations, clubs or funds calculated to be for the benefit of or to advance the interests and well-being of the Company or of any such other company as aforementioned, and make payments to or towards the insurance of any such person as aforementioned and do any of the matters as aforementioned, either alone or in conjunction with any such other company as aforementioned;

(xxxv) To establish and support or aid in the establishment and support of associations, institutions, funds and conveniences calculated to benefit persons who are or have been Directors of or who have been employed by or who are serving or have served the Company or any other Company which is a subsidiary or associate of the Company or the dependents or connection of such persons and to grant pensions, gratuities, allowances, relief and payments in any other manner calculated to benefit the persons described herein;

(xxxvi) To enter into contracts with its salaried employees, including a chief executive who, prior to his appointment as such, was not a director of the Company or of its subsidiary, and to provide for such other financial assistance to said employees or workers under personnel rules and regulations that the Company may subsequently adopt;

(xxxvii) To pay out of the funds of the Company all costs, charges, and expenses preliminary or incidental incurred in formation or about the promotion licensing, registration, establishment and management of the Company and to remunerate any person, firm or company for services rendered or to be rendered in or about the formation or promotion of the Company or the conduct of its business and to do all other such lawful acts and things as are incidental or conducive to the attainment of its objects;

(xxxviii) To establish or promote or concur or participate in establishing or promotion of any (associated) company, from such businesses, assets, properties & rights as managed by the Company from time to time, whose objects are similar or in part similar to the objects of this Company or the establishment or promotion of which may be beneficial to the Company, or whose objects shall include the acquisition of all or any of the property or liabilities of the Company or the promotion of which may seem, directly or indirectly, calculated to benefit the Company as permissible under the law;

(xxxix) To procure the license and registration or other recognition of the Company in any country, state or place, and to establish and regulate agencies for the purpose of the Company's business and to apply, or join in applying, to any parliament, Government, local municipal or

other authority or body, in any jurisdiction, for any laws, decrees, concessions, orders, rights or privileges that may seem conducive to extend the Company's objects, or any of them, or effecting a variation in the constitution of the objects, business or undertakings of the Company, and to oppose any proceedings or applications which may seem calculated directly or indirectly to prejudice the Company's interests;

(xl) To negotiate agreements, contracts and arrangements with organizations, institutions, bodies and individuals for the purpose of carrying out the functions and activities of the Company;

(xli) To get insurance of the property, assets and employees of the Company in any manner deemed fit by the Company, and to create any reserve fund, sinking fund, insurance fund, or any other special fund whether for depreciation or for repairing, insuring, improving, extending or maintaining any of the properties of the Company or for any other purpose conductive to the interests of the Company, but not to act as insurance company;

(xlii) To institute, and defend any claims, suits, petitions, litigation, or proceedings before the national and foreign courts, and arbitration fora, and participate in the dispute resolution, and settlement of claims and disputes;

(xliii) To take such actions as are considered necessary to raise the status or to promote the efficiency of the Company;

(xliv) To print and publish any books or leaflets that the Company may think desirable;

(xlv) To adopt such means of making known the business and products and services of the Company as seem expedient and in particular by advertisement in the print and electronic media;

(xlvi) To conduct, hold and arrange symposia, seminars, conferences, road shows, investment conferences, lectures, workshops and dialogue and to print, publish and prepare journals, magazines, books, circulars, reports, catalogues and other works relating to any of the objects of or to the work done by the Company, subject to the permission, if required of the relevant authorities;

(xlvii) To cease carrying on or wind up any business or activity of the Company and to cancel any registration of and to wind up or procure the dissolution of the Company in any state or territory and to dispose by any means of the whole or any part of the property and/or assets of the Company or of any interest therein including but not

limited to such assets on trust to the Company and to distribute in specie in specie or in any manner, whatsoever, by way of dividends or bonus or reduction of capital all or any of the property or assets of the Company among its members, and particularly, but without prejudice to the generality of the foregoing, securities of the assets or liabilities of the Company or any proceeds of sale or other disposal of any property or assets of the Company, in case of winding up of the Company, all in accordance with the applicable laws of Pakistan;

(xlviii) To resolve disputes by negotiation, conciliation, mediation, arbitration, litigation, or other means, judicial or extra-judicial, and to enter into compromise agreement with creditors, members and any other person in respect of any difference or dispute with them and to exercise the power to sue and be sue and to initiate or oppose all actions, steps, proceedings, or applications which may seem calculated directly, or indirectly to benefit or prejudice, as the case may be, the interest of the Company or of its members;

(xlix) To make rules or regulations not inconsistent with this Memorandum and to provide for all matters for which provision is necessary or expedient for the purpose of giving effect to the provisions of this Memorandum and the efficient conduct of the affairs of the Company;

(l) To take such steps as may be necessary to give the Company the same rights and privileges in any part of the world as are possessed by local companies of a similar nature; and

(li) To do all other such lawful acts and things as are incidental or conducive to the attainment of the above objects or any one of them.

24). The Company shall achieve the above said objects subject to the following conditions:-

i. The Company is formed as a Private Company Limited by Shares;

ii. No change in the Memorandum and Articles of Association shall be made except with the prior approval of the Securities and Exchange Commission of Pakistan (the 'SECP');

iii. Notwithstanding anything stated in any object clause, the Company shall obtain such other licenses, permissions, or approvals of the relevant public authorities as may be required under any relevant statutory regulations and laws for the time being in force, to carry out its specific object;

iv. The Company shall comply with such conditions as may be imposed by the SECP from time to time; and

25) It is declared that notwithstanding anything contained in the foregoing object clauses of this Memorandum of Association nothing contained therein shall be construed as empowering the Company to undertake or to indulge in business of security service, payment system, Reit management services, Electronic funds transfers in and outside Pakistan, deposit taking from general public, network marketing, referral marketing & direct selling banking company, leasing investment, managing agency, insurance business, any of the NBFC business, multi-level marketing (MLM), pyramid and Ponzi scheme, commodity, future contract or shares trading business locally or internationally, directly or indirectly as restricted under the law or any unlawful operation.

IV. The liability of the members is limited.

V. The Authorized Share Capital of the Company is PKR. One Lac (100,000) divided into One Thousand only (1000) Ordinary Shares of PKR.100 (Pak Rupees One Hundred) each with power to increase or reduce the Capital and to divide the Shares in the Capital for the time being into several classes and to attach thereto respectively such rights, privileges and conditions as may be determined by or in accordance with the regulations of the Company, and to vary, modify or abrogate any such rights, privileges or conditions in such manner, as may for the time being be provided by the regulations of the Company in accordance with law; provided, however, that rights as between various classes of ordinary Shares, if any, as to profits, votes and other benefits hall be strictly proportionate to the paid-up value of Shares.

Frontier Works Organization
BOT Dte

We, whose names and addresses are subscribed herein below, are desirous of being formed into a Company in pursuance of this Memorandum of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company, as set opposite our respective names:-

Sr. No.	Name & Surname (present and former in full)	NIC No.	Father's Name in full	Nationality (ies) with any former Nationality	Occupation	Residential/ Registered address in full	Number of Ordinary Shares taken by each Subscriber	Signatures
1.	M/s Frontier Works Organization (FWO) Through Sardar Salman Sher Qaisrani	35201-9945895-7	Sardar Rashid Ahmed Qaisrani	Pakistan Pakistani	Company Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	997 (NINE HUNDRED NINETY SEVEN)	
2.	Muhammad Afzal	34202-2385058-5	Adalat Hussain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	
3.	Syed Waqar Hasnain	37201-1659988-5	Syed Dildaar Hasnain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	

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4.	Muhamad Amir Khan	17301-0699294-7	Muhammad Khalid Khan	**Pakistani**	**Business**	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	
	Total Shares						1000 (One Thousand)	

Dated: 3rd day of September, 2016

WITNESS to above signatures:

National Institutional Facilitation Technologies Pvt. Ltd

5th Floor, AWT Plaza II Chundrigar Road, Karachi, Pakistan

Frontier Works Organization BOT Dte

CERTIFIED TO BE TRUE COPY

Muhammad Tariq Rasheed

Assistant Registrar

Company Registration Office Islamabad

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THE COMPANIES ORDINANCE, 1984

[PRIVATE] COMPANY LIMITED BY SHARES

ARTICLES OF ASSOCIATION

OF

FRONTIER OIL COMPANY-1 (PRIVATE) LIMITED

PRELIMINARY

1. TABLE 'A' TO APPLY

Subject as hereinafter provided, the Regulations contained in Table 'A' of the First Schedule to the Companies Ordinance, 1984, (hereinafter referred to as Table 'A') shall apply to the Company so far as those are applicable to Private Limited Companies, with the exception of those provisions of the Regulations which are inconsistent herewith.

2. DEFINITIONS

The marginal notes hereto shall not effect the construction hereof, and in these Articles unless there is something in the subject or context inconsistent therewith:

a. '**Articles**' means the Articles of Association of the Company as originally framed or as from time to time altered by special resolution;

b. '**Board**' means the Board of Directors of the Company appointed from time to time pursuant to these Articles;

c. '**Chairman of the Board**' means the Chairman of the Board appointed from time to time pursuant to these Articles;

d. '**Chief Executive**' means the Chief Executive of the Company;

e. '**Company**' means Frontier Oil Company – I (Pvt.) Limited;

f. '**Directors**' means includes any person occupying the position of a director for the time being of the Company, by whatever name called;

g. '**Dividend**' includes bonus shares;

h. '**FWO**' means the Frontier Works Organization

i. '**General Meeting**' means a meeting of the members of the Company which is properly convened and properly complies with notice of meeting and quorum requirements and may be either an Annual General Meeting or an Extraordinary General Meeting;

j. '**Memorandum**' means the Memorandum of Association of the Company;

k. '**Month**' means the calendar month according to the Gregorian Calendar;

l. '**Office**' means the Registered Office for the time being of the Company;

m. '**Ordinance**' means the Companies Ordinance, 1984 or any statutory modification or re-enactment thereof for the time being in force;

n. '**Person**' includes an individual, company, corporation and body corporate;

o. '**Proxy**' includes an agent or attorney duly constituted under an instrument of proxy or a duly executed power of attorney;

p. '**Register**' means the Register of the members to be kept in pursuant to the provisions of Section 147 of the Ordinance;

q. '**Registrar**' means the Registrar of Companies;

r. '**Seal**' means the Common Seal of the Company;

s. '**SECP**' means the Securities and Exchange Commission of Pakistan;

t. '**Secretary**' means the Company Secretary of the Company;

u. '**Shares**' means the ordinary shares of the Company's share capital par value PKR. 10 each and in issue at any point in time and include Class A Shares and Class B Shares;

v. '**Special Resolution**' means the special resolution of the Company as defined in Section 2(1)(36) of the Ordinance; and

w. '**Year**' used in the context of financial matters shall mean financial year of the Company.

3. INTERPRETATION

In these Articles, unless the context otherwise requires:-

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a. Provisions bearing on transfer or transmission of Shares, meetings, voting in person or by proxy, management, and the appointment, powers and removal of Directors, and employees of the Company shall be read subject to the provisions of Section 183 relating to power of control by a holding company over its subsidiary;

b. The headings are for convenience only and do not constitute part of these Articles and shall not be used in construing these Articles;

c. References to any Act, Ordinance, legislation, Rules or Regulations or any provisions of the same shall be a reference to that Act, Ordinance, legislation, Rules or Regulations or provision, as amended, re-promulgated or suspended from time to time;

d. Expressions referring to writing shall, unless the contrary intention appears, be construed as including references to typewriting, printing, lithography, photography and other modes of representing or reproducing words in visible form;

e. The terms 'include' or 'including' shall mean include or including without limitation;

f. Words importing the singular number include the plural number and *vice versa* and words denoting any gender shall include all genders

g. Words importing persons shall include bodies corporate; and

h. Unless the context so otherwise requires, words or expressions contained in these Articles shall be of the same meaning as in the Ordinance or any statutory modification thereof in force at the date at which these Articles become binding on the company.

PRIVATE COMPANY

4. COMPANY TO BE A PRIVATE COMPANY

The Company is a Private Company limited by Shares, and may function accordingly and exercise all powers of a [Private] Company.

THE BUSINESS OF THE COMPANY

5. THE BUSINESS OF THE COMPANY

The business of the company shall include all or any of the objects enumerated in the Memorandum of Association; and shall be carried out at such place or places anywhere in Pakistan or elsewhere as the Directors may deem proper or advisable from time to time.

CAPITAL

6. CAPITAL

The Authorized Share Capital of the Company is PKR.[1,00,000] (Pak Rupees One Hundred Thousand) divided into [One Thousand] (1000) Ordinary Shares of PKR.100 (Pak Rupees Hundred) each with power to increase or reduce the Capital and to divide the Shares in the Capital for the time being into several classes and to attach thereto respectively such rights, privileges and conditions as may be determined by or in accordance with the regulations of the Company, and to vary, modify or abrogate any such rights, privileges or conditions in such manner, as may for the time being be provided by the regulations of the Company in accordance with law; provided, however, that rights as between various classes of ordinary Shares, if any, as to profits, votes and other benefits hall be strictly proportionate to the paid-up value of Shares.

7. POWER TO INCREASE CAPITAL

Subject to the provisions of these Articles, the Company in General Meeting may from time to time by special resolution increase the share capital by such sum to be divided into Shares of such amount as may be deemed appropriate. The new Shares shall be subject to the same provisions with reference to transfer and transmission as the Shares in the original share capital.

8. REDUCTION OF CAPITAL AND HOW CARRIED INTO EFFECT

Subject to Sections 96 and 97 of the Ordinance and these Articles, the Company may from time to time by special resolution reduce its share capital in any way and in particular (without prejudice to the generality of the power) by paying off capital or cancelling any paid-up capital, which has been lost or is unrepresented by available assets or extinguishing or reducing the liability on any of its Shares in respect of share capital not paid-up or otherwise as may seem expedient and capital may be paid off upon the footing that it may be called up again or otherwise and paid up capital may be cancelled as aforesaid without reducing the nominal amount of the Shares by the like amount to the extent that the unpaid and callable capital shall be increased by the like amount.

SHARES

9. CONTROL OF DIRECTORS

Subject to the provisions of Section 183 of the Ordinance, the Shares shall be under the control of the Directors who may allot or otherwise dispose of the same to such persons, on such terms and conditions and at such times, as they thinks fit.

10. Fully paid Shares shall be allotted to all subscribers in the first instance and the Company shall not be bound to recognize any equitable, contingent, future or partial claim to or interest in a Share on the part of any person other than the registered share holder, save as herein provided or saves as ordered by some Court of competent jurisdiction.

11. SUBDIVISION OR CONSOLIDATION OF SHARES

Subject to the provisions of Section 92 of the Ordinance and these Articles, the Company may by special resolution alter the conditions of its Memorandum so as to:

a) increase its share capital by such amount as it thinks expedient;

b) consolidate and divide the whole or any part of its share capital into Shares of larger amount than its existing Shares;

c) sub-divide its Shares, or any of them, into Shares of smaller amount than is fixed by the Memorandum;

d) cancel any Shares, which at the date of passing of the resolution in that behalf, have not been taken or agreed to be taken by any person, and diminish the amount of its share capital by the amount of Shares so cancelled.

Provided that, in the event of consolidation or sub-division of Shares, the rights attaching to the new Shares shall be strictly proportional to the rights attaching to the previous Shares so consolidated or sub-divided;

Provided further that, where any Shares issued are of a class which is the same as that of Shares previously issued, the rights attaching to the new Shares shall be the same as those attaching to the Shares previously held.

12. The new Shares issued by the Company shall rank *pari passu* with the existing Shares of the class to which the new Shares belong in all matters including the right to such bonus or right issue and dividend as may be declared by the Company subsequent to the date of issue of such new Shares.

13. LOANS ADVANCES FOR PURCHASE OF COMPANY'S SHARES PROHIBITED

Except to the extent permitted by Section 95 of the Ordinance, no part of the funds of the Company shall be employed in the purchase of any Shares of the Company and the Company shall not give whether directly or indirectly and whether by means of a loan, guarantee, the provisions of security or otherwise any financial assistance for the purchase of or in connection with a purchase made or to be made by a person of any Shares of the Company or give any loan upon the security of any Shares of the Company.

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14. PERSONS IN WHOSE NAMES SHARES TO BE REGISTERED

Shares may be registered in the name of any limited Company or other corporate body but not in the name of a minor or a firm. Not more than four persons shall be registered as joint-holders of any Shares.

15. THE FIRST NAMES OF JOINT HOLDERS OF SHARES

If any Share stands registered in the name of two or more persons the person first named in the Register shall as regards receipt of dividend or bonus or service of notice and all or any other matters connected with the Company except voting at the meeting and the transfer of Shares be deemed the sole holder. In the case of the death of anyone or more of the persons named in the Register as the joint-holders of any Share the survivor or survivors shall be the only person or persons recognized by the Company as having any title to or interest in such Share but nothing herein contained shall be taken to release the estate of a joint-holder from any liability on Shares held by him jointly with any other person.

16. TRANSFER AND TRANSMISSION OF SHARES

No Share can be mortgaged, pledged, sold, hypothecated, transferred or disposed of by any member to a non-member without the previous sanction of the Board. The Directors may decline to register any transfer of shares to transferee of whom they do not approve and shall be bound to show any reasons for exercising their discretion subject to the provisions of Section 77 and 78 of the Ordinance. The legal heirs, executors or administrators of a deceased holder shall be the only persons to be recognized by the Directors as having title to the Shares. In case of Shares registered in the name of two or more holders, the survivors and the executors of the deceased shall be the only persons to be recognized by the Company as having any title to the Shares.

CERTIFICATE

17. MEMBER'S RIGHT TO CERTIFICATE

Every person whose name is entered as a member in the Register shall be without payment entitled to receive within ninety (90) days after allotment or within forty-five (45) days of the application for registration of transfer, a certificate under Seal specifying the Share or Shares held by him and the amount paid-up thereon, including in particular and without limitation, such legends as the Company shall be obliged to affix to certain classes of Share Certificates as provided by law or as the Company shall have agreed to affix pursuant to any contractual arrangement in this regard, and upon payment of such charges if any as the Directors may determine for every certificate after the first.

18. CERTIFICATES

The certificates of title of Shares and duplicates thereof when necessary shall be issued under the Seal and signed by two Directors or by one Director and the Secretary.

19. ONLY ONE CERTIFICATE FOR EACH SHARE

The Company shall not be bound to issue more than one share certificate in respect of a Share or shares held jointly by two or more persons and delivery of a certificate for a Share to anyone joint-holder shall be sufficient delivery to all.

20. The Company shall not be bound to register more than four persons as joint-holders of any Share.

21. DELIVERY OF CERTIFICATE

The Company shall within ninety days after the allotment of its Shares and within forty five days after the date on which the application for the registration of transfer has been lodged, complete and have ready for delivery the certificates of all Shares allotted or transferred and shall serve notice to the member unless the condition of issue of the Shares otherwise provide.

22. REPLACEMENT OF CERTIFICATE

If any certificate shall be worn out, defaced, destroyed or lost or if there is no further space on the back thereof for endorsement of transfer it may be renewed or replaced on payment of such sum not exceeding two rupees as the Directors may from time to time prescribe; provided, however, that such new certificate shall not be granted except upon delivery of the worn out or defaced or used up certificate for the purpose of cancellation or upon proof of destruction or loss to the satisfaction of the Directors and on such indemnity as the Directors may deem adequate in the case of a certificate having been lost or destroyed. Any renewed certificates shall be marked as such.

23. TRUST NOT RECOGNIZED

24. Except as required by law, no person shall be recognized by the Company as holding any Share/s upon trust, and the Company shall not be bound by or be compelled in any way to recognize (even when having notice thereof) any equitable, contingent, future or partial interest in any Share or any interest in any fractional part of a Share (except only as by these Articles or by law otherwise provided) any other rights in respect of any Share except an absolute right to the entirety thereof in the registered holder.

25. PAYMENT OF COMMISSION

The Company may at any time pay a commission to any person for subscribing or agreeing to subscribe (whether absolutely or conditionally) for any Shares, debentures or debenture-stock in the Company or procuring or agreeing to procure subscriptions (whether absolutely or conditionally) for any Shares, debentures or debenture-stock in the Company; Provided, that, if the commission in respect of Shares shall be paid or payable out of Capital, the statutory requirements and conditions shall be observed and complied with, and the amount or rate of

commission shall not exceed such percentage on the Shares, debentures or debenture-stock in each case subscribed or to be subscribed, as may be determined by the Board, subject to any limits required by law. The Commission may be paid or satisfied, either wholly or partially, in cash or in Shares, debentures or debenture-stock. The Company may also on any issue of Shares pay such brokerage fees as may be lawful; Provided that such brokerage fees shall not exceed such percentage of the Shares, debentures or debenture-stock paid-up as may be determined by the Board, subject to any limits required by law.

TRANSFER AND TRANSMISSION OF SHARES

26. TRANSFER/TRANSMISSION AND ENCUMBRANCE OF SHARES

A transfer and transmission of Shares by any member may be subject to the approval of the Board, which may be withheld in their absolute discretion subject to law.

The Members shall not undertake or permit any change in control unless such change in control:

(a) is required by any applicable laws or by the operation of the applicable laws or by order of a court, tribunal, or Government Authority with appropriate jurisdiction; or

(b) is affected with the prior written approval of FWO

27. FORM OF TRANSFER OF SHARES

The Shares in the Company shall be transferred in any usual or common form which the Directors shall approve.

28. The instrument of transfer of any Share in the Company shall be executed both by the transferor and transferee, and the transferor shall be deemed to remain the holder of the Share until the name of the transferee in entered in the Register in respect thereof.

29. TRANSMISSION

The executors, administrators, heirs or nominees, as the case may be, of a deceased sole holder of a Share shall be the only persons recognized by the Company as having any title to the Share. In the case of a Share registered in the names of two or more holders, the survivor or survivors shall upon proof of his right of succession be the only person or persons recognized by the Company as having any title to the Share.

30. RIGHTS OF PERSON ENTITLED BY TRANSMISSION

A person becoming entitled to a Share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would have been entitled if he were the registered holder of the Share, except that he shall not, before being registered as a

member in respect of the Share, be entitled in respect of it to exercise any right conferred by membership in relation to meetings of the Company.

LIEN

31. LIEN

The Company shall have a first and paramount lien on all Shares and dividends payable thereon for all moneys owed (whether presently payable or not) by a member or his estate to the Company: Provided that the Directors may at any time declare any Share to be wholly or in part exempt from the provisions of this Article.

32. POWER TO SELL

The Company may sell in such manner as the Directors may think fit any Shares on which the Company has a lien but no sale shall be made unless such sum in respect of which the lien exists is presently payable nor until the expiration of fourteen days after a notice in writing stating and demanding payment of such part of the amount in respect of which the lien exists as is presently payable has been given to the registered holder for the time being of the Share or the person entitled thereto by reason of the death or bankruptcy of the registered holder. For giving effect to any such sale the Directors may authorize some person to transfer the Shares sold to the purchaser of the shares comprised in any such transfer and he shall not be bound to see to the application of the purchase in money nor shall his title to the Shares be affected by any irregularity or invalidity in the proceedings in reference to the sale.

33. PROCEEDS OF SALE

The proceeds of the sale shall be received by the Company and applied in payment of such part of the amount in respect of which the lien exists as is presently payable and the residue shall (subject to a like lien for sums not presently payable as existed upon the Shares prior to the sale) be paid to the person entitled to the Shares at the date of the sale.

MEMBERSHIP

34. The number of members with which the Company proposes to be registered is [six (06)], and the minimum number of members shall not be, at any time, less than [two]

35. However, the Directors may, from time to time, whenever the Company or the business of the Company requires, increase the number of members.

36. The Company in its General Meeting may from time to time lay down the qualifications and conditions subject to which any person or class of persons shall be admitted to membership of the Company.

37. The rights and privileges of a member shall not be transferable and shall cease on his death or otherwise ceasing to be a member.

38. The subscribers to the Memorandum and such other persons as the Directors shall admit to membership shall be members of the Company.

39. One person shall have the right to hold one membership.

ADMISSION TO MEMBERSHIP

40. The application for seeking membership of the Company shall be required to be seconded by an existing member whereupon the Board shall decide the matter of his admission as member or otherwise within three (03) Months of making of such application. No minor or lunatic shall be admitted as a member of the Company.

41. Every person, upon applying for admission to membership, shall sign an undertaking that he will, if admitted, so long as he is a member, duly observe the Articles of the Company for the time being in force.

42. The Board shall subject to the Articles, accept or reject any application for admission to membership. The Board's decision shall be final and it shall not be liable to give any reasons thereof.

CESSATION/EXPULSION FROM MEMBERSHIP

43. A member renders himself liable to expulsion or suspension by the Board if:

a. he refuses or neglects to give effect to any decision of the Board; or

b. he infringes any of the regulations of the Articles; or

c. he is declared by a Court of competent jurisdiction to have committed a fraud, or to be bankrupt, or to be insane or otherwise incompetent; or

d. he is held by the Committee of the Company to have been guilty of any act discreditable to a member of the Company; or

e. he is acting or is threatening to act in a manner prejudicial to the interest or functioning of the Company or any other institute, body corporate, society, association or institution in which the Company has an interest;

f. he is disqualified as laid down in the SECP Public Sector Companies (Corporate Governance) Rules, 2013.

44. The Company in its General Meeting may, on an appeal of the aggrieved member and after giving an opportunity of hearing, annul or modify the decision of the Board with regard to expulsion of the member by resolution supported by two-thirds majority. The person expelled

shall be reinstated as a member from the date of the resolution of the General Meeting annulling the decision of the Board.

45. Termination of membership shall occur automatically:

a. in the event of the death of a member; and

b. in the event a member fails to pay any amount due by him to the Company within three (03) Months after such obligation has become due.

GENERAL MEETINGS AND PROCEEDINGS

46. STATUTORY MEETING (SM)

The statutory General Meeting of the Company shall be held within the period required by the provisions of Section 167 of the Ordinance.

47. ANNUAL GENERAL MEETING (AGM)

A General Meeting to be called Annual General Meeting (the '**AGM**'), shall be held, in accordance with the provisions of Section 158 of the Ordinance, within eighteen (18) Months from the date of incorporation of the Company and thereafter once at least in every calendar Year within a period of four (04) Months following the close of its financial Year and not more than fifteen (15) Months after the holding of its preceding AGM as may be determined by the Directors.

48. OTHER GENERAL MEETINGS

All other meetings of the members of the Company other than the Statutory Meeting ('SM') and AGM shall be called Extraordinary General Meetings (the '**EGM**').

49. EXTRAORDINARY GENERAL MEETINGS (EGMS)

The Directors may, whenever they think fit, call an EGM, and the same shall also be called on such requisition(s), as is provided by the provisions of Section 159 of the Ordinance.

50. NOTICE OF GENERAL MEETINGS

Twenty-one (21) days' notice at least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hour of meeting and, in case of special business, the general nature of that business, shall be given in the manner provided by the Ordinance for the General Meeting, to such persons as are, under the Ordinance or the Articles of the Company, entitled to receive

such notices from the Company but the accidental omission to give notice to or the non-receipt of notice by any member shall not invalidate the proceedings at any General Meeting.

51. Omission to Give/Receipt Notice Not to Invalidate Proceedings

The accidental omission to give notice of a meeting to or the non-receipt of notice of a meeting by any person entitled to receive notice shall not invalidate the proceedings at the meeting.

52. Meeting by a Shorter Notice

With the consent in writing of all the members entitled to receive notice of some particular meeting that meeting may be convened by such shorter notice and in such manner as those members may deem appropriate.

53. Special Business

All business that is transacted at an EGM and that is transacted at an AGM with the exception of the consideration of the accounts, balance sheet and the reports of the Director and Auditors, the election of Directors, the appointment of and the fixing of remuneration of the Auditors shall be deemed special business.

54. Quorum

No business shall be transacted at any general meeting unless a quorum of members representing not less than twenty five percent (25%) of the total voting power present in person but being not less than two (2) members, is present at that time when the meeting proceeds to business.

55. Effect of Quorum Not Being Present

If within half an hour from the time appointed for the meeting a quorum is not present, the meeting, if called upon the requisition of members, shall be dissolved and in any other case, it shall stand adjourned to the same day in the next week at the same time and place and if at the adjourned meeting a quorum is not present within half an hour from the time appointed for the meeting, the members present, shall be a quorum.

56. Chairman of Meeting

The Chairman of the Board, shall preside as Chairman at every General Meeting of the Company, but if he is not present within fifteen minutes after the time appointed for the meeting, or is unwilling to act as Chairman, any of the Directors present may be elected to be the Chairman and if none of the Directors present is willing to act as Chairman, the members present shall choose one of their number to be the Chairman.

57. Adjournment

The Chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for thirty (30) days or more, notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid, it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an adjourned meeting.

58. VOTING

At any General Meeting a resolution put to the vote to the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the Chairman that a resolution has, on a show of hands, been carried, or carried unanimously, or by a particular majority, or lost, and an entry to that effect in the book of the proceedings of the Company shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favor of or against that resolution.

59. DEMAND FOR POLL

A poll may be demanded in accordance with the provisions of Section 167 of the Ordinance.

60. MANNER OF TAKING POLL

If a poll is duly demanded, it shall be taken in accordance with the manner laid down in the provisions of Section 168 of the Ordinance and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

61. TIME OF TAKING POLL

A poll demanded on the election of Chairman or on a question of adjournment shall be taken at once.

62. CASTING VOTE

In the case of an equality of votes, whether on a show of hands or on a poll, the Chairman of the meeting at which the show of hands takes place or at which the poll takes place, shall have and exercise a second or casting vote.

63. VOTES ON RESERVED MATTERS

Reserved Matters shall be decided through unanimous voted resolution of the members

64. VOTES OF MEMBERS

On a show of hands every member present in person shall have one vote and upon a poll every member present in person shall have one vote.

65. VOTE BY JOINT-HOLDERS

In case of joint-holders, the vote of the senior who tenders a vote, whether in person or by proxy, shall be accepted to the exclusion of the votes of joint-holders. For this purpose, seniority shall be determined by the order in which the names stand in the Register.

66. VOTE BY CORPORATION'S REPRESENTATIVE(S)

Anybody corporate which is a member of the Company may by resolution of its Directors or other governing body authorize such person as it thinks fit to act as its representative at any meeting of the Company or of any class of members of the Company and the person so authorized shall be entitled to exercise the same powers on behalf of the body corporate which he represents as that body corporate could exercise if it were an individual member of the Company present in person. A body corporate attending a meeting through such representative shall be deemed to be present at the meeting in person. However, no body corporate shall vote by proxy as long as a resolution of its directors in accordance with the provisions of Section 162 of the Ordinance is in force.

67. OBJECTION TO VOTE

No objection shall be raised to the qualification of any voter except at the meeting or adjourned meeting at which the vote objected to is given and tendered, and every vote not disallowed at such meeting shall be valid for all purposes. Any such objection made in due time shall be referred to the Chairman of the meeting, whose decision shall be final and conclusive.

68. INSTRUMENT OF PROXY HOW MADE

The instrument appointing a Proxy shall be in writing under the hand of the appointer or of his attorney duly authorized in writing or if the appointer is a corporation under its common seal or the hand of an officer or attorney. A proxy need not be a member of the Company.

69. TIME FOR DEPOSITING PROXY AT OFFICE

The instrument appointing a Proxy and the power of attorney or other authority (if any) under which it is signed or a notarized certified copy of that power or authority shall be deposited at the Office not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of Proxy shall not be treated as valid.

70. FORM OF PROXY

An instrument appointing a Proxy may be in the following form or in any other form which the Directors shall approve:

I, _____ of _____ [in the district of _____] appoint _____ of _____ as my Proxy to attend, speak and vote for me on my behalf at the annual or (as the case may be) Extraordinary General Meeting of the Company to be held on the day of _____ and at any adjournment thereof

SIGNED this _____ day of _____, 20____

71. WHEN VOTE BY PROXY VALID THROUGH AUTHORITY REVOKED

A vote given in accordance with the terms of an instrument or Proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the Proxy or of the authority under which the Proxy was executed or the transfer of the Shares in respect of which the Proxy is given provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the Company at the office before the commencement of the meeting or adjourned meeting at which the Proxy is used.

MANAGEMENT AND ADMINISTRATION

72. There shall be, for the overall management of the Company's affairs, a Board, which will be elected from amongst the members.

73. One term of the Board would be for three (03) Years.

74. QUALIFICATION OF DIRECTOR

No person shall be appointed as a Director if he is ineligible to hold office of Director of a Company under the provisions of Section 187 of the Ordinance

75. No member/person shall hold more than one office in the Company, such as those of Chief Executive/Director or Company Secretary.

76. FIRST DIRECTORS

The subscribers of the Memorandum, whose names are given herein below, shall be the first Directors of the Company and they shall hold office until the election of Directors in the first AGM, subject to the provisions of Sections 174 and 176 of the Ordinance.

A. Muhammad Afzal

B. Syed Waqar Hasnain

C. Muhamad Amir Khan

77. NUMBER OF DIRECTORS

The number of Directors shall not be less than two (02) and not more than seven (07). The Company may, however, determine through Special Resolution, such other number not being less than two (02), before the election of the Directors. An elected Director shall hold office for a period of two (02) years following the date from which his election is effective unless he earlier resigns, becomes disqualified from being a Director or otherwise ceases to hold office. Subject to the provisions of Section 177 of the Ordinance, retiring Directors shall continue to perform their functions until their successors are elected. The retiring Directors shall be eligible for re-election.

78. The Directors shall be entitled to be paid fees or be reimbursed for their expenses in attending meetings as the Board may from time to time decide. Any Director performing executive services for the Company (including for the purpose of this Article the office of Chief Executive or Chairman or a Director serving on any Committee) which in the opinion of the Directors are outside the scope of the ordinary duties of the Directors may be paid such extra remuneration as shall from time to time be determined by the Board subject to any law for the time being in force applicable to the Company.

79. PROCEDURE FOR ELECTION OF DIRECTORS

i. The Directors of the Company shall be elected in accordance with provisions of sub sections (1) to (4) of Section 178 of the Ordinance, in the following manner:

   a. The Directors of the Company shall be elected by the members of the Company in General Meeting;

   b. The Directors of the Company shall be elected on the basis of one member one vote;

c. Every member present in person or by Proxy or by representative shall have such number of votes as is equal to the product of the number of voting Shares held by him and the number of Directors to be elected; and

d. The candidate who gets the highest number of votes shall be declared elected as Director and then the candidate who gets the next highest number of votes shall be so declared and so on until the total number of Directors to be elected has been so elected.

ii. If the number of persons who offer themselves, to be elected is not more than the number of Directors fixed by the Directors under the provisions of sub-section (1) of Section 178, all persons who offered themselves shall be deemed to have been elected as Directors.

80. REMOVAL OF DIRECTOR

Subject to the provisions of Section 181 of the Ordinance, at any time the Company may by resolution in General Meeting remove a Director elected in the manner provided for in the provisions of Section 178 of the Ordinance but no such resolution shall be deemed to have been passed if the member nominating him has not voted in favour of such a resolution and the number of votes cast in favour of such a resolution is less than:

i. the minimum number of votes that were cast for the election of a Director at the immediately preceding election of Directors if the resolution relates to the removal of a Director elected under the provisions of sub-section (5) of Section 178 of the Ordinance; or

ii. the total number of votes for the time being computed in the manner laid down in the provisions of subsection (5) of Section 178 of the Ordinance divided by the number of Directors for the time being if the resolution relates to removal of Directors appointed under the provisions of Section 176 or Section 180 of the Ordinance.

81. CASUAL VACANCY AND ALTERNATE OR SUBSTITUTE DIRECTORS

a. Any casual vacancy occurring among the Directors may be filled up by the Directors within thirty days of the vacancy and the person so appointed shall hold office for the remainder of the term of Director in whose place he is appointed.

b. An existing Director may, with the approval of the Board, appoint an alternate Director to act for him during his absence from Pakistan of not less than three (03) Months. The alternate Director so appointed shall *ipso facto* vacate office if and when the Director appointing him returns to Pakistan.

82. VACANCY OF OFFICE OF DIRECTOR(S)

The office of a Director shall be vacated if:

a) he is ineligible on any one or more grounds enumerated in the provisions of Section 187 of the Ordinance;

b) he absents himself from three consecutive meetings of the Directors or from all meetings of the Directors for a continuous period of three Months whichever is the longer, without the appointment of an alternate Director or without leave of absence from the Board;

c) he or any firm of which he is a partner or any private company of which he is a director without the sanction of the Company in General Meeting accepts or holds any office of profit under the Company other than that of chief executive or a legal or technical adviser or a banker;

d) he is found to be of unsound mind by a Court of competent jurisdiction;

e) he is adjudged an insolvent,

f) he acts in contravention of the provisions of Section 195 of the Ordinance.

g) he has been convicted by a Court of competent jurisdiction for an offence involving moral turpitude;

h) he resigns his office by notice in writing to the Company or is otherwise removed by the member nominating him;

i) he has betrayed lack of fiduciary behaviour and a declaration to this effect has been made by a Court of competent jurisdiction under the provisions of Section 217 of the Ordinance.

83. PROCEDURE OF CONTINUING DIRECTORS WHEN THERE ARE VACANCIES TO BE FILLED-IN

The continuing Directors may act notwithstanding any vacancy in their body but if and so long as their number is reduced below the number fixed by or pursuant to the regulations of the Company as the necessary quorum of Directors, the continuing Directors may act for the purpose only of filling vacancies in their body or summoning a General Meeting of the Company but for no other purpose.

84. CREDITORS MAY NOMINATE DIRECTORS

In addition to or in place of the Directors elected or deemed to have been elected under Article 62, the Company may have Directors nominated by the Company's creditors or other special interests by virtue of contractual arrangements subject to the provisions of Section 183 of the Ordinance.

85. DIRECTORS REPRESENTING SPECIAL INTERESTS

The provisions of Section 178, Section 180 or Section 181 of the Ordinance shall not apply to—

a) Directors nominated by a corporation or company formed under any law in force and owned or controlled, whether directly or indirectly, by the Federal Government or a Provincial Government on the board of directors of a company in or to which such corporation or company has made investment or otherwise extended credit facilities;

b) Directors nominated by the Federal Government or a Provincial Government on the Board of Directors of the Company; or

c) Directors nominated by foreign equity holders on the board of the Pakistan Industrial Credit and Investment Corporation Limited, or of any other company set up under a regional co-operation or other co-operation arrangement approved by the Federal Government:

Provided that, where a Director referred to in clause (a), (b) or (c) is nominated, such number of the votes computed in the manner laid down in subsection (5) of section 178 as is equal to the minimum number of votes which would have been sufficient to elect such Director if he had offered himself for election shall stand excluded from the total number of votes otherwise available at an election of the Director to the authority or person nominating him:

Provided further that a Director nominated hereunder shall hold office during the pleasure of the corporation, company, Government or authority which nominates him.

86. DIRECTORS MAY APPOINT ATTORNEYS/AGENTS

The Directors may from time to time and at any time by power of attorney appoint any company, firm or person or body of persons, whether nominated directly or indirectly by the Directors, to be the attorney or attorneys of the Company, for such purposes and with such powers, authorities and discretions (not exceeding those vested in or exercisable by the Directors under these Articles) and such period and subject to such conditions, if any, as they may think fit, and any such powers of attorney may contain such provisions for the protection and convenience of persons dealing with any such attorney to delegate all or any of the powers, authorities and discretions vested in him.

87. DIRECTORS MAY MAKE CONTRACTS WITH THE COMPANY

Subject to the provisions of the Ordinance, the Directors shall not be disqualified from contracting with the Company either as vendor purchaser or otherwise nor shall any such contract or agreement entered into by or on behalf of the Company with any company or partnership of or in which any Director of the Company shall be a member or otherwise interested be avoided nor shall any such Director so contracting or being such member or so interested be liable to account to the Company for any profit realised by any such contract or

arrangement by reason of such Director holding that office or of the fiduciary relation thereby established but the nature of his interest must be disclosed by him at the meeting of the Directors at which the contract or arrangement is determined on if the interest then exists or in any other case at the first meeting of the Directors after the acquisition of the interest. A General Notice that any Director of the Company is a Director or a member of any other company or is a member of any named firm and is to be regarded as interested in any subsequent transaction with such company or firm shall as regards any such transaction be sufficient disclosure under this Article and subject to the provisions of Section 214 of the Ordinance after any such General Notice it shall not be necessary to give any special notice relating to any particular transaction with such firm or company. In the case of a contract for the appointment of a manager of the Company, the provisions of Section 218 of the Ordinance all be observed and performed.

88. Register of Contracts with Directors

In accordance with the provisions of Section 219 of the Ordinance a register shall be kept by the Directors in which shall be entered particulars of all contracts or arrangements to which Article 69 applies and which shall be open to inspection by any member at the Office during business hours.

89. Directors to Comply with the Law

The Directors shall duly comply with the provisions of the Ordinance and in particular with the provisions in regard to the registration of the particulars of mortgages and charges affecting the property of the Company or created by it and shall keep a Register of the Directors and Managers and shall send to the Registrar all returns and statements required under the Ordinance.

The Board

90. Chairman of the Board

The Directors may elect one of their members as the Chairman of the Board. The Chairman of the Board shall preside at all meetings of the Board but, if at any meeting the Chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as Chairman, the Directors present may choose one of their member to be Chairman of the meeting.

91. Duties and Powers of the Board

The Board shall conduct and manage all the business affairs of the Company, exercise all the powers, authorities and discretion of the Company, obtain or oppose the application by others for all concessions, grants, charters and legislative acts and authorization from any government or authority, enter into such contracts and do all such other things as may be

necessary for carrying on the business of the Company, except only such of them as under the statutes and Articles are expressly directed to be exercised by General Meetings and (without in any way prejudicing or limiting the extent of such general powers) shall have the following special powers and duties:

a. To present to the General Meeting of the Company any matters which the Directors feel are material to the Company, its objects or interests or affecting the interests of members and make suitable recommendations regarding such matters.

b. To regulate, through Articles, the admission of members.

c. To appoint, remove or suspend the Legal Advisor(s), bankers, or other officers on such terms and conditions as they shall think fit and as may be agreed upon.

d. To appoint any qualified person as a first Auditor(s) subject to provisions of the Ordinance;

e. To determine the remuneration, terms and conditions and powers of such appointees and from time to time, revoke such appointments and name another person of similar status to such office except for the Auditor in which case the relevant provisions of the Ordinance shall be followed;

f. To raise or borrow any sum, or sums of money from time to time at their absolute discretion for the purpose of the Company, subject to the provision of the Ordinance, from banks, firms or companies, sponsors, investors, and may secure the payment of money in such manner and upon such terms, and conditions in all respects as they think fit particularly by the issue of debentures of the Company or by making, drawing, accepting or endorsing on behalf of the Company any promissory note or bills of exchange or giving or issuing any other security of the Company. Debentures and other securities may be made assignable free from any equities between the Company and the persons to whom the same may be issued. Any debentures or other security may be issued at a discount, premium or otherwise and with any special privilege as to redemption, surrender, drawing, allotment of Shares, attending and voting at General Meeting of the Company or subject to compliance of the provisions of the Ordinance.

g. To delegate, from time to time, to any such appointee all or any of the powers and authority of the Board and to reconstitute, restrict or vary such delegations;

h. To agree upon and pay any expenses in connection with the Company's objects and undertakings and pay all the expenses incidental to the formation and regulation of the Company;

i. To constitute from time to time committee(s) from among themselves or co-opt other persons for the purpose and delegate to them such functions and powers as the Board may see fit to carry out the objects of the Company.

j. Subject to the provisions of Section 196 of the Ordinance, the Directors may exercise all the powers of the Company to borrow and mortgage or charge its undertaking, property and assets (both present and future) or issue securities, whether outright security for any debt, liability or obligation of the Company.

PROCEEDINGS OF THE BOARD

92. The Board shall meet at least once in each quarter of every Year, subject thereto meetings of the Board shall be held at such time as the directors shall think fit. All meetings of the Board shall be held at the registered office of the Company or at such other place as the Board shall from time to time determine. The meetings of the Board shall be called by the Chairman on his own accord or at the request of the Chief Executive (or any three Directors) by giving at least seven (07) days' notice to the members of the Board.

93. At least twenty five percent of the total number of Directors or two (2) Directors whichever is higher, for the time being of the Company, shall constitute a quorum.

94. Except as otherwise provided by these Articles, every question at meetings of the Board shall be determined by a majority of votes of the Directors present, each Director having one vote. In case of an equality of votes or tie, the Chairman shall have a casting vote in addition to his original vote as a Director.

95. Minutes of the proceedings of every meeting of the Board and a record of attendance of the Directors thereat shall be recorded by the Secretary in a book kept for that purpose. These shall be signed by the Chairman of the meeting at which they are read.

RESOLUTION THROUGH CIRCULATION

96. A resolution in writing signed by all Directors for the time being entitled to receive notice of the meeting of Directors or affirmed by them in writing shall be as valid and effectual as if it had been passed at a meeting of the Directors duly convened and held.

97. For the purpose of obtaining a Resolution by Circular, it shall be permissible to circulate the text of the proposed resolution duly signed by the Chief Executive and obtain the signatures of all the other Directors thereon separately by fax or email (the signed original whereof shall be sent in due course by mail or courier to the Company for its record) and such resolution shall be effective as soon as the text of the resolution signed by each of the other Directors shall have been faxed or emailed to and received by the Company.

CHIEF EXECUTIVE

98. The Directors may, as from the date not later than fifteenth day after the date of incorporation of the Company, appoint a person to be the Chief Executive of the Company and vest in him the affairs of the Company subject to their general supervision and control. The Chief Executive, if not already a Director, shall be deemed to be a Director of the Company and be entitled to all the rights and privileges and subject to all the liabilities of that office.

99. Within fourteen days from the date of election of Directors under the provisions of Section 178 of the Ordinance or the office of the Chief Executive falling vacant, as the case may be, the Directors of the Company shall appoint any person, including an elected Director, to be the Chief Executive, but such appointment shall not be for a period exceeding three (03) Years from the date of appointment.

100. The Chief Executive shall report directly to the Board. The remuneration and other terms and conditions of appointment of the Chief Executive shall be determined by the Board.

101. QUALIFICATION OF THE CHIEF EXECUTIVE

No person who is not eligible to become a Director of the company under the provisions of Section 187 of the Ordinance, shall be appointed or continue as the Chief Executive of the Company.

102. REMOVAL OF CHIEF EXECUTIVE

The Directors by passing resolution by not less than three-fourths of the total number of Directors for the time being or the Company may by a Special Resolution passed in a General Meeting remove a Chief Executive before the expiry of his term in office.

MINUTES BOOK

103. The Directors shall cause minutes to be duly entered in a book or books provided for the purpose of:

a. all resolutions and proceedings of General Meeting(s) and the meeting(s) of Directors and Committee(s) of Directors, and every member present at any General Meeting and every Director present at any meeting of Directors or Committee of Directors shall put his signatures in a book to be kept for that purpose;

b. recording the names of the persons present at each meeting of the Directors and of any Committee of the Directors, and the General Meeting; and

c. all orders made by the Directors and Committee(s) of Directors.

SECRETARY

104. The Secretary may be appointed by the Directors for such term at such remuneration and upon such conditions as they may think fit and any Secretary so appointed may be removed by them. Where there is no Secretary capable of acting, the Directors may appoint an Assistant or Deputy Secretary or any other officer of the Company to perform the duties of Secretary.

105. The Secretary shall be responsible for all secretarial functions and shall ensure compliance with respect to requirements of the Ordinance concerning the meetings and record of proceedings of the Board, committees and the General Meeting of members, review the applications for admission to membership and the recommendations accompanying the same to ensure that they are in the form prescribed, ensure that all notices required by these Articles or under the Ordinance are duly sent and that all returns required under the Ordinance are duly filed with the concerned Company Registration Office.

106. COMMITTEES

The Directors may delegate any of their powers to Committees consisting of such member or members of their body as they think fit and they may from time to time revoke such delegation. Any Committee so formed shall, in the exercise of the powers so delegated, conform to any regulations that may from time to time be imposed on it by the Directors.

107. CHAIRMAN OF COMMITTEE MEETINGS

A Committee may elect a chairman of its meetings, but, if no such chairman is elected, or if at any meeting the chairman is not present within ten (10) minutes after the time appointed for holding the same or is unwilling to act as chairman, the members present may choose one of them to be the chairman of the meeting.

108. PROCEEDINGS OF COMMITTEE MEMBERS

A Committee may meet and adjourn as it thinks proper. Questions arising at any meeting shall be determined by a majority of votes of the members present. In case of an equality of votes, the chairman shall have and exercise a second or casting vote.

109. VALIDITY OF DIRECTORS' ACTS

All acts done by any meeting of the Directors or of a Committee of Directors, or by any person acting as a Director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of such Directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be a Director.

110. THE SEAL

The Directors shall provide for the safe custody of the Seal, which shall not be affixed to any instrument except by the authority of a resolution of the Board or by a Committee of Directors authorized in that behalf by the Directors, and two Directors or one Director and the Secretary of the Company shall sign every instrument to which the Seal shall be affixed.

FINANCES

111. The funds of the Company shall be applied in defraying the expenses and shall be applicable in or towards the acquisition by purchase, lease or otherwise and furnishing and maintenance of suitable premises and assets for the use of the Company and shall be subject to the general control and direction of the Board.

112. All cheques, promissory notes, drafts, bills of exchange and other negotiable instruments and all receipts for moneys paid to the Company shall be signed, drawn, accepted, endorsed or otherwise executed, as the case may be, in such manner as the Directors shall from time to time by resolution determine.

113. No person, except persons duly authorized by the Board and acting within the limits of the authority as conferred, shall have authority to sign any cheque or to enter into any contract so as thereby to impose any liability on the Company or to pledge the assets of the Company.

DIVIDENDS AND RESERVES

114. COMPANY MAY DECLARE A DIVIDEND

The Company in General Meeting may declare Dividends but no dividend shall exceed the amount recommended by the Directors. The Directors may from time to time pay to the members such interim Dividend as appears to the Directors to be justified by the distributable profits of the Company.

115. DIVIDEND PAYABLE FROM PROFITS ONLY

No Dividend shall be paid by the Company otherwise than out of profits of the Company or in contravention of the provisions of Section 248(2) of the Ordinance.

116. All Dividends shall be declared and paid according to the amounts paid on the Shares.

117. RESERVE FUND

The Directors shall before recommending any Dividend set aside out of the profits of the Company such sum or sums as they think proper as a reserve or reserves which shall at the discretion of the Directors be applicable for redemption of debentures or to meet contingencies for equalization of or for special dividends or for rebuilding, repairing, restoring, replacing, improving, maintaining or altering any of the property of the Company or of for equalizing Dividends or for such other purpose as the Directors may in their absolute discretion think conducive to the interest of the Company, and pending such application may at the like discretion either be employed in the business of the Company or be invested in such investments (other than Shares of the Company) as the Directors may from time to time think fit.

118. The Directors may carry forward any profits which they may think prudent not to distribute, without setting them aside as a reserve.

119. DIVIDENDS TO MEMBERS INDEBTED TO THE COMPANY

When any member is indebted to the Company, all Dividends payable to him or a sufficient part thereof may be retained and applied by the Directors in or towards satisfaction of the debt of such member.

120. PAYMENT OF DIVIDENDS

Any Dividend or other moneys payable in cash in respect of Shares may be paid by cheque or warrant sent through the post direct to the registered address of the holder or in the case of joint-holders to the registered address of that one of the joint-holders who is first named on the Register or to such persons and to such address as the holder or joint holders may in writing direct. Every such cheque or warrant shall be made payable to the order of the person to whom it is sent. Any of two or more joint-holders may give effectual receipt for any Dividends or other moneys payable in respect of the Shares held by them as joint-holders. The Dividend shall be paid within the period laid down in the provisions of Section 251 of the Ordinance.

121. UNPAID DIVIDEND SHALL NOT BEAR INTEREST

Dividends shall be paid within the period as specified in the provisions of Section 251 of the Ordinance. Unpaid Dividends shall not bear interest as against the Company.

CAPITALIZATION OF PROFITS

122. CAPITALIZATION OF PROFITS

The Company in General Meeting may upon the recommendation of the Directors resolve that it is desirable to capitalize any part of the amount for the time being standing at the credit of the Company's reserve accounts or to the credit of the profit and loss account or otherwise available for distribution and accordingly that such sum be set free for distribution amongst the members who would be entitled thereto if distribution by way of Dividend and in the same proportion on condition that the same be not paid in cash but be applied in paying up in full un-issued Shares of the Company to be allotted and distributed/credited as fully paid up to and amongst such members in the proportion aforesaid and the Directors shall give effect to such resolution.

ACCOUNTS

123. BOOKS OF ACCOUNTS

The Directors shall cause to be kept proper books of account as required under the provisions of Section 230 of the Ordinance so that such books of account shall be kept at the Office or at such other place as the Directors think fit as provided in the said Section 230 and shall be open to inspection by the Directors during business hours.

124. INSPECTION BY MEMBERS

The Directors shall from time to time determine the time and places for inspection of the accounts and books of the Company by the members not being Directors, and no member (not being a Director) shall have any right to inspect any account and book or papers of the Company except as conferred by law or authorized by the Directors or by the Company in General Meeting.

125. ANNUAL ACCOUNTS

The Directors shall as required by the provisions of Section 233 of the Ordinance cause to be prepared and to be laid before the Company in AGM such Balance Sheet and Income and Expenditure Account and Cash Flow Statement duly audited and reports as are required in the Ordinance.

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126. COPY OF ACCOUNTS TO BE SENT TO MEMBERS

A copy of balance sheet and profit and loss account and the Cash flow statement along with the reports of Directors and Auditors of the Company shall, at least twenty-one (21) clear days before the holding of the General Meeting, be sent to all the members and the persons entitled to receive notices of General Meetings, in the manners in which notices are to be given as provided in the provisions of Section 50 of the Ordinance

127. DIRECTORS' REPORT

The balance sheet and profit and loss account shall be audited by the Auditors of the Company and shall subject to the provisions of Section 236 of the Ordinance be accompanied by a report of the Directors as to the state and condition of the Company and as to the amount which they recommend to be paid out of the profits by way of dividends to the members and the amount (if any) which they propose to carry to one or more reserves according to the provisions in that behalf herein contained and every report of the Directors shall be signed by the Directors in accordance with the provisions of Sections 236 and 241 of the Ordinance.

128. COPY OF BALANCE-SHEET AND REPORTS TO BE SERVED UPON REGISTERED HOLDER

A copy of the balance sheet and profit and loss account together with reports of Directors and Auditors shall at least twenty one (21) days preceding the Annual General Meeting be sent to the persons entitled to receive notices of General Meetings in the manner in which Notices are to be given hereunder and a copy thereof shall be deposited at the Office of the Company for the inspection of members for a period of twenty one days (21) prior to such meeting.

129. AUDITORS

Auditors shall be appointed and their duties regulated in accordance with the provisions of Sections 252-255 of the Ordinance.

NOTICE(S)

130. NOTICE TO MEMBERS

Notice shall be given by the Company to members and Auditors of the Company and other persons entitled to receive notice in accordance with the provisions of Section 50 of the Ordinance. All notices, requests, demands, claims, and other communications hereunder shall be in writing, sent by registered or certified mail, return receipt requested, postage prepaid, addressed to the intended recipient at its address as set forth in the Register of members or Directors, as the case may be and shall be deemed duly given upon actual receipt. Any notice, request, demand, claim or other communication hereunder may be sent to the intended

recipient at the address or number set forth in the Register of members or Directors using any other means (including personal delivery, expedited courier, messenger service, facsimile transmission, telex, ordinary mail, or electronic mail), but no such notice, request, demand, claim, or other communication shall be deemed to have been fully duly given unless and until it actually is received by the intended recipient.

131. NOTICE TO JOINT-HOLDERS

A notice may be given by the Company to the joint-holders of a Share by giving the notice to the joint-holder named first in the Register in respect of the Share and a notice so given shall be sufficient notice to all the holders of such Shares.

MISCELLANEOUS

132. CONFIDENTIALITY

Every Director, Secretary, Auditor, trustee, member of a committee, officer, servant, agent, accountant, or other person employed in the business of the Company, if so required by the Directors, before entering upon his duties, sign a confidentiality undertaking in relation to all transactions of the Company with its customers and the state of accounts with individuals and in manners relating thereto, and shall observe strict secrecy representing all transactions of the Company, and shall not reveal any of the matters which may come to his knowledge in the discharge of his duties except when required so to do by the Directors or the Company in General Meeting or by a Court of law, and except so far as may be necessary in order to comply with any of the provisions herein contained.

133. No member or other person (not being a Director) shall be entitled to enter upon the property of the Company or examine the Company's premises or properties without the permission of a Director, subject to Article 133, to require discovery of or any information representing any details of the Company's trading or any matter which is or may be in the nature of a trade secret, mystery of trade, or secret process or of any matter, whatsoever, which may relate to the conduct of the business of the Company and which in the opinion of the Directors will be inexpedient, in the interest of the Company and its members, to communicate.

134. RECONSTRUCTION

On any sale of the undertakings of the Company, the Directors or the liquidators on a winding up may, if authorized by a Special Resolution, accept fully paid Shares, debentures or

securities of any other company, either then existing or to be formed for the purchase in whole or in part of the property of the Company. The Directors (if the profits of the Company permit), or the liquidators (in a winding up) may distribute such Shares or securities, or any other properties of the Company amongst the members without realization, or vest the same in trustees for them. A Special Resolution may provide for the distribution or appropriation of the cash, Shares or other securities, benefits or property, and for the valuation of any such securities or property at such price and in such manner as the meeting may approve. All shareholders shall be bound by any valuation or distribution so authorized, and waive all rights in relation thereto save only such statutory rights (if any) as are, in case the Company is proposed to be or is in the course of being wound up, incapable of being varied or excluded by these Articles.

135. WINDING UP

If the Company is wound up, whether voluntarily or otherwise the liquidator may, with the sanction of a Special Resolution, divide amongst the contributories in specie or kind, the whole or any part of the assets and liabilities of the Company, subject to the provisions of Section 421 and other provisions of the Ordinance as may be applicable.

136. INDEMNITY

Every officer or agent for the time being of the Company may be indemnified out of the assets of the Company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the Company, except those brought by the Company against him in which judgment is given in his favor or in which he is acquitted, or in connection with any application under the provisions of Section 488 in which relief is granted to him by a Court of competent jurisdiction.

137. ARBITRATION

Every intra-corporate dispute shall, as a condition precedent to any other action at law be referred, in conformity with the Arbitration Act, 1940, as amended, and its implementing rules, to the decision of an arbitrator to be appointed by the parties in dispute or, if they cannot agree upon a single arbitrator, to the decision of two arbitrators of whom one shall be appointed by each of the parties in dispute, or, in the event of two arbitrators not agreeing, then of an umpire to be appointed by the two arbitrators, in writing, before proceeding on the reference. Intra-corporate disputes shall include any dispute that may arise between Company on the one hand and any of the members, their executors, administrators or assigns on the other hand, or between members, their executors, administrators or assigns, relating to these Articles or the statutes, or anything then or thereafter done, executed, omitted or suffered in pursuance of these Articles or of the statutes or any breach or alleged breach, or otherwise relating to these Articles, or to any statute affecting the Company or to any of the affairs of the Company.

138. DISPUTE RESOLUTION

In the event that a dispute, Claim or controversy arises between the company, its management or its shareholders, or between the share- holders inter- se, or the directors inter- se, all steps shall be taken to settle the dispute and resolve the issue through mediation by an accredited mediator before taking recourse to formal dispute resolution such as arbitration or litigation

We, whose names and addresses are subscribed herein below, are desirous of being formed into a Company in pursuance of these Articles of Association, and we respectively agree to take the number of Ordinary Shares in the capital of the Company, as set opposite our respective names:-

Sr. No.	Name & Surname (present and former in full)	NIC No.	Father's Name in full	Nationality (ies) with any former Nationality	Occupation	Residential/ Registered address in full	Number of Ordinary Shares taken by each Subscriber	Signatures
1.	M/s Frontier Works Organization (FWO) Through Sardar Salman Sher Qaisrani	35201-9945895-7	Sardar Rashid Ahmed Qaisrani	Pakistan Pakistani	Company Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	997 (NINE HUNDRED NINETY SEVEN)	
2.	Muhammad Afzal	34202-2385058-5	Adalat Hussain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	
3.	Syed Waqar Hasnain	37201-1659988-5	Syed Dildaar Hasnain	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	

Frontier Works Organization BOT Dte

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4.	Muhamad Amir Khan	17301-0699294-7	Muhammad Khalid Khan	Pakistani	Business	Head Quarters FWO 509 Kashmir Road RA Bazar Rawalpindi	1 (ONE)	
	Total Shares						1000 (One Thousand)	

Dated: 3rd day of September, 2016

WITNESS to above signatures:

National Institutional Facilitation Technologies Pvt. Ltd

5th Floor, AWT Plaza II Chundrigar Road, Karachi, Pakistan

Frontier Works Organization BOT Dte

CERTIFIED TRUE COPY

Muhammad Tariq Rasheed

Assistant Registrar

Company Registration Office Islamabad

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
28 August 2017

To: **Mr. Abdul Basit**
Registrar
Head Office OGRA
Islamabad
Ph: 051-9244296
Fax: 051-9244413

Subject: APPLICATION FOR GRANT OF LICENSE FOR CONSTRUCTION AND OPERATION OF NEW OIL PIPELINES

1. In reference to your letter no. OGRA-6 (5)-FOC/2017 dated August 03 2017 on the subject regarding map submission needed for the license of Oil Pipeline, please find attached following information/documents:

   a. Project map approved by Surveyor Group of Pakistan

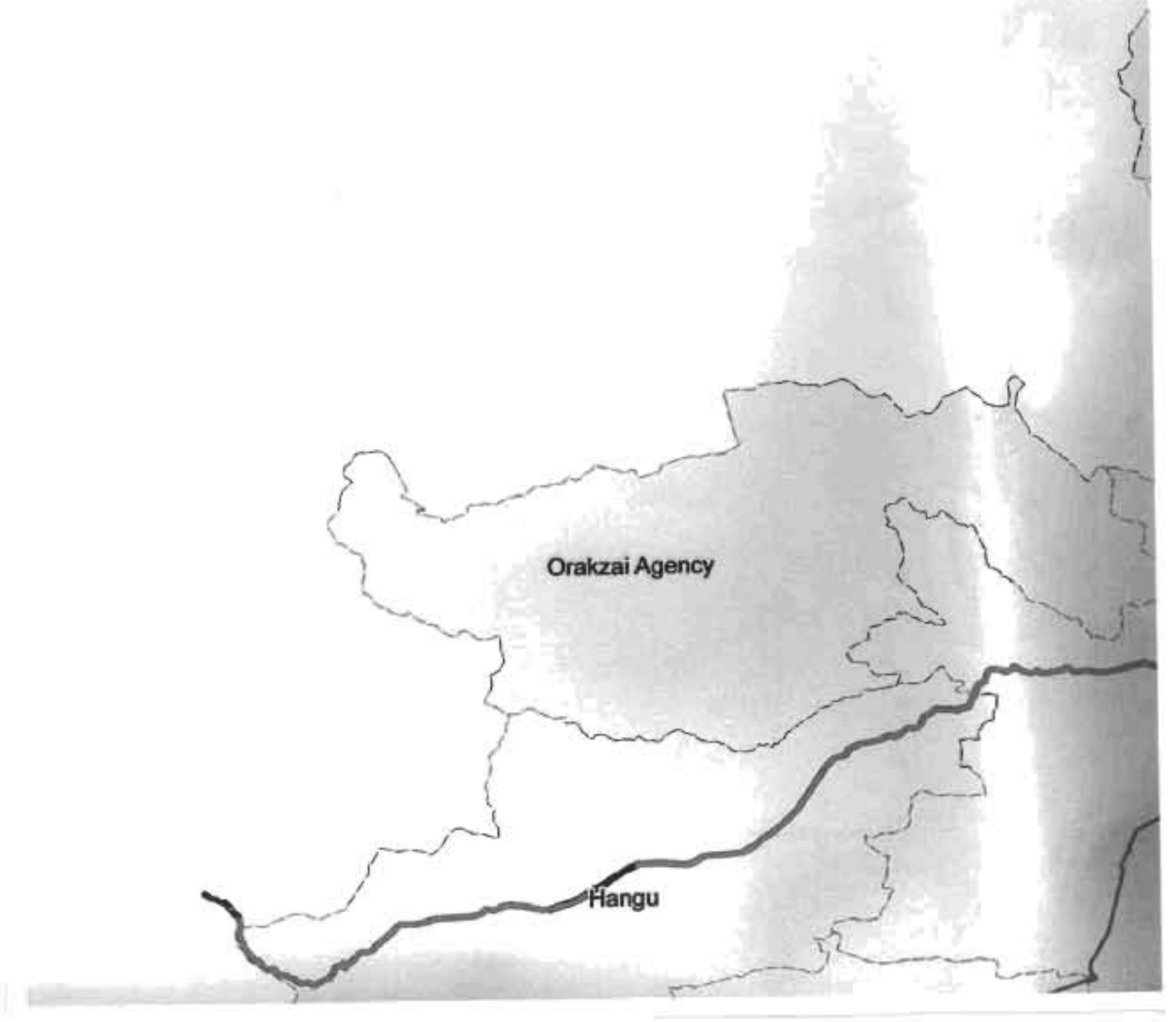
2. Forwarded for your information, please.

OIL & GAS REGULATORY AUTHORITY
29 AUG 2017
Diary: 2836
ISLAMABAD

Major Abdul Majid
GSO-II(BOT)

281

SURVEY OF PAKISTAN



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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/

To: **Mr. Abdul Basit** on leave
Registrar
Head office OGRA

Subject: **Extension of White Oil Pipeline Infrastructure**

1. Frontier Works Organization is financially and technically very sound and is capable to handle the project owing to our worth and expertise. As proof please find attached the following original bank document that legitimize our stand that we have requisite equity financing available to undertake the project:

- National Bank of Pakistan: Financial Due Diligence Letter.
- MCB Bank Limited: Account Maintenance Certificate
- Allied Bank: Account Maintenance Certificate

2. Forwarded for your necessary action, please.

HQ Frontier Works Organisation
No.........
Date.........

Major Abdul Majid
GSO-II (BOT)

Oil & Gas Regulatory Authority
14 MAR 2018
Diary 2305
ISLAMABAD

14/3 Incharge/F-I
JBD(R)

14/3

MCB Bank Limited
Bank for Life

Account Maintenance Certificate

Dated: 12-03-2018

Reference Number: CHK/AMC/12

Customer Name: *ALI RAZA*, ABU BAKAR YOUSAF MITHA, SYED HAFEEZ AHMED AYAZ, HAMID RASHID

We certify that under mentioned detail related to caption subject stands true. This certificate is being issued at customer's specific request without any risk and responsibility on the part of the bank or any of its officials. Available Balance of account # is Rs. 3,642,243,138.92

Title of Account	HQ FRONTIER WORKS ORGANIZATION (FWO)
Account Number	0 7 3 4 0 7 9 8 1 1 0 0 3 5 9 3
Identity document/ Number	Select: CNIC POC ARC NICOP PPT NTN BRN Others____ GIN # : 60447RFFIN
Type of Account	GLD
Currency	PKR
Account Opened Since	16-OCT-2014
Conduct of Account	☑ Satisfactory ☐ Un-Satisfactory ☐ Other:

MCB BANK LTD. Chaklala Scheme-III Rawalpindi

Branch Manager Stamp & Sign

Branch Operation Manager Stamp & Sign

Chaklala Scheme III Branch, Commercial Area, 61-E, Usman Plaza, Rawalpindi (Pakistan)
Ph: 051-5766027, 5766028, 5766029
E-mail: mcb1517@mcb.com.pk, http: www.mcb.com.pk

آئل اینڈ گیس
ریگولیٹری اتھارٹی

Oil & Gas
Regulatory Authority

No. OGRA-10-12-(60)/2018
March 20, 2018

Mr. Salman Qaisrani
Deputy DG (BOT),
Frontier Oil Company-1 (FOC-1),
Headquarters FWO 509, Kashmir Road, RA Bazar,
Rawalpindi

Subject: **APPLICATION FOR GRANT OF LICENCE FOR CONSTRUCITON AND OPERATION OF NEW OIL PIPELINE.**

Dear Sir,

This is with reference to the application submitted by Frontier Oil Company-1 for grant of licence for construction & operation of new oil pipeline to FOC-1. In this respect kindly provide the following information/documents:-

i) Detailed reasons of reviewing the initial project in terms of pipeline route as well as cost & other aspects of feasibility report;

ii) Board resolution of FWO for investment in FOC-1;

iii) A comparison of proposed pipeline tariff viz-a-viz the existing IFEM rates;

iv) Clarification with respect to undertaking the subject pipeline project in the light of the legal status and nature of business of FOC-1 as declared in the financial statements for the period 22nd September, 2016 to 30th June, 2017;

v) Documentary evidence for holding Right Of Way (ROW) for the subject project;

vi) Compliance in respect of Rule 25(b) of Pakistan Oil (Refining, Blending, Transportation, Storage and Marketing) Rules, 2016;

vii) Year wise and depot wise volume of MS & HSD based on which feasibility has been proposed for the subject project.

Yours truly,

(**Misbah Yaqub**)
Executive Director (F&A)

54-B, Fazlul Haq Road, Blue Area, Islamabad. PABX: +92 51 9244090-98, Fax: +92 51 9244310
54-B فضل الحق روڈ، بلیو ایریا، اسلام آباد فون:98-9244090 51 92+ فیکس:9244310 51 92+

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar
Head office OGRA

Ref: Letter No. OGRA-10-12-(60)/2018 dated March 20, 2018

Subject: **Board resolution of FWO for investment in FOC-1**

1. In reference to your letter mentioned above, please find attached Board resolution of FWO for investment in FOC-1.
2. Submitted for information please.

Salman Qaisrani
Dy DG (BOT)

Frontier Works Organization BOT Dte

Board Resolution

It is now hereby and be resolved;

That FWO shall subscribe shares 995 (99.5% of Ordinary Share Capital) in the proposed company Frontier Oil Company (FOC)-1 (Private) Limited with proposed registered address at 509, Kashmir Road, RA Bazar, Rawalpindi, through Mr. Salman Qaisrani s/o Sardar Rashid Ahmed Qaisrani, holder of CNIC # 35201-9945895-7

And it is further resolved that the other five (5) subscribed shares in the proposed company Frontier Oil Company (FOC)-1 (Private) Limited shall be held through the following persons:

Sr.no	Name of Director	CNIC #
1	Muhammad Afzal S/o Adalat Husain	34202-2385058-5
2	Salman Qaisrani S/o Sardar Rashid Ahmed Qaisrani	35201-9945895-7
3	Syed Waqar Hasnain S/o Syed Dildaar Hasnain	37201-1659988-5
4	Ameer Khan S/o Muhammad Khalid Khan	173010-699294-7

Signed on this day of ___. 2016 at Rawalpindi.

Frontier Oil Company 1 (FOC-1)

Authorized Signatory
Major General
Muhammad Afzal

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar
Head office OGRA

Ref: Letter No. OGRA-10-12-(60)/2018 dated March 20, 2018

Subject: **Clarification of FOC-1 Legal Status to Under take Nature of Business**

1. It is to inform that FOC-1 is fully authorized by SECP through its Memorandum of Association to undertake the subject pipeline project. The Memorandum of Association (MoA) in its clause 10 defines the nature of business as:

> "To locate, establish, construct , equip, operate, use, manage and maintain jetties, ports, ship operations, transporting facilities, storage, loading and unloading facilities and terminal for oil, liquid natural gas, liquid petroleum gas and all petroleum products."

2. The certified copy of MoA has already been submitted to OGRA for reference.
3. Submitted for information please.

Frontier Works Organization BOT Dte

Salman Qaisrani
Dy DG (BOT)

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar OGRA
Islamabad

Subject: **Reasons for change in Route, Cost and Volumes for FOC-1 proposed Pipeline project**

1. It is submitted that the route cost and the volumes of FOC-1 proposed pipeline are as under:

   a) As per rule 25-A of Pakistan Oil (Refining, Blending, Transportation, Storage and Marketing) rules 2016 no pipeline exists in the area where the applicant proposes to construct a new pipeline whereas in the previous proposal a part of the route proposed by FOC-1 was in the area of the already existing MFM pipeline

   b) FOC-1 never wanted to get in conflict with regards to handling of volumes with the existing MFM pipeline network

   c) FOC-1 initial proposal included the cost of constructing a jetty and a storage farm at Port Qasim

2. Forwarded for your necessary action, please.

Salman Qaisrani
Dy DG (BOT)

Frontier Works Organization
BOT Dte

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar
Head office OGRA

Subject: **Compliance with respect to Rule 25 (b) of Pakistan Oil Rules 2016 for FOC-1 Purposed Pipeline.**

1. It is submitted that as per the rule 25(b), NOCs are required to be taken from the concerned departments including EPA. Acquisition of these NOCs requires a cost to be incurred, which is not viable to be incurred at this stage.
2. FOC-1 undertakes that all the requisite NOCs from all the concerned Government Departments shall be obtained by FOC-1 before undertaking the project after the license is issued in favor of FOC-1 to undertake the project.
3. Forwarded for your necessary action, please.

Salman Qaisrani
Dy DG (BOT)

Frontier Works Organization BOT Dte

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar
Head office OGRA

Ref: Letter No. OGRA-10-12-(60)/2018 dated March 20, 2018

Subject: **Concession agreement between FWO & NHA for Motorway M-2**

1. In reference to your letter mentioned above, please find attached the copy of relevant parts of Concession Agreement between FWO & NHA for Motorway M-2 project.
2. Submitted for information please.

Frontier Works Organization BOT Dte

Salman Qaisrani
Dy DG (BOT)

559

HQ Frontier Works Organization,
509 Kashmir Road, R. A Bazar,
Rawalpindi
Tel: 051-9271847
Fax: 051- 9271820
444/BOT/WOP/18/01

To
Mr. Abdul Basit
Registrar Oil & Gas Regulatory Authority (OGRA)
Islamabad

Subject: Comparison of FOC-1 Proposed Pipeline Tariff with Current IFEM Rates

1. FOC-1 initially proposed a pipeline route originating from Mehmood Kot - Faisalabad, Faisalabad - Machike and Faisalabad - Thallian - Taru Jabba. The proposed tariff at that time was $0.045 per metric ton per Kilometer (USD/PKR @ 105). The route to route comparison with IFEM rates prevalent during March 2016 is as under:

Route	IFEM Rate (MOGAS) Per MT	IFEM Rate (HSD) Per MT	FWO Proposed Pipeline Tariff Per MT
Mehmood Kot to Thallian (596 KM)	3,160	1,768	2,816
Mehmood Kot to Machike (364 KM)	2,400	418	1,720
Thallian to Tarujabba (150 KM)	972	854	709

2. FOC-1 has now proposed another route for the pipeline which will be from Machike - Thallian - Taru Jabba. The proposed tariff for the pipeline is $0.031 per metric ton per Kilometer. The route to route comparison with IFEM rates prevalent during March 2018 is as under:

Route	IFEM Rate Per 1000L	IFEM Rate (MOGAS) Per MT	IFEM Rate (HSD) Per MT	FWO Proposed Pipeline Tariff PKR Per MT
Machike to Thallian (285 KM)	1,381	1,877	1,649	972*
Machike to Tarujabba (440 KM)	1,997	2,714	2,385	1,501*

**The proposed pipeline tariff quoted above is tentative and based on preliminary calculations.*

Frontier Works Organization BOT Dte

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3. Submitted for your information and necessary action.

Yours Respectfully,

Frontier Works Organization BOT Dte

Salman Qaisrani
Dy DG BOT

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HQ FWO (BOT Dte)
509 Kashmir Road
R.A Bazar Rawalpindi
Tel: 051-9271847
444/BOT/WOP/17/
21 March 2018

To: **Mr. Abdul Basit**
Registrar OGRA
Islamabad

Subject: **Depot Wise volumes for FOC-1 Proposed pipeline**

1. It is submitted that FOC-1 has proposed at pipeline project and the volumes being envisaged to be served to depots are as under

Location	Volumes MOGAS	Volumes HSD
CTL	13,407	5,872
JGT	65,832	28,834
TJB	887,586	675,514
SRNG	100,557	44,044
FAQ	452,246	328,863
KAN	93,853	89,138
THL		239,758
Total	1,613,481	1,411844

2. Forwarded for your necessary action, please.

Frontier Works Organization BOT Dte

Salman Qaisrani
Dy DG (BOT)

(322 pages) Feasibility Report Annex-B

Construction of New Oil Jetty at Port Qasim & Enhancement of WOP Infrastructure on DFBOO Basis

Table of Contents

1 Pakistan Economic Overview

Key Economic Indicators	
Population	186 Million
20-39 Year Population	27%
Middle Class	45% (85 million)
Exports	$ 25 billion
Imports	$ 42 billion
Remittances	$ 16 billion
GDP Growth	4.4 % (expected 7% in years to come)

2 Pakistan Strategic Location

3 Introduction

The way petroleum product consumption has gone up is unprecedented. The Petroleum Product usage during the year 2014-15 is 22 Million Ton/year, which is expected to grow up to 25-MillionTon/year by 2018-19 Especially the utilization of Motor Gasoline (MOGAS) has an upward trend due to unavailability of CNG. The utilization of MOGAS in the year 2005-06 was 1,183,458 Tons, which has increased to 4,638,136 Tons during the year 2014-15. In the present Geo-Political situation the utilization of Petroleum Products in Afghanistan and adjacent neighboring Land Locked countries can be fed through northern parts of Pakistan, this requirement shall increase the demand of petroleum products, in particular MOGAS to many folds.

To cater to the present and future need of Petroleum Products the requirement for Handling Jetties, Pipeline infrastructure, Storage Depots & Terminals are required for short term and long term requirements. Currently, we have Oil handling Jetties at Kemari & Bin-Qasim Ports. Kemari Port has three oil Jetties namely OP-1, OP-2 & OP-3 with individual capacity of 8-MillionTon/year and total capacity of 24-MillionTon/year. The major products being handled at Kemari Port are Crude & MOGAS & a small quantity of Diesel, mostly for use of Karachi City. The Crude Oil is transported through KMK pipeline to Mahmood-Kot. MOGAS is transported through road transport for up-country Oil Depots, which is a major source of Environmental hazard and product movement delays to up-country due to tank Lorrie's erratic movements. The only FOTCO jetty at Port Bin- Qasim has a capacity of 9-MillionTon/year. The major products being handled at FOTCO jetty are Furnace Oil, Diesel & Crude. The State-run and private companies can store roughly 1.3 million tons of petroleum products in tanks scattered around the country. Pakistan needs storage facilities that can house at least additional 1.7 million tons of petroleum products to counter the sudden spike in demand like the one in January, 2015 which adversely affected the country. In order to cater for the strategic petroleum needs for twenty seven days storage, additional Oil handling Jetties, Storage Terminals & Depots are required.

Pakistan being a longitudinal market for petroleum products – where the points of supply like ports are located in the south and bulk consumption taking place up north – makes it all the more important to address the issue of storage facilities. Government of Pakistan encourages private entities to invest in petroleum product storage development, in order to fill in the gap of supply & demand.

In the present state majority of the Oil Marketing Companies do not have requisite storage facility and retail network. The kind of sales volume these OMC's possess, does not permit them to import petroleum products to the tune of 35000 metric ton (The smallest cargo available).So these OMC's are either dependent on major OMC's or they try to import the 35000 MT cargo by pooling in the resources with other small OMC's. In both the cases the delay impacts the

end consumer and causes shortages of petroleum products in one of the fastest growing consumer market.

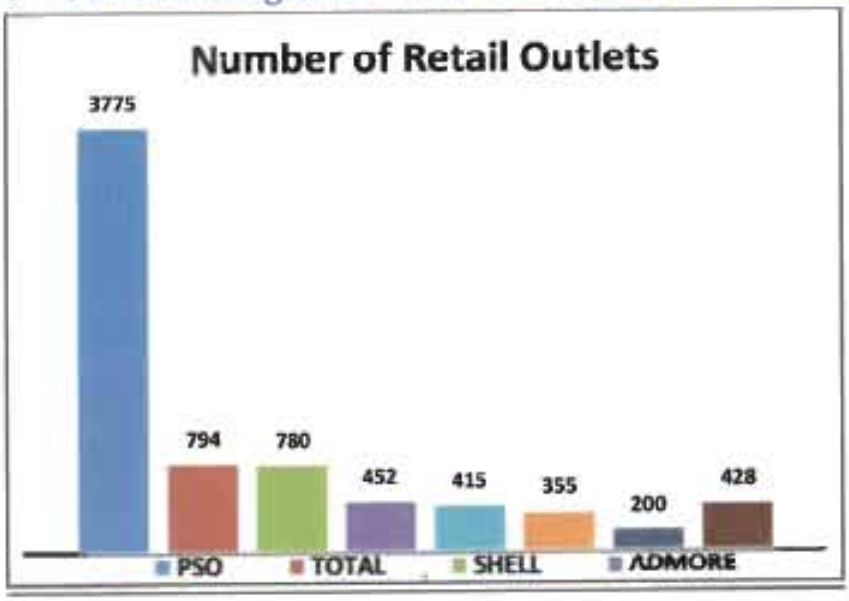
4 Current Storage Position in Pakistan

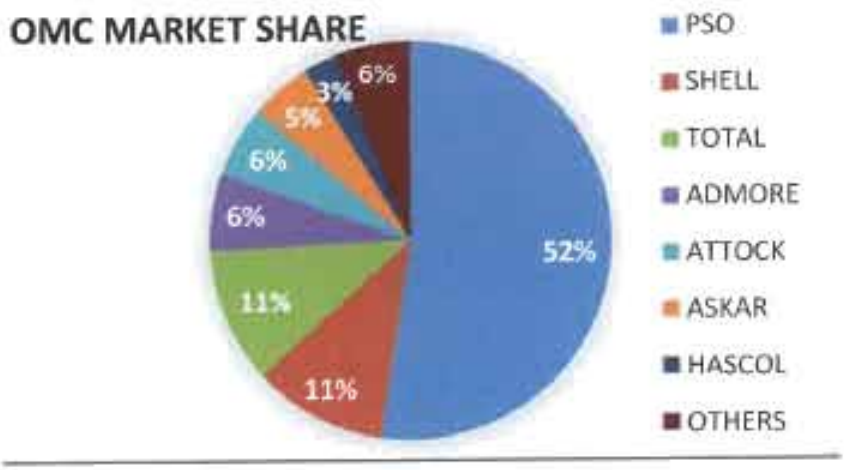
The storage capacity of International Energy Agency (EIA) member which includes countries like Japan, Turkey Czech Republic & Korea have 90 days stock cover, compared to other international countries Pakistan faces frequent oil shortages particularly in densely populated Punjab Province due to shortage of oil storage facilities. Even countries like India have 2 weeks of stock cover and even small country with less technical & infrastructure capabilities like Jordan has 60 days of strategic reserve.

No company including State owned OMCs are able to maintain twenty one 21 days stock cover, which is a bare minimum lead time to replenish the stock. More than fifteen (15) Oil Marketing Companies (OMCs) were issued licenses to operate of which most of them do not have enough storage facility across Pakistan to meet the requirements of their outlets.

The upper Punjab position feeding the area in Rawalpindi/ Islamabad and Northern Areas is worse as no new storage has been developed in Sihala and Tarujabba region since many years. Presently the Zarb-e-Azb is carried out in Northern Areas of Pakistan hence requirement of connectivity of KPK Province with Pipe Line Network is most essential. As per changing International scenario the war conflicts have shifted from Afghanistan to Middle East and Iraq hence the Pipeline Network & storage requirement at KPK can be of great use for petroleum product requirements at Afghanistan and neighboring land locked countries Turkmenistan, Tajikistan & Kazakhstan. The Pipeline network connecting Taru Jabba in KPK can be extended up to Jalalabad Afghanistan at a distance of 94 Miles.

5 Oil Marketing Share and retail outlets in Pakistan





6 Current Storage Capacity across Pakistan

- Northern Punjab – 80,780 MT
- Central Punjab – 182,030 MT
- Southern Punjab – 124,861 MT
- Khyber Pakhtunkhawa & Chitral – 33,836 MT
- Northern Area – 1,211 MT
- Balochistan – 11,708 MT
- Sindh (excluding Karachi) – 51,724 MT
- Karachi – 321,081 MT

7 Current Storage Capacity across Pakistan Petroleum Product Wise

S/n	Product	Storage(MT)
1	HOBC	1829
2	MS	196324
3	JP-1	41977
4	SK	32833
5	HSD	549884
6	LDO	12957
	Total	**835804**

8 FWO INVESTMENT PLAN FOR WHITE OILPIPELINE IN INFRASTRUCTURE EXTENSION

FWO will form a SPV with potential players in the field, the equity investment & shareholding will be decided during the course of negotiation/agreement. The SPVC shall acquire the services of EPCC contractor with the provision of supplier financing to achieve the project objective on a 100% supplier credit basis. The SPVC shall carry out detailed feasibility study to establish the financial credential of the project various other potential investment opportunities will also be gauged in the light of feasibility study. The option of bank borrowing at different debt equity ratio will also be studied, the tenure of supplies financing or bank borrowing will be for a period ranging from 8-10 years.

9 Formation of Joint venture Company for fuel Supply

FWO has taken initiative to make available the Petroleum Products with in the Country by joining hands with one of the largest Oil Suppliers of the world. We are also focusing on upgrading Oil Jetty, Storage Facilities and Pipe line network to meet the strategic needs of the country along with the commercial angle of supplying petroleum products to oil marketing companies and other Consumer supplies at door step throughout the country in order to meet the urgent petroleum product requirement immediately and in the long run completely. Major players in the field and investors have contacted FWO for the formation of Joint Venture Company.

10 Pricing Formula

The proposed joint venture company plans to provide petroleum products at the door step of Oil marketing Companies Storages along White Oil Pipeline & Bulk Supply in the vicinity of Karachi (Sindh) Thallian (Northern Punjab) & Tarujabba (KPK).

10.1 Diesel Pricing (HSD):

- Based on AG-Plttas (5-days Average)
- The AG-Plttas is of 0.05% Sulphur
- The required quality is 0.5% Sulpher
- The premium is 15 USD /MT (This amount has to be reduced for competing the Pakistani Market
- Surveyor Fees 944 USD per Cargo.
- Warfage 40,000 USD/Cargo
- Insurance Charges 0.02% appx
- Custom Duty 10% appx

10.2 MOGAS Pricing:

- Based on AG-Plttas (5-days Average)
- Standard Price is Nafta-80 RON
- PMG of 87-RON is considered in Pakistan Cutter stock is added and premium is charged (This amount has to be reduced for competing Pakistan Market.) normally the premium in August-September is 110-135 USD/MT In Dec-Jan is 54-64 USD/Ton
- Surveyor Fees 944 USD per Cargo.
- Warfage 40,000 USD/Cargo
- Insurance Charges 0.02% appx
- Custom Duty 2.5% appx

For Bulk Supply the suggested amounts can be reduced, moreover CNPC is itself a fuel supplier/producer

11 Development of Oil Jetty at Bin- Qasim Port

The MOGAS demand during the year 2014-15 is 4,638,136 Tons, which is anticipated to increase by 7,869,282 Tons by the year 2018-19. The present handling capacity at Kemari Port is insufficient to handle such big quantum. Moreover the point to ponder is that MOGAS is transported through Tank Lorries from Karachi to up-Country, which is a major environmental hazard and cause of Road structure failures. The cartel of road transport and misuse of IFEM privilege is costing huge to the nation.

In order to meet the ever growing demand of MOGAS and to eliminate the road transport of MOGAS from Karachi to Up-Country, FWO plans to utilize the existing infrastructure for a MOGAS specific Oil Jetty at Port Qasim for which 50 Acers of land will be required. FWO also plans to build a storage capacity in the future, while the parcel of different OMC's will be stored at the already existing storage facilities of OMC's at Port Qasim.

WHITE OIL PIPELINE INFRASTRUCTURE EXTENSION (ELIMINATING THE ROAD TRANSPORT OF PG)

Note:

- **Yearly Throughput of MOGAS (Local & Imported) 4,732,381 MT (2014-2015)**
- **Yearly Throughput of HSD (Local & Imported) 7,417,017 MT (2014-15)**
- **Yearly Projected Throughput of MOGAS (2018-19) 7,099,362 MT**
- **Yearly Projected Throughput of HSD (2018-19) 7,869,282 MT**

Product Properties:

S.No	Product	Specific Gravity	Viscosity @ 40 C (cSt)	Vapour Pressure
1	MOGAS	0.75	0.7	7.98
2	HSD	0.87	6.5	

12 Pipeline Details and Elevations

The current optimum capacity of WOP is 8 Million Tons / year (Currently being utilized at approximately 5 Million Ton/ year) the optimum capacity can be enhanced to 12 Million Ton /year by installing additional booster station. FWO has initiated negotiations with Pak-Arab Pipeline Company PAPCO for optimum utilization of WOP infrastructure. The possibility can be common storage of MOGAS for onward transmission to WOP. PAPCO has a plan for Dual utilization of WOP through pigging.

The Product stored connected to jetty will be connected to the WOP network which can be made available to interim storages of various OMC's along WOP network for consumer needs such as Shikarpur, Mahmoodkot, Faisalabad & Machikae and shall also cater for the needs of Karachi and surroundings for Local OMC's.
The WOP at Mahmoodkot will be extended up till Thallian (The source point declared by MOP&NR) adopting the ROW along Motorway. Initially the storage facility of 50,000 MT will be developed for providing consumer supplies to Various OMC's and other major Consumers. Moreover connecting the facility with adjacent Oil Village as per phase-I.

The pipeline network at Thallian will further be extended to Tarrujabba which at present is connected through road network. The proposed extension has high potential of connecting the Nothern Province of the Country (Khyber Pakhtoon Khwa) with the Petroleum Pipeline network. And further extension to Jalalabad Afghanistan

Following pipelines are suggested for proposed hydraulic analysis

- Jetty through trestle to pumping stations. 30" Dia

(Proposed White Oil pipeline network)

- **Mahmood Kot to Faisalabad 18" Dia**
- **Mahmood Kot to Tarrujaba 18" Dia**
- **Faisalabad to Macheki 18" Dia**

13 Product Transfer & Storage Arrangement

The following pipeline transfer arrangements have been catered for as part of the system

- MOGAS import (Jetty-Pumping station-Buffer terminal-White oil storage facility-White oil pipeline network from Port Qasim to Mahmood Kot via Shikarpur-White oil pipeline extension form Mahmood Kot to Faisalabad-Thallian-Tarujabba
- HSD import (Jetty-Pumping station-Buffer terminal-White oil storage facility-White oil pipeline network from Port Qasim to Mahmood Kot via Shikarpur-White oil pipeline extension form Mahmood Kot to Faisalabad-Thallian-Tarujabba
- Buffer Oil terminal at Bin Qasim 300,000 MT Capacity
- Bulk Oil Storage Shikarpur 50,000 MT Capacity
- Bulk Oil Storage Mahmoodkot 100,000 MT Capacity
- Bulk Oil Storage Faisalabad/Gatti 50,000 MT Capacity
- Bulk Oil Storage Macheke 100,000 MT Capacity
- Bulk Oil Storage Terminal at Thallian 16,0000 MT Capacity
- Bulk Oil Storage Terminal at Tarujabba 50,000 MT Capacity
- Supply to interim storages at Shikarpur-Mahmood Kot & Faisalabad
-

Dedicated pumps will be used for each product even if the pipeline is common

14 SYSTEM OPTIMIZATION

Hydraulic Analysis will be conducted with different line sizes to select the most economical size. Capital cost of pipelines and pumps was calculated and pumps operating cost was also estimated for 2 years and 5 years operations.

Pipelines sizes have been selected such that the system pressure does not exceed the 150 # piping class allowable pressure (i.e 19.0 barg with 25 – 30% allowance for surge pressure).

15 Pipeline

Pipeline has been divided into following segment:

New Jetty to Buffer Terminal

Hydraulic analysis will be performed and cost of various pipeline configurations will be compared to select the most economical line size. It will be ensured that the pipeline design pressure does not exceed the 150 # pressure class. On these bases, following pipeline sizes are recommended:

Configuration	Line Size (in)
Jetty-Pumping Station	**36" Dia**
Pumping Station-Buffer Terminal	**24" Dia**
Buffer Terminal- WOP Storage & Infrastructure	**18" Dia**

16 FACILITIES DESCRIPTION

The proposed system will consist of the following facilities:

16.1 Scraper Launcher / Receiver & Interface Detection

- The products will be dispatched & received through Scraper Launcher & Receiver
- Located on the scraper launchers & receivers is a scraper detector. This will inform the Control Room operator when the scraper has been received

- To determine the interphase arrival between product batches of MOGAS & HSD, a densitometer is proposed to be installed downstream of the scraper receivers. This meter can detect even minute changes in product density. The density is provided at Control Room

16.2 Flow Measurement

Ultrasonic type Flowmeters are proposed at both ends of the pipeline to measure the flow of MOGAS & HSD / products being received / dispatched. Although the accuracy of Ultrasonic Flowmeters is relatively low as compared to the Turbine or PD meters, these are proposed being more economical. Since custody transfer of oil is done through manual dip, flowmeters will serve internal control only.

16.3 Slop Tanks

A slop tank is proposed to be installed at the Jetty Head, Pumping area and Buffer Terminal. The slop tank will be used to collect the transmix quantities of oil during batch pigging. Oil drained from un-piggable portions of pipeline will also be collected in the slop tanks.

17 SCADA System

17.1 Introduction

The control system proposed for the pipeline is based on the concept of supervisory control from the main control room at buffer Oil Terminal. A SCADA System shall be provided to ensure efficient management and control of the pipeline operations.

The salient features of the system are given below:

17.2 Pipeline Management

The SCADA system shall provide a single database that can be accessed by different disciplines independently. The system shall provide the following management functions:

- Graphical presentation of operating conditions and status
- Batch scheduling and tracking
- Maintenance planning
- Product accounting and reconciliation
- Historical logging of events and alarms
- Trending selected variables
- Report generation and printing

17.3 Pipeline Control

To ensure that the pipeline system is operated efficiently and safely, it is necessary to exercise control along the entire length of the pipeline. The SCADA system shall provide the following major control functions:

- Pump monitoring and control
- Valve position monitoring and control
- Profile monitoring and control
- Energy optimization
- Regulatory controls
- Graphical presentation of alarm conditions
- System diagnostics and fault reporting
- Emergency shut-down system

17.4 Pipeline Leak Detection

Pipeline leak detection systems are generally based on the following techniques:

- Pressure monitoring
- Flow monitoring
- Volume Reconciliation
- Flow Balance
- Dynamic modeling incorporating corrected volume, unexpected flow and pressure

The type of information required for pipeline leaks consists of the following:

- Detection of the occurrence of a leak
- Detection of a leak already present in the line
- Leak location

For an effective leak detection system a combination of the above mentioned techniques is generally incorporated to analyses incoming data allowing detection sensitivity to be maximized while simultaneously reducing false alarms.

18 SCADA System Overview

The main SCADA Control Room for the pipeline monitoring system will be located at the Buffer Terminal site. Port Qasim Terminal (PQT) will be interfaced to the pipeline system to allow monitoring and override facilities in case of emergency. The site will always be manned 24 hrs/day. From this site all aspects of remote operation and monitoring of the pipeline will be possible. The main pipeline and tank valves will be continuously monitored to allow remote operation from the SCADA system.

In addition to the Central Control Room the pipeline system will include 2 RTU's (Remote Terminal Unit) located at:

- Oil Jetty
- Buffer Terminal

These RTU's will provide all local control and interlocking logic. The emergency shutdown logic will reside within each RTU rather than the Central Control Room. To access information from the RTU, a graphical touch screen display will be installed at each remote site for local intervention by the operator. Communications to the Central Control Room will be through a serial port connected to the Telecoms digital multiplexer unit located at each site.

The communication network to the field RTU's will be via a digital multiplexed telecoms cabinet that will handle voice, fax, telex and data communications. The main hub will be located at the Central Control Room with slave nodes located at each RTU site. Connection to each site will be through single mode Fibre optic cable and repeaters with a pipe capacity of 2 Mbs.

The SCADA operator at the Central Control Room will be able to perform the following control operations from each console:

18.1 Pump start / stop

- Booster pump & refinery tankage valves (MOV) open / close
- Mainline valves (MOV) open / close
- Remote Terminal Unit diagnostics
- Set point changes (Authorized user only)
- Remote configuration of field stations (RTU's)
- Controlled shut-down of remote stations

Status information provided at the Central Control Room SCADA Terminals will include:

- Pumps - running / stopped
- MOV - valve status local, remote, open, close
- Pig - depart / receipt
- Control valve status
- Tanks on-line and on receipt or dispatch
- Meter status
- CP status and data transmission.

Analogue Data to be provided at the Central Control Room SCADA Terminals will include:

- Pump suction pressures
- Pump discharge pressure
- Tank levels
- Pipeline pressures
- Batch flow & quantity
- Flow rate
- Pipeline product temperature

19 Telecommunications System

The telecommunication system would be designed to provide a dedicated network along the pipeline route, with main control centre located at Buffer Terminal.

The telecommunication system will provide the following functions:

- Voice (telephone) communications
- Fax/Telex communications
- Hotline voice communications
- Data communications
- System diagnostics
- Interface to PLC/RTU equipment

The telecommunications system will be based on Fibre Optic Cable architecture. The following hardware and facilities will be provided:

- Transmission equipment with Audio interface, Digital multiplexing and ancillaries
- Control and Alarm units
- Network control and management facilities
- Diagnostic utilities
- Special tools and programming equipment
- Telecommunication equipment and un-interruptible power supplies at each site

The fibre optic cable suitably sheathed and armored can be laid along the pipeline. At locations where pipeline crosses water channels the fibre optic cable would have to be protected with a conduit pipe laid parallel to the pipeline. The optical fibre cable system would have the capacity to carry many additional channels in the future if required.

20 Business Case

The project is based on Design, Finance, Build, Own & Operate basis (DFBOO Basis). The financial model reference tenure is assumed for 45 years with WACC based on LIBOR +6%

20.1 Strategic Storage Requirement of 21 days:

Present Storage Details:

- Northern Punjab – 80,780 MT
- Central Punjab – 182,030 MT
- Southern Punjab – 124,861 MT
- Khyber Pakhtunkhawa & Chitral – 33,836 MT
- Northern Area – 1,211 MT
- Balochistan – 11,708 MT
- Sindh (excluding Karachi) – 51,724 MT
- Karachi – 321,081 MT

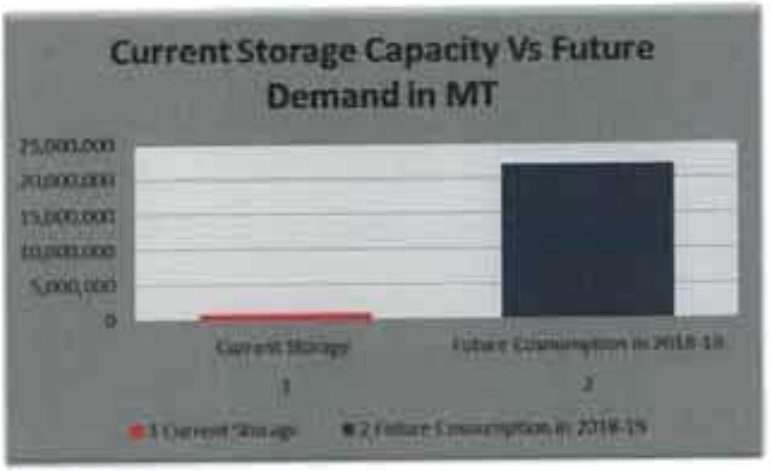
- Total Petroleum Product usage 2014-15: 22,074,136.00 MT
- Total Petroleum Product usage using extrapolation method: 2018-2019: 25,067,873.00 MT.
- 21 day Storage Requirement: 1,854,336.00
- % increase in Storage required : 130%

20.2 Basis of Petroleum Product Increase:

Future Projection of Petroleum Products in Line with Present & Previous usage

	PETROLEUM PRODUCTS									ACTUALS
Years	JP-1	JP-4	JP-8	TOTAL(JP-1/JP-8)	MOGAS	S.K.O	H.S.D	L.D.O	F.O	TOTAL
					Forecasts					
2014-15	699,000	97,000	144,000	940,000	4,658,136	192,000	7,270,000	44,000	9,000,000	22,074,136
2015-16	706,350	-	145,440	851,490	5,331,856	180,000	7,415,400	42,000	9,000,000	22,827,686
2016-17	713,050	-	146,894	859,944	5,867,242	180,000	7,563,708	42,000	9,000,000	23,516,894
2017-18	720,280	-	148,363	868,544	6,453,966	180,000	7,784,982	42,000	9,000,000	24,259,492
2018-19	727,382	-	149,847	877,229	7,099,362	180,000	7,989,282	42,000	9,000,000	25,067,873
					Actuals					
2013-14	704,250	61,000	141,765	907,226	3,865,113	176,837	6,897,085	49,767	9,551,883	21,448,941
2012-13	666,529	1,786	139,219	806,523	3,340,237	166,305	6,829,486	15,961	8,473,030	19,648,033
2011-12	609,430	132,415	131,109	909,954	2,753,550	153,957	6,655,387	20,754	8,576,012	19,055,432
2010-11	702,065	641,996	153,228	1,496,853	2,290,350	160,105	6,921,420	48,501	8,571,883	19,932,546
2009-10	676,020	631,275	150,444	1,457,741	1,928,818	161,935	7,424,876	74,407	9,376,721	20,296,731
2008-09	423,445	429,493	152,298	1,155,230	1,521,413	178,224	7,049,772	88,733	8,072,801	18,707,265
2007-08	669,120	330,827	104,683	1,008,808	1,456,789	228,022	8,245,598	173,458	7,596,368	18,723,911
2006-07	709,588	301,895	175,549	1,187,032	1,151,642	259,695	7,205,356	150,154	7,475,828	17,450,270
2005-06	767,298	333,525	156,328	1,257,071	1,183,458	225,591	7,575,861	134,155	5,316,605	15,302,573

*Source: OCAC-Annex A



20.3 White Oil Usage History

Province wise Consumption of Petroleum Products:

MS — Figs. in M. Tons

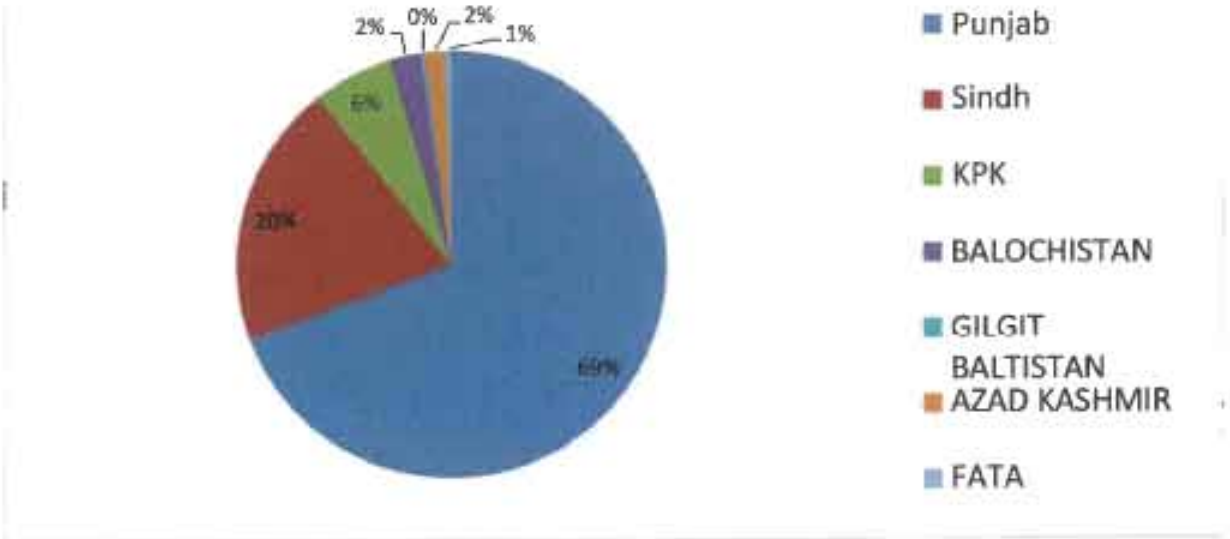
PROVINCE	2004 - 05	2005 - 06	2006 - 07	2007 - 08	2008 - 09	2009 - 10	2010 - 11	2011 - 12	2012 - 13	2013 - 14	2014-15	2015-16 (Jul-Sep)
PUNJAB	811,240	740,555	713,626	871,661	938,558	1,196,848	1,412,590	1,751,781	2,178,239	2,590,411	3,284,651	948,779
SINDH	409,857	354,081	345,907	426,426	421,000	495,900	560,359	635,587	727,043	809,628	943,845	272,041
NWFP	63,597	61,203	63,063	94,717	107,040	143,804	167,738	225,168	257,047	268,605	285,499	91,427
BALOCHISTAN	13,118	6,155	6,542	37,927	25,644	51,439	73,576	92,153	96,217	104,782	110,115	33,304
GILGIT BALTISTAN	-	-	-	-	-	-	-	-	9,393	12,519	15,920	5,783
AZAD KASHMIR	24,542	21,464	22,524	24,719	29,173	41,027	46,335	48,879	55,107	59,911	70,943	20,760
FATA	-	-	-	-	-	-	-	-	17,491	19,257	21,408	6,447
TOTAL PAKISTAN:	1,322,354	1,183,458	1,151,662	1,455,450	1,521,415	1,929,018	2,260,596	2,753,568	3,340,537	3,865,113	4,732,381	1,378,541
% Growth		-10.5%	-2.7%	26.4%	4.5%	26.8%	17.2%	21.8%	21.3%	15.7%	22.4%	

HSD

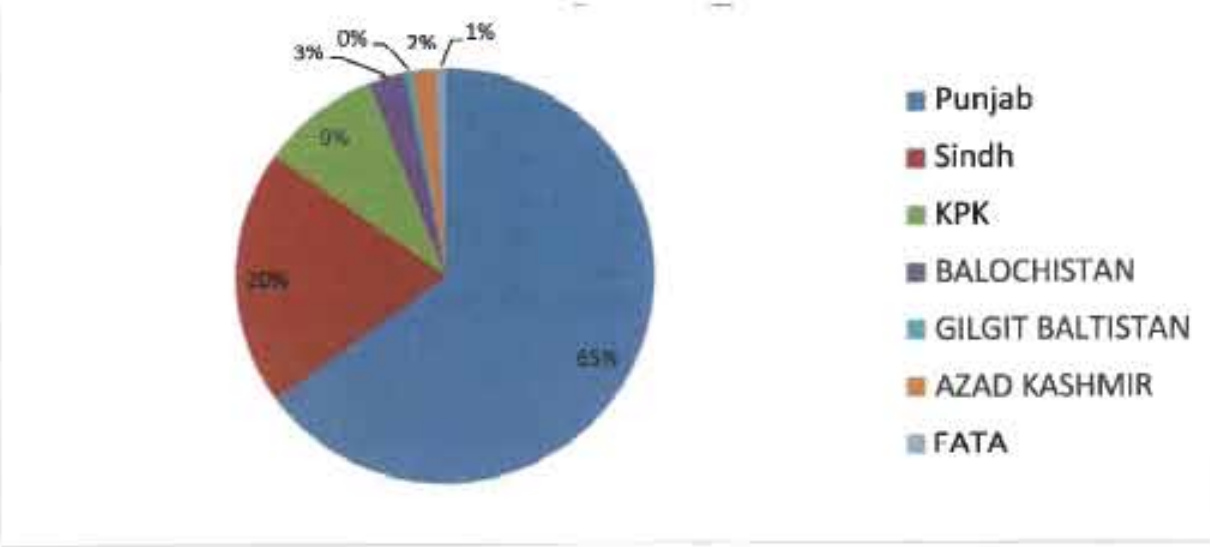
PUNJAB	4,416,941	4,213,558	3,981,915	4,594,831	4,364,795	4,288,869	4,017,198	4,122,664	4,209,694	4,246,389	4,822,475	1,065,723
SINDH	1,845,053	1,822,803	1,852,450	2,019,350	1,641,467	1,678,031	1,571,553	1,409,628	1,363,889	1,458,643	1,475,564	334,501
NWFP	1,050,322	1,086,782	1,220,798	1,310,953	1,101,717	1,052,016	989,499	974,807	814,453	745,172	676,391	157,992
BALOCHISTAN	245,832	143,953	126,157	180,167	134,796	194,371	196,207	187,940	206,517	220,783	205,207	44,366
GILGIT BALTISTAN	-	-	-	-	-	-	-	-	43,696	41,916	46,928	12,819
AZAD KASHMIR	176,118	108,555	103,866	117,467	146,997	211,592	156,963	140,148	127,380	122,625	129,241	31,089
FATA	-	-	-	-	-	-	-	-	63,837	62,164	61,211	13,700
TOTAL PAKISTAN:	7,734,266	7,375,651	7,285,186	8,222,768	7,649,772	7,424,879	6,931,420	6,835,187	6,829,466	6,897,692	7,417,017	1,660,160
% Growth		-4.6%	-1.2%	12.9%	-7.0%	-2.9%	-6.6%	-1.4%	-0.1%	1.0%	7.5%	

*Source: OCAC

Consumption of MOGAS Share Province wise during 2014-15



Consumption of HSD Share Province wise during 2014-15



20.4 Petroleum Product Import Detail

Month	100 LL	HSD		LSFO / HSFO	HSFO	CRUDE			JP-1	MOGAS
	KEAMARI	KEAMARI	FOTCO	KEAMARI	SPM /FOTCO	KEAMARI	SPM	FOTCO	KEAMARI	KEAMARI
Oct-15	0	52190	182465	62912	481053	549163	155281	0	10500	110261
Sep-15	1043	0	107594	61453	493453	576931	189116	0	0	138290
Aug-15	0	54981	160016	204644	358144	779511	201667	0	10003	137203
Jul-15	0	0	198356	68503	429955	574340	117599	0	17000	182885
Total	1043	107171	628431	397512	1722605	2477165	664183	0	37507	1368559
Jun-15	0	0	384795	0	483346	634347	136560	0	0	266471
May-15	0	6923	349958	124093	382808	630067	206342	0	6296	318995
Apr-15	0	62638	251880	69163	529364	559148	172292	0	0	349386
Mar-15	0	7825	301699	68670	320184	698881	148529	0	0	243073
Feb-15	0	40929	214320	92843	419572	479496	133647	0	0	309724
Jan-15	0	11594	107967	63968	200801	425336	97886	0	9997	320922
Dec-14	1000	52608	347828	121041	189962	673665	39228	0	0	227333
Nov-14	0	9959	290403	63121	204868	426509	72114	0	0	281233
Oct-14	0	52529	157711	138824	478889	564174	84007	0	30449	139077
Sep-14	0	52623	163694	66167	452201	612740	108351	0	0	273681
Aug-14	0	0	283822	136681	621823	638512	108214	0	0	187484
Jul-14	999	52689	185129	127587	628951	504674	109610	0	0	189378
Total	1999	350317	2834604	1052159	5117569	6847547	1406790	0	46742	3124661
Jun-14	0	13855	259994	133115	604675	687367	59347	0	36689	196456
May-14	0	4042	262584	58111	470376	634464	62347	0	28491	149788
Apr-14	0	52836	210290	62767	443205	642324	89429	0	23113	267783
Mar-14	0	0	104934	125803	407578	551450	0	0	0	157139
Feb-14	0	57200	102915	0	319552	643098	68135	0	7694	152054
Jan-14	0	0	157042	121444	477413	554303	66083	0	0	284565

*Source: OCAC

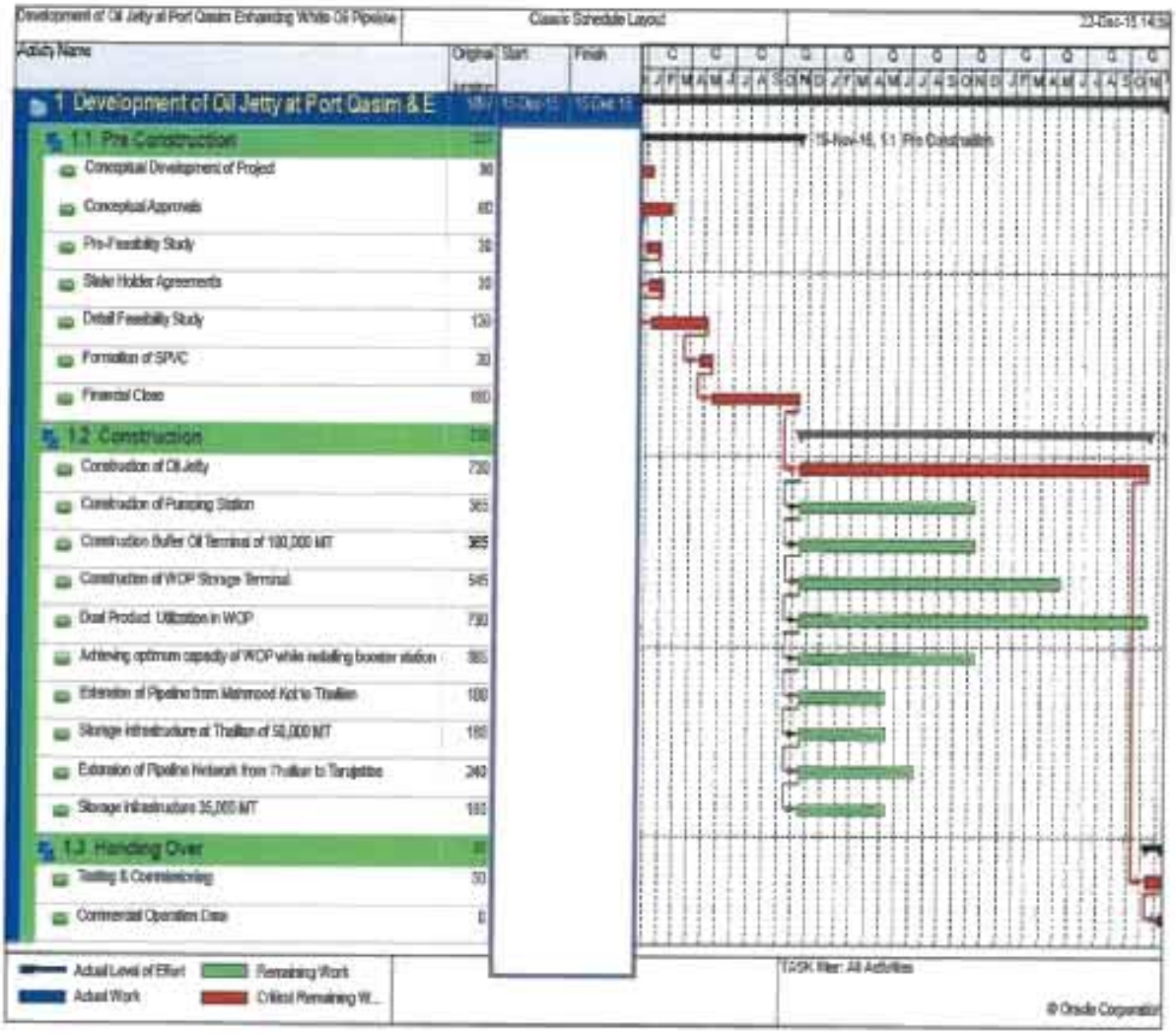
21 Logic of MOGAS throughput from MAHMOOD KOT to Tarujabba via Thallian

MOGAS usage in Punjab for the year 2014-15 is 3,284,651 MT; the anticipated MOGAS sale in Northern Punjab is 30% of the total sale of the Punjab that is 985,395 MT, the anticipated sale in 2018 is taken as 35% of 2014-15 sale that is 1,330,283 MT. MOGAS sale for KPK during 2014-15 is 385,424.00 MT, the anticipated sale for 2018 is taken 35% more than the 2014-15 sale that is 520,322 MT hence the total MOGAS throughput through pipeline is 1,850,605.00 MT.

22 Logic of HSD throughput from MAHMOOD KOT to Tarujabba via Thallian

HSD usage in Punjab during 2014-15 is 4,822,475.00 MT, anticipated HSD sale for northern Punjab is taken as 30% of the total usage that is 1,446,742.00 MT, and the anticipated increase till 2018 is 35% that is 1,953,101 MT. HSD usage in KPK is 676,391 MT which will be transported through dedicated pipeline the anticipated sale for 2018 is taken 20% more than 2015 sale hence the total sale of HSD in KPK is 811,669. Total HSD throughput through pipeline is 2,764,770 MT

23 Project Timelines



24 Formation of Task force

Presentation made in the Ministry of Petroleum & Natural Recourses on the Project Scope dated February 18th, 2016, and subsequently the Task Force formed by Federal Secretary for Petroleum & Natural resources comprising of:

S/#	Name of Person	Designation	Deptt.
1	Mr. Abdul Jabbar Memmon	DG-Oil	MoP&NR
2	Mr. Imran Ali Abro	Research Officer	MoP&NR
3	Dr. Ilyas Fazil	CEO	OCAC
4	Mr. Tariq Razavi	MD	PARCO
5	Mr. Seikh Imran ul Haq	MD	PSO
6	Mr. Atif Sajjad	Joint Executive Director	OGRA
7	Mr. Salman Qaisrani	Director-BOT	FWO

25 Terms of Reference (TOR) for Task Force

The Task Force was tasked to complete the assignment as per project scope, in the light of Project Charter. The task force formulated the TOR to proceed further. The TOR finalized are:

- To identify the Stakeholders involved at different stages of the Project and to highlight their respective nature of interaction in the Project Proceedings.
- To examine the proposal for the Construction of new oil jetty at Port Qasim with all requisite facilities and to work out the basis of tariff of handling MS and HSD
- To analyze the proposed oil storage plans at Port Qasim, Mehmood Kot,Thallian and Tarujabba.
- To examine the details of proposed investment initiative for existing white oil pipeline project jointly by FWO and PAPCO.
- To analyze the project details for construction of Mehmood Kot-Machike-Thallian-Tarujabba-pipline, its ROW from Parco and its economic viability.
- To examine the issues of throughput for new pipeline project in view of the demand potential in the concerned areas, its required diameter and allied facilities.
- To determine a basis for the tentative tariff for the parallel pipeline and corresponding modalities with respect to IFEM.
- To formulate modalities for initial pipeline fill for the new pipeline project.
- To examine the concessions and other related approvals required from the government.
- To submit a report in the matter to Secretary, Petroleum by 15th March, 2016.

26 First Task Force Meeting

The first task force meeting was held at Ministry of Petroleum & Natural Resources at 4th April 2016 under the Chairmanship of DG Oil. The proposal as submitted by FWO was discussed in detail and it was decided that FWO will review and revise the projections of the project plan in the light of discussion held in the meeting, it was also directed by the Task Force that FWO, PAPCO & PARCO would meet in OCAC in order to achieve clarity with regard to the construction of New Oil Jetty and issues related to initial pipeline fill and pipeline tariff. Minutes of meeting attached as **Annex-L**.

27 Oil Companies Advisory Committee (OCAC)

Background & Interaction details:

Infrastructure development is the key to long term economic gains in any sector. In petroleum sector Storage and pipeline connectivity is the major future requirement. Minimum storage of 27 days is an essential requirement to replenish the stock in emergency situations. The strategic requirement of minimum storage cannot be effective unless the product is moved through pipeline infrastructure instead of Road Transport, even the storage of 40 to 45 days is not enough. OCAC is anticipated to coordinate with OMC's and confirm off take through OMC's for the proposed infrastructure. Recommend MOP&NR the tariff structure for pipelines. Evaluate the proposal and the financial model and recommend the concessions in duty structure as requested by FWO. A detailed presentation was given to CEO OCAC in which the pipeline volumes were justified and were approved by OCAC. The detail working on pipeline volumes are given below:

28 Basis of Petroleum Product Increase:

28.1 CPEC Fuel Requirement

The total length of the CPEC route is 2,674 KMs. The total trade expected to take place via this route is expected to be at least 10% of total China trade. This data is further confirmed by Pak China Joint Chamber of commerce and Industry (**Annex-G**) World Bank Data Site http://data.worldbank.org/indicator/IS.SHP.GOOD.TU mentions the number of Container Movement from China as 181,635,245 20 Feet equivalent containers, i.e 500,373 containers per day (One way) and the annual growth has never gone below 6%. Keeping in view that due to turning radius restrictions at Korakaram Highways, the trucks will carry on 20 feet containers at least for next few years, the reference container size in the enclosed study is of 20 feet. The total number of trucks has been taken as 25,000 Trucks (which is a conservative figure) the movement considered every day is to and from Gwadar and Khunjrab Pass. (This reference is valid after 3 years that is 2023-24). The fuel consumption considered for the trucks for reference purpose is 3 Km per liter of HSD (again a conservative working which is relevant for flat roads, whereas a

large stretch of road will be on inclined roads with consumption of more fuel). It is been assumed that about 10-15% of trade volume of China will pass through CPEC in near future, but we have kept the figures very conservatives.

The traffic volumes considered for the consecutive 20 years has been taken as following:

2018-19	0.25% of Chinese Trade
2019-20	0.63% of Chinese Trade
2020-21	1.25% of Chinese Trade
2021-22	1.9 % of Chinese Trade
2022-23	2.5 % of Chinese Trade
2023-24	we have kept the volume max at 2.5% growth rate (China GDP growth rate is minimum 6%

Conservative Figures for year 2023-24

China Annual Containers Export	**181,635,245**	**Nos**
Pakistan	**2674**	**KM**
Trucks (2.5% Of Volume)	**12,656**	**Per Day One way**
Trucks (Return Traffic)	**12,656**	**Per day One way**
Trucks (total Traffic)	**25,311**	**Per Day Both ways**
Fuel Average	**3**	**KM / Liter**
Total HSD per day	**22,283,333**	**Liters**
Total Tons per day	**18,941**	**Tons**
Total Tons per Annum	**6,999,463**	**Tons**

We can now project the volume till the time period of our analysis, i.e. 2038-39 with a GDP growth rate of 6% which caters only the growth of Chinese economy and our share remains at 10%, however we have calculated our numbers at less than 2.5% shares in Chinese economy against the anticipated share of 10%.Whereas logistic experts are of the view that the share percentage will also increase rapidly, but we will remain on the conservative side.

28.2 Basic Project Assumptions

As stated above, we have compiled our conclusions based on available established data either from OCAC and other government or published sources. In addition to the above, we would like to state the basic assumption taken by us as follows:

Project Lifetime;

Pipeline: 50 Years
Jetty: 40 Years

Project Period considered for Project Viability Study:

Pipeline: 20 Years
Jetty: 20 Years

First Year of Operation

2018-19

28.3 Normal Growth Projection:

Motor Sprit demand is expected to grow at a steady rate of 10% per annum till 2019-20 and after that the growth rate will be much lower, i.e. 5% per annum. Reference OCAC (Pakistan Oil Report 2014-2015)

Year	Regular Demand (MT)	Increase %
2014-15	*4,732,381*	*10%*
2015-16	*6,000,000*	*10%*
2016-17	*6,600,000*	*10%*
2017-18	*7,260,000*	*10%*
2018-19	*7,986,000*	*10%*
2019-20	8,784,600	*10%*
2020-21	9,223,830	5%
2021-22	9,685,022	5%
2022-23	10,169,273	5%
2023-24	10,677,736	5%
2024-25	11,211,623	5%
2025-26	11,772,204	5%
2026-27	12,360,814	5%
2027-28	12,978,855	5%
2028-29	13,627,798	5%
2029-30	14,309,188	5%
2030-31	15,024,647	5%
2031-32	15,775,879	5%
2032-33	16,564,673	5%

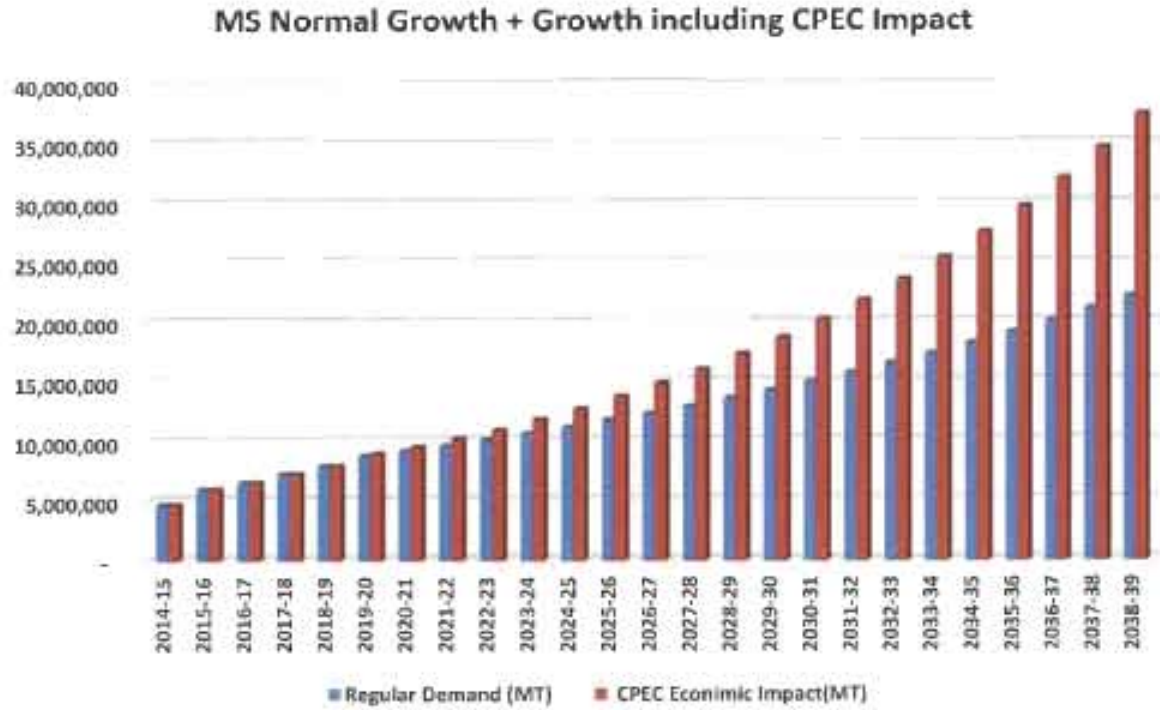
2033-34	17,392,907	5%
2034-35	18,262,552	5%
2035-36	19,175,680	5%
2036-37	20,134,464	5%
2037-38	21,141,187	5%
2038-39	22,198,247	5%

28.4 MS WITH CPEC ECONOMIC IMPACT

In year 2019-2020 to 2021-2022 a growth rate of 2% due to CPEC economic Impact in addition to normal growth rate (10%) is considered as per OCAC Pakistan Oil report 2014-15. In the year 2022-2023 to 2038-2039 a growth rate of 3% due to CPEC economic Impact, in addition to normal growth rate (5%) is considered as per OCAC Pakistan Oil report 2014-15. The volumetric growth from the year 2014-15 to 2018-19 given below in the table are kept as per the OCAC Pakistan Oil report 2014-15 and no CPEC Impact is considered.

Year	MS Regular Demand (MT)	MS with CPEC Economic Impact (MT)	Increase %
2014-15	4,732,381	4,732,381	
2015-16	6,000,000	6,000,000	
2016-17	6,600,000	6,600,000	
2017-18	7,260,000	7,260,000	
2018-19	7,986,000	7,986,000	
2019-20	8,784,600	8,944,320	12%
2020-21	9,223,830	9,570,422	7%
2021-22	9,685,022	10,240,352	7%
2022-23	10,169,273	10,957,177	7%
2023-24	10,677,736	11,833,751	8%
2024-25	11,211,623	12,780,451	8%
2025-26	11,772,204	13,802,887	
2026-27	12,360,814	14,907,118	8%
2027-28	12,978,855	16,099,687	8%
2028-29	13,627,798	17,387,662	8%
2029-30	14,309,188	18,778,675	8%
2030-31	15,024,647	20,280,969	8%
2031-32	15,775,879	21,903,447	8%

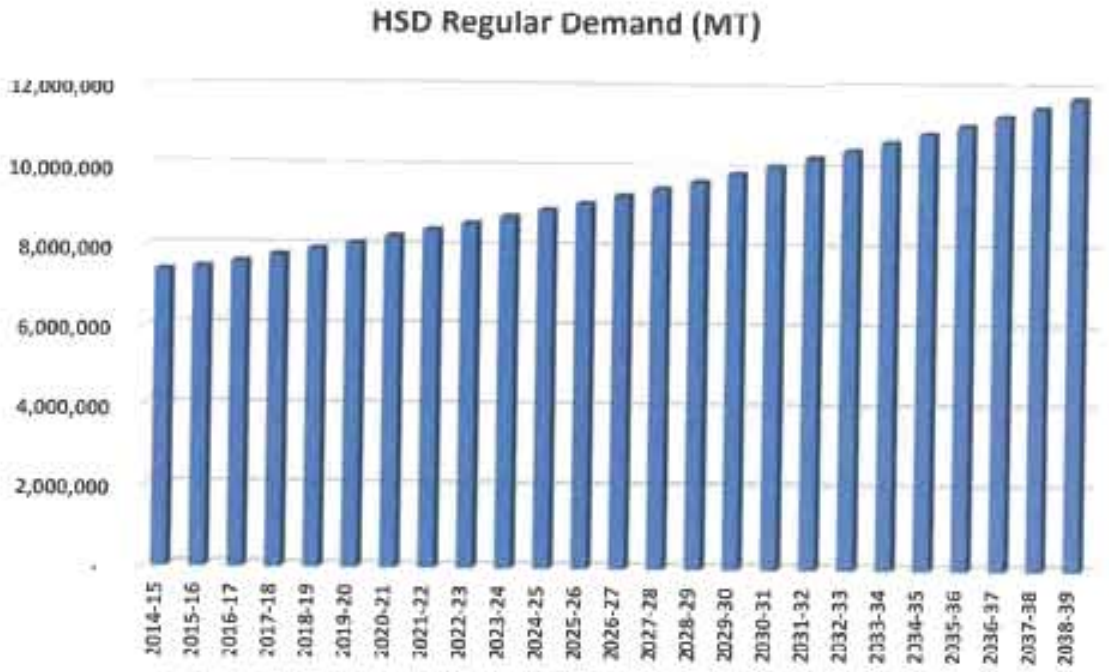
2032-33	16,564,673	23,655,722	8%
2033-34	17,392,907	25,548,180	8%
2034-35	18,262,552	27,592,035	8%
2035-36	19,175,680	29,799,397	8%
2036-37	20,134,464	32,183,349	8%
2037-38	21,141,187	34,758,017	8%
2038-39	22,198,247	37,538,659	8%



28.5 HSD Normal Growth Projection:

Diesel demand is expected to grow at a steady rate of 2% per annum. We have assumed that the 2% increase in volume comprises of the following components: (a) 40% of the 2% increase in production from 2014 -15 onwards as forecasted by OCAC is due advancement and efficiency enhancement projects such as isomerization and DHDS planned by the refineries. (b) 60% of the 2% is due to expansion of projects and will required equivalent increase in the import of crude by sea.

HSD Volume	Regular Demand (MT)	Increase %
2014-15	7,417,017	
2015-16	7,500,000	2%
2016-17	7,650,000	2%
2017-18	7,803,000	2%
2018-19	7,959,060	2%
2019-20	8,118,241	2%
2020-21	8,280,606	2%
2021-22	8,446,218	2%
2022-23	8,615,143	2%
2023-24	8,787,445	2%
2024-25	8,963,194	2%
2025-26	9,142,458	2%
2026-27	9,325,307	2%
2027-28	9,511,813	2%
2028-29	9,702,050	2%
2029-30	9,896,091	2%
2030-31	10,094,013	2%
2031-32	10,295,893	2%
2032-33	10,501,811	2%
2033-34	10,711,847	2%
2034-35	10,926,084	2%
2035-36	11,144,605	2%
2036-37	11,367,498	2%
2037-38	11,594,848	2%
2038-39	11,826,744	2%

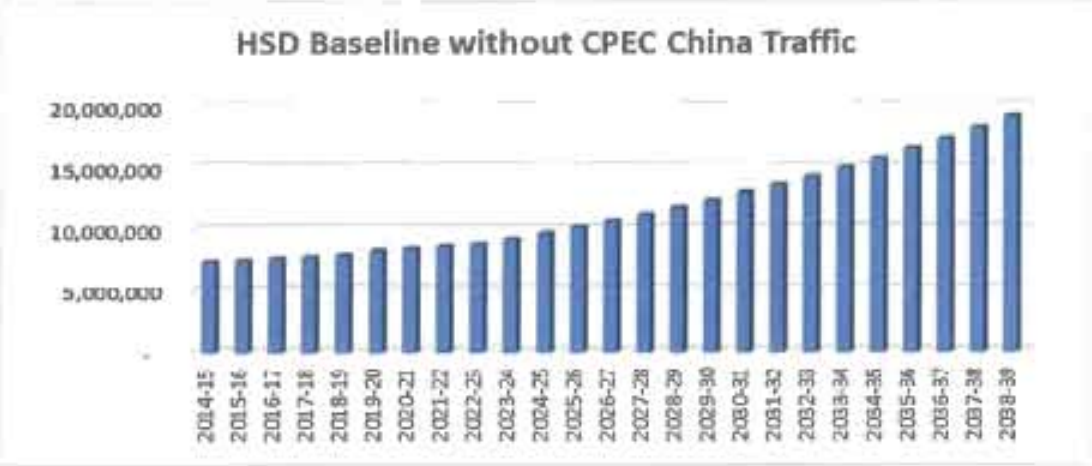

HSD Regular Demand (MT)
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
-
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
2034-35
2035-36
2036-37
2037-38
2038-39

28.6 HSD Growth Baseline without China Traffic Projection:

HSD Volume	Baseline without CPEC China Traffic	Increase %
2014-15	7,417,017	2%
2015-16	7,500,000	2%
2016-17	7,650,000	2%
2017-18	7,803,000	2%
2018-19	7,959,060	2%
2019-20	8,277,422	2%
2020-21	8,442,971	2%
2021-22	8,611,830	2%
2022-23	8,784,067	5%
2023-24	9,223,270	5%
2024-25	9,684,434	5%
2025-26	10,168,655	5%
2026-27	10,677,088	5%
2027-28	11,210,942	5%
2028-29	11,771,490	5%
2029-30	12,360,064	5%
2035-36	16,563,668	5%
2036-37	17,391,851	5%
2037-38	18,261,444	5%
2038-39	19,174,516	5%
2030-31	12,978,067	5%
2031-32	13,626,971	5%
2032-33	14,308,319	5%
2033-34	15,023,735	5%
2034-35	15,774,922	5%

As per all economists and government estimates, 2.5% to 3% addition is expected in GDP of Pakistan due to spillover effect of CPEC projects, however we have considered a growth of 3% as CPEC impact on national economic growth which includes 3% enhanced utilization HSD per year, the same figure is considered for the next 25 years (which is again a conservative figure). The impact of CPEC growth on GDP of Pakistan is expected to take effect from year 2021-22, for

this specific reason the impact while calculating the volume with CPEC growth impact has been taken from 2021-22.



28.7 HSD-CPEC China Traffic Impact

The total number of trucks has been taken as 25,000 Trucks (which is a conservative figure) the movement considered every day is to and from Gwadar and Khunjrab Pass. (This reference is valid after 3 years that is 2023-24). The fuel consumption considered for the trucks for reference purpose is 3 Km per liter of HSD (again a conservative working which is relevant for flat roads, whereas a large stretch of road will be on inclined roads with consumption of more fuel). It is been assumed that about 10-15% of trade volume of China will pass through CPEC in near future, but we have kept the figures very conservatives.

2019-20	0.625 % of Chinese Trade
2020-21	1. 25 % of Chinese Trade
2021-22	1.875 % of Chinese Trade
2022-23	2.50 % of Chinese Trade
2023-24	we have kept the volume max at 2.5% (Plus Chinese GDP)

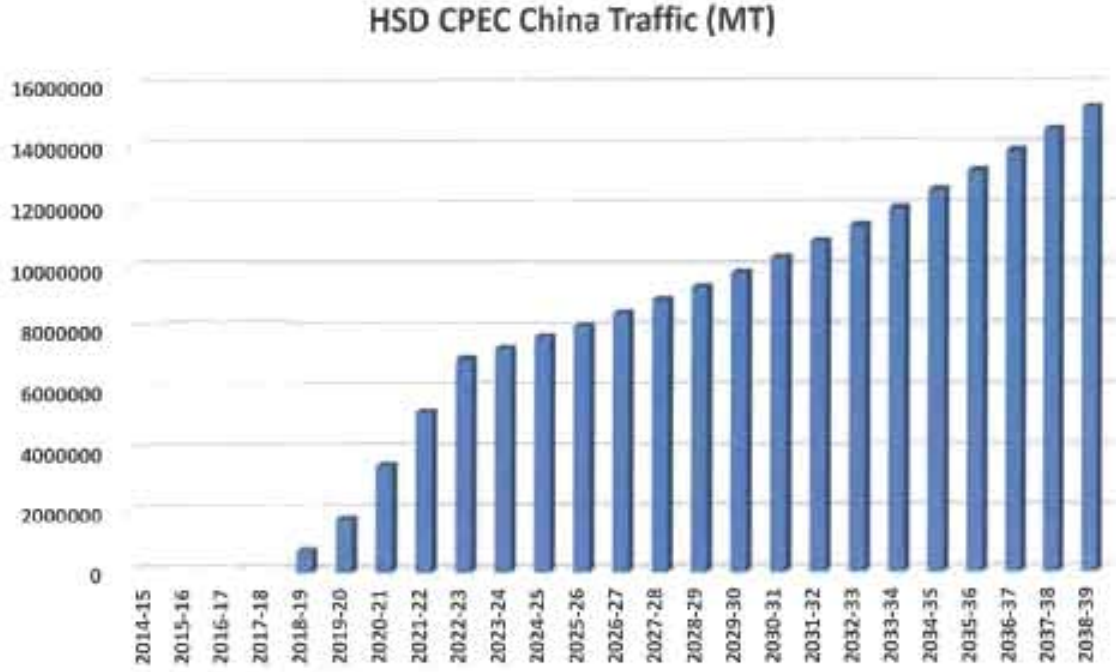
HSD Conservative Figures for year 2022-23

China Annual Containers Export	181,635,245	Nos
Pakistan	2674	KM
Trucks (2.5% Of Volume)	12,656	Per Day One way
Trucks (Return Traffic)	12,656	Per day One way
Trucks (total Traffic)	25,311	Per Day Both ways
Fuel Average	3	KM / Liter
Total HSD per day	22,283,333	Liters
Total Tons per day	18,941	Tons
Total Tons per Annum	6,999,463	Tons

28.8 HSD WITH CPEC TRAFFIC IMPACT

It is assumed that the CPEC traffic impact will increase rapidly between year 2018-19 to 2022-23 and from year 2022-23 it will increase at steady pace of 5% every year as depicted in the table below:

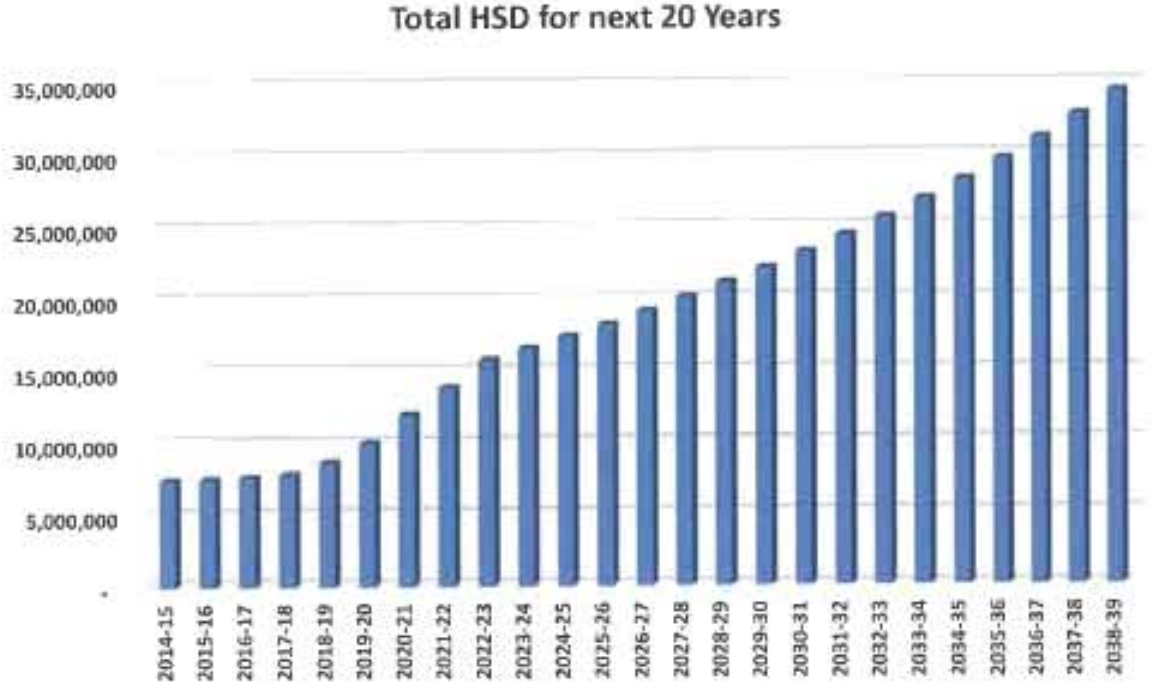
HSD Volume	CPEC China Traffic (MT)
2014-15	
2015-16	
2016-17	
2017-18	
2018-19	699,946
2019-20	1,749,866
2020-21	3,499,732
2021-22	5,249,598
2022-23	6,999,463
2023-24	7,349,437
2024-25	7,716,908
2025-26	8,102,754
2026-27	8,507,891
2027-28	8,933,286
2028-29	9,379,950
2029-30	9,848,948
2030-31	10,341,395
2031-32	10,858,465
2032-33	11,401,388
2033-34	11,971,458
2034-35	12,570,031
2035-36	13,198,532
2036-37	13,858,459
2037-38	14,551,382
2038-39	15,278,951


HSD CPEC China Traffic (MT)
16000000
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
2034-35
2035-36
2036-37
2037-38
2038-39

20.9 Total HSD Projection for next 20 years:

Based on above calculations, the total HSD consumption will be as follows;

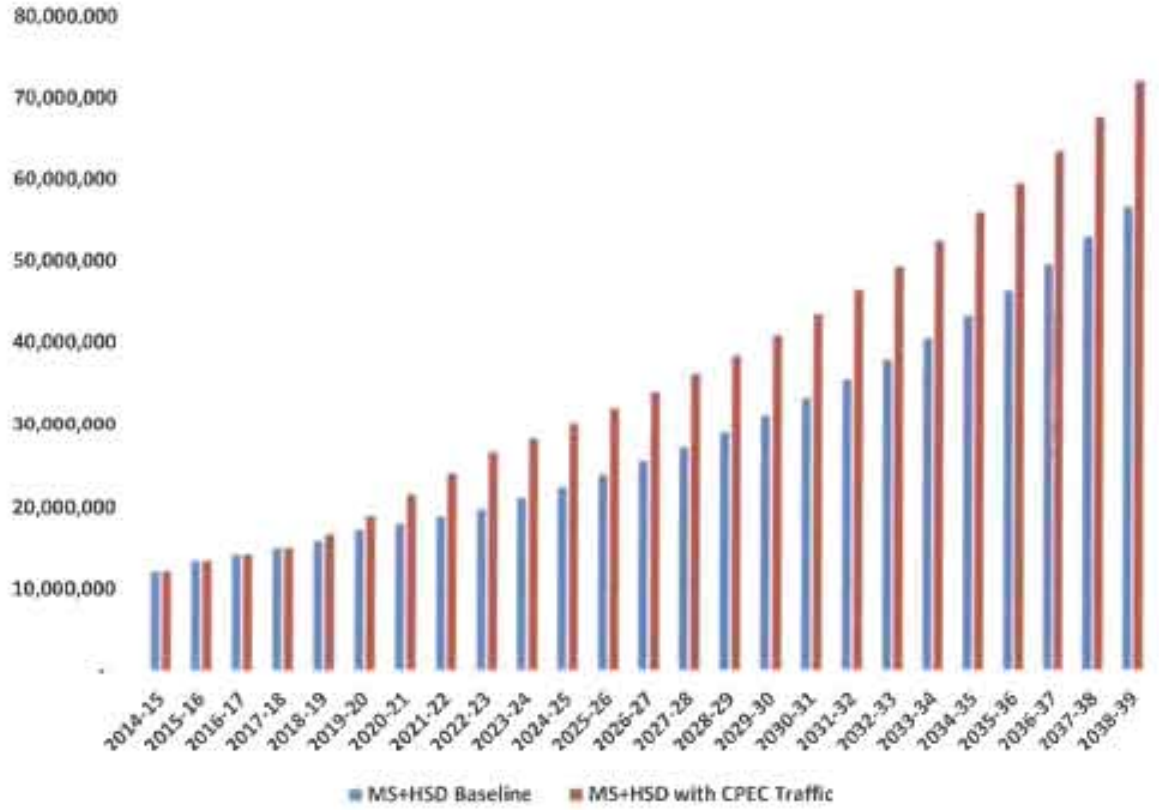
HSD Volume	Total with CPEC	Increase %
2014-15	7,417,017	
2015-16	7,500,000	
2016-17	7,650,000	
2017-18	7,803,000	
2018-19	8,659,006	
2019-20	10,027,288	
2020-21	11,942,702	
2021-22	13,861,428	
2022-23	15,783,530	
2023-24	16,572,707	
2024-25	17,401,342	
2025-26	18,271,409	
2026-27	19,184,979	
2027-28	20,144,228	
2028-29	21,151,440	
2029-30	22,209,012	
2030-31	23,319,462	
2031-32	24,485,436	
2032-33	25,709,707	
2033-34	26,995,193	
2034-35	28,344,952	
2035-36	29,762,200	
2036-37	31,250,310	
2037-38	32,812,825	
2038-39	34,453,467	


Total HSD for next 20 Years
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
2034-35
2035-36
2036-37
2037-38
2038-39

28.10 Future MS + HSD Baseline and MS + HSD with additional China Transi Trade Volumes:

Based on the concluding of the above data, the consolidated scenarios are as follows:

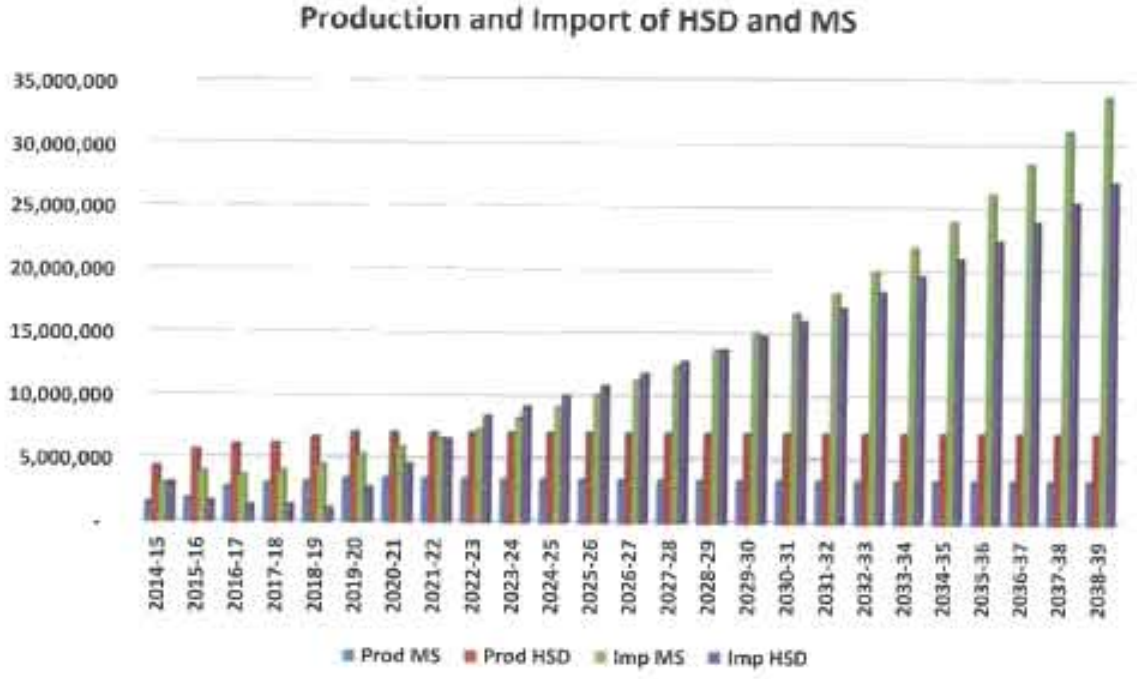
Year	MS+HSD Baseline (OCAC)	MS+HSD with CPEC Traffic
2014-15	12,149,398	12,149,398
2015-16	13,500,000	13,500,000
2016-17	14,250,000	14,250,000
2017-18	15,063,000	15,063,000
2018-19	15,945,060	16,645,006
2019-20	17,221,742	18,971,608
2020-21	18,013,393	21,513,125
2021-22	18,852,182	24,101,780
2022-23	19,741,243	26,740,707
2023-24	21,057,021	28,406,457
2024-25	22,464,884	30,181,793
2025-26	23,971,542	32,074,296
2026-27	25,584,206	34,092,097
2027-28	27,310,630	36,243,916
2028-29	29,159,152	38,539,102
2029-30	31,138,739	40,987,687
2030-31	33,259,036	43,600,432
2031-32	35,530,417	46,388,882
2032-33	37,964,042	49,365,430
2033-34	40,571,915	52,543,373
2034-35	43,366,956	55,936,987
2035-36	46,363,065	59,561,597
2036-37	49,575,201	63,433,659
2037-38	53,019,461	67,570,843
2038-39	56,713,175	71,992,125


MS & HSD Cosolidated Baseline VS CPEC (M. Tons)
80,000,000
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
-
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
2034-35
2035-36
2036-37
2037-38
2038-39
MS+HSD Baseline
MS+HSD with CPEC Traffic

28.11 Production and Import of HSD and MS

Import volumes are calculated after subtracting production volumes of a specific year from the total projected demand calculated above. The projections for present & future 5 years are taken from OCAC Pakistan Oil report 2014-15. We have interpolated data for next 20 years and Import figures are the projected demand figures which have been assumed in this report (as calculated above) by us minus the productions numbers of OCAC.

	Production		Imports	
Year	**Prod MS**	**Prod HSD**	**Imp MS**	**Imp HSD**
2014-15	1,591,439	4,458,357	3,141,126	3,203,705
2015-16	1,935,900	5,787,400	4,064,100	1,712,600
2016-17	2,873,700	6,268,400	3,726,300	1,381,600
2017 18	3,119,200	6,390,200	4,140,800	1,412,800
2018-19	3,317,300	6,822,400	4,668,700	1,136,660
2019-20	3,488,500	7,220,200	5,455,820	2,807,088
2020-21	3,488,500	7,220,200	6,081,922	4,722,502
2021 22	3,488,500	7,220,200	6,751,852	6,641,228
2022-23	3,488,500	7,220,200	7,468,677	8,563,330
2023-24	3,488,500	7,220,200	8,345,251	9,352,507
2024-25	3,488,500	7,220,200	9,291,951	10,181,142
2025-26	3,488,500	7,220,200	10,314,387	11,051,209
2026-27	3,488,500	7,220,200	11,418,618	11,964,779
2027-28	3,488,500	7,220,200	12,611,187	12,924,028
2028-29	3,488,500	7,220,200	13,899,162	13,931,240
2029-30	3,488,500	7,220,200	15,290,175	14,988,812
2030-31	3,488,500	7,220,200	16,792,469	16,099,262
2031-32	3,488,500	7,220,200	18,414,947	17,265,236
2032-33	3,488,500	7,220,200	20,167,222	18,489,507
2033-34	3,488,500	7,220,200	22,059,680	19,774,993
2034-35	3,488,500	7,220,200	24,103,535	21,124,752
2035-36	3,488,500	7,220,200	26,310,897	22,542,000
2036-37	3,488,500	7,220,200	28,694,849	24,030,110
2037-38	3,488,500	7,220,200	31,269,517	25,592,625
2038-39	3,488,500	7,220,200	34,050,159	27,233,267


Production and Import of HSD and MS
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
2023-24
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
2034-35
2035-36
2036-37
2037-38
2038-39
Prod MS
Prod HSD
Imp MS
Imp HSD