

“Environment Impact Assessment Report of “Augmentation/Conversion of Storage Facilities at Vijayawada Terminal”

EXECUTIVE SUMMARY

Project Description

Project proponent

Hindustan Petroleum Corporation Limited (HPCL), Public Sector “Navratna” Oil Company with its headquarters at Mumbai, is one of the major companies engaged in refining, marketing and distribution of Petroleum Products in India. HPCL operates two refineries - one at Mumbai and another at Visakhapatnam, and holds equity stake in Mangalore Refineries and Petrochemicals Limited. The company owns a wide network of distribution and marketing infrastructure throughout the country, comprising terminals, depots, pipeline networks, aviation service stations, LPG bottling plants, inland relay terminals and retail outlets, lube and LPG distributorships, etc. Total cross country pipeline network of HPCL is around 2572 Kms with a capacity of 23.57 MMTPA.

HPCL operates Vizag - Vijayawada - Secunderabad pipeline for transportation of MS, HSD, SKO & ATF, with a name plate capacity of 5.38 MMTPA (especially to feed Andhra Pradesh & Telangana market). The company now proposes to install a new pipeline of 4.48 MMTPA capacity from Vijayawada to Dharmapuri (VDPL) in Tamilnadu, which will initiated through existing POL Terminal at Vijayawada.

Proposed Project

At present, Vijayawada Terminal has facilities for receipt of petroleum products through VVSPL pipeline, their storage within terminal and dispatch through existing VVSPL pipeline, and tank lorries. As HPCL intend to install a pipeline from Vijayawada to Dharmapuri, the existing storage, pumping and associated facilities at the terminal would not be adequate and therefore, installation of additional facilities is proposed.

The proposed project is for enhancing of storage, pumping and other associated facilities within the existing Vijayawada Terminal to meet the requirement of the proposed VDPL pipeline. The storage capacity of existing Vijayawada Terminal is 2, 22,973.5 KL. After augmentation of 2,070 KL the total storage capacity will be 2, 25,043.5 KL. The proposed Augmentation/Conversion Project of existing Vijayawada Terminal includes:

- Facilities for receipt of additional petroleum products from existing Vizag-Vijayawada-Secunderabad (VVSPL) pipeline
- Storage capacity expansion at the terminal by 2,070 KL, addition of 1000 KL of Ethanol and 1070 KL of Bio diesel .
- Centrifugal pumps: 2 working + 1 stand by for pipeline pumping the products towards Dharmapuri in the proposed VDPL, and associated facilities.
- Basket filters 1 working + 1 stand by
- Pigging facilities in the main pipeline
- Dispatch facilities in the existing terminal
- Flow meter and pressure control valves
- Pipeline control room modification for monitoring
- Modification of existing fire fighting facilities
- DG Set: 1 x 250 KVA
- Admin Building

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Project Location

The proposed augmentation/ expansion will be implemented in existing Vijayawada Terminal, located vill. Kondapalli, Distt. Krishna, Vijayawada city in the state of Andhra Pradesh. Geographically, the terminal is located between latitudes 16°39'37.52"N to 16°39'5.75"N and longitudes 80°33'30.90"E to 80°33'34.58"E. The terminal is approx. 20 km from Vijayawada city. The nearest railway stations are Kondapalli – both approx. 3km from the Terminal. The nearest domestic airport is at Vijayawada.

Land Requirement

The total land area available in Vijayawada Terminal is around 137.3 Acres. The total land is under possession of HPCL, and no further land acquisition is required for implementing the proposed project.

Water Requirement and Source

The existing water consumption in the terminal is approx. 15.03 KLD [15 KLD(Washings and Domestic & Gardening) + 12 KL (per 2 mock drills in the year.)], which includes domestic uses, washings, plantation, fire drills, etc. The source of water is ground water, extracted within premises through tube wells. For operations of the proposed augmentation/expansion, approx. 3 KLD additional water will be required. Water conservation measures will be adopted to meet the additional requirements without increasing the withdrawal of ground water.

Technology and process description

The POL Terminal mainly has handling and storage facilities of different petroleum products. The brief process description is as follows:

- The Product is presently received through VVSPL pipeline, and onward transfer towards existing Secunderabad terminal. A new spur line Vijayawada-Dharmapuri Pipeline is proposed from existing Vijayawada Terminal to meet the demand of nearby states. The storage capacity of existing Vijayawada Terminal is 2, 22,973.5 KL. After augmentation of 2,070 KL the total storage capacity will be 2, 25,043.5 KL. On implementation of the project, petroleum products will be received through the existing VVSPL and transfer towards VDPL from existing Vijayawada Terminal.
- Routing of different products in their designated tanks through pumps, pipelines and manifolds.
- Storage in Tanks
- Dispatch of products through tank pipeline and truck Lorries to retail outlets.
- To HPCL installation through existing VVSPL pipeline
- Onward transfer of products to Dharmapuri Terminal through VDPL-pipeline

Existing storage facilities

The POL terminal of HPCL at Vijayawada is provided with storage tanks for Class A & B petroleum products. The tanks for Class A petroleum are floating roof tanks (FRV) while the tanks for Class B petroleum products are closed roof tanks (CRV). The design of the installation is in accordance with Indian standards OISD 117,118,141 and as contained in Petroleum Rules and approved by The Chief Controller of Explosives. The details of product storage tanks are as follows:

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Tank No.	Product	Class	Type Of Tank
31-T-001a	MS	A	Floating Roof
31-T-001b	MS	A	Floating Roof
31-T-001c	MS	A	Floating Roof
31-T-007c	LAN	A	Floating Roof
31-T-007d	MS	A	Floating Roof
31-T-002a	SKO	B	Floating Roof
31-T-002b	SKO	B	Floating Roof
31-T-004a	SKO	B	Int.Fl Roof Ext. Fixed Roof
31-T-003a	HSD	B	Floating Roof
31-T-003b	HSD	B	Floating Roof
31-T-003c	HSD	B	Floating Roof
31-T-007a	HSD	B	Floating Roof
31-T-004b	ATF	B	Int.Fl Roof Ext. Fixed Roof
31-T-004c	ATF	B	Int.Fl Roof Ext. Fixed Roof
31-T-002c	Bio diesel		Cone Roof
31-T-05a	Slop	A	Cone Roof
31-T-05b	Slop	A	Cone Roof
31-V-011	BlueDye Vessels	B	Vertical Type
31-V-014a	Additives Vessels	A	Vertical Type
31-V-014b	Additives Vessels	B	Vertical Type

Tag No.	Description	Class	Type Of Tank
31-V-001	Ms Sump Vessels	A	Horizontal
31-V-002	Sko Sump Vessels	B	Horizontal
31-V-003	Hsd Sump Vessels	B	Horizontal
31-V-008	Hexane Vessel	A	Horizontal

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31-V-009	Hexane Vessel	A	Horizontal
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The underground MS/HSD/SKO tanks are used for unloading products from sink tank trucks and removal of excess loaded products from the tank trucks. All the tanks have been installed in separate dyked enclosures as per OISD standards.

Proposed Additional storage facilities

Under the proposed augmentation/conversion of Vijayawada Terminal, the following additional storage tanks are proposed.

Name of the products	Existing Capacity (KL)	Proposed Capacity (KL)	Total Capacity after Augmentation (KL)
MS	73,090	0	73,090
HSD	1,07,112	0	1,07,112
SKO	26,070	0	26,070
Hexane	70	0	70
ATF	10400	0	10400
LAN	5200	0	5200
Slop	800	0	800
Turbo	0.5	0	0.5
Power	0.5	0	0.5
Blue dye	0.5	0	0.5
Bio diesel	70	1070	1140
Ethanol	160	1000	1160
Total	2,22,973.5	2,070	2,25,043.5

Preventive Measures for Leakages and Accidents

Fire protection and detection system has been provided in accordance with OISD 117. Fire detection and protection system, fire alarm system, fire extinguishers, fire water tank, Hydrocarbon Detectors and Emergency Shutdown System are installed within the POL terminal. High Volume Long Range (HVLR) monitors are being installed as per recommendations of M B Lal Committee.

Wastewater Treatment

One number of effluent treatment plants, comprising Collection Sumps and Oil water Separator has been provided. Washings and storm water from Tank farm, Pump bays and loading gantry areas are routed into the Collection Sumps and passed through the Oil Water Separators for removal of oil from the contaminated water.

Project Cost

The total capital cost of the proposed augmentation/expansion project at existing Vijayawada Terminal is around Rs 85.15 Crores.

DESCRIPTION OF THE ENVIRONMENT

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A brief description of study area, period, components and methodology adopted for establishing baseline characteristics of the environment are as follows:

- Study area: Area located within 10 km distance from the terminal
- Study period: March to May, 2018 (Pre-monsoon or summer season)
- Components: All components and parameters of the environment, as required under the Standard Terms of Reference, published by Ministry of Environment, Forest & Climate Change.
- Methodology: As specified by Central Pollution Control Board and Bureau of Indian Standards and EIA Manual published by MOEF&CC.

Land Environment

Topography & Drainage: The area has predominantly undulated hilly topography and is situated in Dist. Krishna, Vijayawada region of Andhra Pradesh. Average elevation of the site is 11 m above mean sea level. The study area is drained by the river Krishna, which is 9 Km to the South of the terminal.

Land use/ land cover: Brief statement of the land use/ land cover of the study area is as follows:

- Open and agricultural land : 25.47%
- Land under settlements : 2.13%
- Forest and vegetation : 67.86%
- Water bodies : 3.62%
- Waste land : 0.93%

Soil quality: Soils of Vijayawada district are classified as black cotton soil, existing in major parts of the district. To establish the baseline characteristics, soil samples from 8 locations in the study area were collected and analyzed. Soils in the study area are sandy loam with pH between 7.16 to 7.64. Potassium, nitrogen and phosphorous were found in the range 0.9 to 2.9 mg/100 gm, 18.4 to 24.2 mg/100 gm, and 2.4 to 3.8 mg/100 gm, respectively.

Climate and Meteorology

The climate of Vijayawada District is tropical. In winter, there is much less rainfall in Vijayawada than in summer. According to Köppen and Geiger, this climate is classified as Aw (Tropical wet and dry). The period from June to October is wet and the average monthly rainfall is more than 183 mm. Annual average precipitation here averages 1067 mm. In Vijayawada, the average annual temperature is 28.5°C. The ambient temperature varies from a minimum of 19°C in December and January to a maximum of 40°C in May. To establish the baseline status, a meteorological station was established at the site, and hourly average values of wind speed, wind direction, ambient temperature, humidity and precipitation were recorded continuously from March to May, 2018.

Air Quality

- Summary of studies performed and observations made to establish the existing ambient air quality of the study area is as follows.
- No. of Monitoring stations for data collection: 8
- Period of Base Line Data Collection: March to May, 2018
- Frequency of sampling: twice/week at each location

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- Averaging period: 24 hours (8 hours for CO)
- Season of study: Pre-monsoon (Summer) season
- Summary of observations:

Pollutants	Unit	Maximum value	Minimum value	98 th Percentile value (Max.)	Prescribed standard
PM ₁₀	µg/m ³	98	64	96.62	100
PM _{2.5}	µg/m ³	55	31	54.08	60
SO ₂	µg/m ³	14	6	14	80
NO ₂	µg/m ³	28	14	27.08	80
CO	mg/m ³	0.97	0.58	0.95	2
HC	ppm	0.26	0.12	0.26	NA
VOC	ppm	BDL	BDL	BDL	NA

Surface water Quality

Water samples from the two important surface water bodies in the study area, viz. Krishna River and near Santhinagar Canal, were collected and analyzed with a frequency of once in a month (3 samples from each source during the study period). Important characteristics of the water samples are as follows.

Paramter	Unit	Krishna River	Near Santhinagar Canal
Turbidity	NTU	1.7	2.1
pH	Units	7.64	7.57
Alkalinity as CaCO ₃	mg/l	213	247
Total dissolved solids	mg/l	462	454
Total hardness as CaCO ₃	mg/l	250	305
Calcium hardness as CaCO ₃	mg/l	150	182
Sulphate as SO ₄	mg/l	100.5	122.6
Chloride as Cl	mg/l	69.70	61.32
Nitrate as NO ₃	mg/l	32	20
Fluoride as F	mg/l	1	1
Iron as Fe	mg/l	0	0
Dissolved Oxygen	mg/l	7	7
B. O. D.	mg/l	10	8
C. O. D.	mg/l	28	24
Total Coliform	MPN/100ml	863	360
Faecal Coliform	MPN/100ml	156	78

Phenolic compounds and heavy metals were not detected in the samples.

Ground water quality

Water samples from 8 locations in the study area were collected and analyzed with a frequency of once in a month (3 samples from each source during the study period). Important characteristics of the water samples are as follows.

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Paramter	Unit	Minimum	Maximum	Standard
pH	Units	7.48	7.62	6.5 – 8.5
Alkalinity as CaCO ₃	mg/l	362	370	200 / 600
Total dissolved solids	mg/l	788	804	500 / 2000
Total hardness as CaCO ₃	mg/l	390	396	200 / 600
Calcium hardness as Ca	mg/l	95.5	97.3	75 / 200
Sulphate as SO ₄	mg/l	49	50	200 / 400
Chloride as Cl	mg/l	186	188	250 / 1000
Nitrate as NO ₃	mg/l	24.5	25	45
Fluoride as F	mg/l	0.72	0.74	1.0 / 1.5
Iron as Fe	mg/l	0.12	0.15	0.3
Total Coliform	MPN/100ml	Absent	Absent	Absent
Faecal Coliform	MPN/100ml	Absent	Absent	Absent

Phenolic compounds and heavy metals were not detected in the samples..

Noise level

The existing levels of noise were monitored at 8 locations, where hourly average noise levels dB(A) were monitored continuously for 24 hours at each locations. Day time and night time noise levels were computed from the measured values. Noise levels at the one commercial areas were found as 62.4 dB (A) during day time and 48.6 dB (A) during night time. At the 7 monitoring locations in residential areas, noise levels were found as 44.6 to 52.4 dB (A) during day time and 38.2 to 42.6 dB (A) during night time. All the measured values are within Ambient Air Quality standards for Noise.

Ecological & Bio-diversity

The study area comes under “**Eastern Ghats**” bio-geographic zone of India (*India State of Forest Report, 2015*). After inspecting all the surroundings it was observed that there are two different ecosystems exist within the project area (aquatic and rocky hillocks). It was also observed that there are 4 major ecosystems in the study area - Forest ecosystem (Kondapalli reserve forests), River ecosystem (Krishna River), Riparian ecosystem (along the banks of Krishna River), and agriculture ecosystem.

The Top canopy mainly consists of *Lannea coromandalica* (Gumpena), *Chloroxylon swietenia* (Billudu), *Anogeissus latifolia* (Chirumanu), *Hardwickia binata* (Narayepi), *Givotia rottleriformis* (Tella poliki), *Diospyros melanoxylon* (Tendu) and *Dalbergia paniculata* (Pachari). Middle storey consists of *Albizia amara* (Chigara), *Acacia sundra* (Sundra), *Emblia officinalis* (Usiri), *Cassia fistula* (Rela), *Strychnos nux-vomica* (Musti), *Bridelia retusa* (Koramamu), *Bambusa arundinacea* (Mulle), *Azadirachta indica* (Vepa), *Bauhinia racemosa* (Aari), *Carissa spinarum* (Kalivi), *Gymnosporia montana* and *Dendrocalamus strictus* (Sadana). The bottom storey is composed of shrubs viz., *Mundulea suberosa*, *Dodonaea viscosa* (Banderu), *Zizyphus oenoplia* (Pariki) and *Helecteres isora*. The floor bears grasses such as *Schima nervosum* (Nendra), *Andropogon contortus*, *Cymbopogon coloratus* (Bodha gaddi), *Aristida setacea* (Broom stick), *Chloris barbata* (Uppu gaddi) and occasional *Phoenix acaulis*. *Bauhinia vahlii* (Addateega), *Acacia caesia* (Korintha), *Pterolobium indicum* (Cheeki), *Butea superba* (Teega moduga) etc climbers are found.

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Analysis of trees data shows that among three sites *Acacia sundra* was most frequent species followed by *Diospyros melanoxylon*, *Pterocarpus marsupium*, and *Tectona grandis*. Density of *Acacia sundra* was also recorded highest among the tree species followed by *Tectona grandis*, *Diospyros melanoxylon*, and *Pterocarpus marsupium*. These tree species were abundantly distributed within the region. Importance value index values were also comparatively high, which show that importance of these species was relatively high in the ecosystem in terms of biomass, productivity etc.

Carnivores such as *Felis chaus* (Jungle cat), *Vulpes bengalensis* (Common fox), *Canis aureus* (Jackal) and *Canis lupus* (Wolf), herbivores such as *Axis axis* (Spotted deer), *Sus scrofa* (Wild pig), *Hystrix indica* (Indian crested porcupine), *Lepus nigricollis* (Black napped hare), *Semnopithecus entellus* (Common langur) and *Macaca maculata* (Rhesus macaque) etc are found in this region.

There is no Wildlife Sanctuary, National Park and Biosphere Reserve in the entire study area. No Endemic, Threatened or Endangered species are found or sited in the study area.

Socio-economical Environment

Study of socio economic profile around the proposed project site has been carried out based on the Census of India 2011. The study area has been considered to be an area covered within a radius of 10 km around the proposed project site beyond which no appreciable impact due to the project is envisaged. The salient features of socioeconomic profile of the study area are as follows:

- The population in the study area is 1, 48,045 with a population density of 518 persons per square kilometer.
- The Sex Ratio (Female per 1000 Male) is 1,023.
- Scheduled Castes (SC) as percentage of total population is 24.5%. Scheduled Tribes (ST) is as 5.6% percentage of total population in the study area.
- In the study area male literacy rate is 79. 4% while female literacy is 69.3%.
- Percentage of main works in the study area is 89.6%. Percentage of marginal workers is 10.4 %.

ANTICIPATED ENVIRONMENT IMPACTS AND MITIGATION MEASURES

Appropriate environmental mitigative measures will be ensured to eliminate/minimize detrimental impacts during this phase. These measures include dust suppression by arranging mobile water sprinklers; in the parking area. Main aspects and activities during operation phase of the proposed project having potential for inducing environmental and/or social impacts are as follows:

- **Hydrology**

Required consumptive water for the existing plant is met from borewells available at the terminal. However, additional water requirement is envisaged for the proposed expansion shall be met from tanker supply. It is therefore expected that this drawl of water for the proposed project is expected to cause adverse minor impact of concern on ground water regime.

- **Air Environment**

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As one 250KVA capacity of new emergency DG set is proposed for the augmentation, emission from the stacks of emergency DG sets is applicable for the proposed project. Additionally some hydrocarbon emission will take place as fugitive emission from leakages of gland, seals etc

- **Water Environment**

Only oily wastewater and domestic effluents will be generated during operation phase. The same will be treated suitably. The wastewater treatment philosophy is based on maximum recycling and re-use.

- **Physical Environment**

For the proposed augmentation no new land will be acquired since the total land (including the land required for proposed expansion) is under possession of HPCL. So the proposed expansion does not have any significant impact on the physical environment.

- **Impact of Solid Waste**

The quantum of solid waste generated from the proposed plant is meagre. Total tank bottom sludge generated during cleaning of oil storage tanks is kept in secured, covered impermeable sump vessels/sludge pit located within POL terminal at a central place earmarked for the purpose prior to safe disposal through effluent treatment plant.

- **Social Environment**

With further development of the area due to the addition of pumping and pigging facilities of the existing terminal, it is expected that civic services in the locality will further improve. The project will have a positive beneficial effect on socioeconomic environment. For the present project, there is no R & R issues involved since the project is an expansion project for which the total land is under possession of HPCL.

Measures for Minimizing Adverse Impacts

- **Air Pollution Control**

Following steps will be taken to control air pollution:

- The emergency DG has stack of adequate height as specified by CPCB.
- 80% of hydrocarbon is stored in Floating Roof (FR) tank to minimize vapour losses.
- Greenery is already developed around the air pollution sources and also along plant boundary to restrict air pollution.

- **Water Pollution Control**

- The wastewater management philosophy is based on “Minimum Discharge” concept. All oily effluents are diverted to Oil Water Separator (OWS). The waste water from OWS after removal of oil & after testing is used for greenery development at the facility. The collected slop oil shall be disposed off to third party for off-site recovery or recycling.

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- **Solid Waste Management**

Tank bottom sludge is generated while cleaning of oil storage tanks. The cleaning of oil storage tanks is done once in five years as per practice of Oil Industry. Total tank bottom sludge thus generated is kept in secured and will be handover to authorized agency. Other hazardous wastes like spent batteries, waste oil, empty drums of oil/chemicals, fluorescent tubing etc. is disposed off in accordance with approved safe procedures. All biodegradable waste (food and kitchen waste) at the POL Terminal is collected and disposed off as per well established practice.

- **Noise Mitigation**

All general equipment is procured with built-in noise abatement measures to restrict noise level not exceeding 85 dB(A) when measured 1 m away from the source surface. The entire plant is so installed so that the resultant noise level within the plant premises remains within 75 dB(A) during day time and 70 dB(A) during night time respectively.

Assessment of Significant Impacts

- **Land**

No additional land is being acquired. Existing industrial land is going to be utilized for the augmentation of storage, pumping, dispatch and pigging facilities. Hence, no impact on land is envisaged

- **Water Source**

As 3KLD additional water requirement is envisaged for the proposed augmentation through tanker supply and recycling and re-use of effluent water have also been envisaged, this is not expected to be a problem of concern.

- **Water Quality**

Wastewater management is based on “Minimum Discharge” approach. Suitable treatment philosophy has been envisaged for washing and domestic effluents. No detrimental impact on the surface water quality is expected.

- **Air Quality**

The ambient air quality of the surrounding of the proposed site represents the expected scenario. The proposed project with the conceived pollution control measures are not expected to induce any impact beyond tolerable limit.

- **Ecology**

All emission and discharges from the proposed plant will be conforming to norms. Hence no detrimental impact on ecology is envisaged.

- **Rehabilitation**

No Resettlement and Rehabilitation (R & R) issue is involved with the proposed project, as the entire land is under possession of HPCL. It is barren and non-agricultural land free from human habitation.

- **Employment/Occupation**

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Marginal workers constitute about 10.4 % of the total population in the study area. The proposed project will generate further indirect employment opportunity and further development of the area.

▪ **Housing**

The proposed Vijayawada terminal falls in Industrial area hence there is no adverse impact on housings.

▪ **Education and Health**

Local literacy rate and educational facilities are fair. Reasonable medical facility is available for immediate attention. It is expected that existing medical and educational facilities will improve due to implementation of the project.

▪ **Services**

The local villages have reasonable civic services. The immigration of people will not strain existing facilities. Thus the overall impact assessed has been found to be appreciably beneficial

ENVIRONMENTAL MONITORING PROGRAM

To ensure the environmental quality in the post project scenario, a monitoring system is proposed. The components of proposed environmental monitoring programme includes

- i. Water monitoring,
- ii. Land monitoring;
- iii. Air and noise monitoring;
- iv. Process and waste monitoring
- v. People and community monitoring and
- vi. Biological monitoring.

An Environmental Management Cell (EMC) is overall responsible for co-ordination of the actions required for environmental monitoring programme and environmental management plan.

ADDITIONAL STUDIES

In the proposed project scenario of emergency may arise due to the accidental release of petroleum products like MS, HSD, and SKO. All safeguard measures as recommended by OISD, Dept of Explosive & statutory authorities are envisaged. No Resettlement and Rehabilitation (R & R) issue is involved with the proposed project.

For the present project, Public Consultation is recommended by SEIAA, Andhra Pradesh while prescribing the Terms of Reference of the EIA study.

PROJECT BENEFITS

The proposed project is expected to bring significant socio-economic and environmental benefits both at local and national level. The physical and social infrastructure will improve in a significant manner. The project will also create some long term and short-term direct /indirect employment. Thus, the proposed project has ushered in the social and economic upliftment of the persons living in the vicinity of the project i.e. of society at large.

ENVIRONMENTAL MANAGEMENT PLAN

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The EMP has been designed within the framework of various legislative and regulatory requirements on environmental and socio-economic aspects of different national and international bodies. EMP includes the following components:

Impact Mitigation Measures during Operation Phase includes Solid Waste Management, Air Pollution Control Measure, Water Pollution Control Measure, Noise Pollution Control Measure, Greenery Development, Socio – Economic Measures, Occupational Safety and Health, Emergency Preparedness (Disaster management Plan) and Audit.

Construction Phase: During construction phase, all precautionary measures shall be taken for dust suppression, prevention of soil erosion and noise reduction. The effect due to construction activities will be temporary in nature and will have no permanent effect on the environment.

Operation Phase: The entire operation of receipt, storage and delivery is carried out under closed circuit and leak proof system so as to avoid emission of hydrocarbon vapours into the atmosphere. However, For detection of leakages, HC Detectors shall be installed at suitable locations.

Air Emissions: There is practically no source of air pollution in the proposed facilities. All the storage tanks shall be leak proof and products shall be handled through closed pipes and adopting proven technological art and options. The sources of atmospheric emissions are limited to fugitive emission of HC vapours and the DG Set, which will be operated in case of power cut. Even when the DG set is operated, emissions of SO₂ and NO_x shall be within the threshold limit. The stack height of the existing DG sets has been kept as per prescribed standard. To detect any leakage during loading operations of MS, HC Detector shall be installed in TLF areas.

Wastewater Generation: There would be insignificant increase in quantity of wastewater after installation of proposed facilities. Sanitary waste water from canteen, wash rooms and toilets shall be treated in septic tank and disposed off through soak pits. Oily wastewater due to floor washing and contaminated surface run-offs shall be sent to existing Oil Water Separators for removing the oil content. The capacity of existing oil water separators is sufficient to sustain the increased load of oily wastewater, if any. The oil free wastewater shall be used in gardening of afforested areas.

Afforestation Program: HPCL and Vijayawada Terminal are conscious of importance of green belt. Different varieties of plants have been planted in vacant spaces and the area identified earlier for plantation. Suitable variety of flora species shall be planted in the available vacant spaces. Further, lawns and gardens will be developed with ornamental plants in vacant land within the terminal. Out of 137.3 acres, about 23.67 acres area has already been brought under green belt development program.

Preventive Maintenance & Planned Inspection: Preventive maintenance and planned inspection of the facilities will be done in accordance with OISD and as per schedule. Record keeping for jobs done would be maintained. The intermittent inspection and maintenance schedule would be prepared as per directive and procedures laid down by OISD.

Energy Saving Programs: It involves installation of energy efficient lighting system which reduces indirectly the generation of green house gases, and other air pollutants. However,

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there shall not be any compromise with required illumination at working places. Use of energy efficient electrical appliances shall be encouraged.

Occupational safety and Health: HPCL endeavor to create and provide the Working Environment to fit the Workmen instead of forcing a workman to adopt the Working Environment. Occupational health and safety issues addressed in the terminal have taken appropriate care against the potential of chemical hazards, fire & explosion, and confined spaces.

CONCLUSION

Any adverse impact due to the proposed project on air, noise, water, land and ecological environment is insignificant and the socio-economic benefits are predominantly positive. It is also evident from the risk analysis study that acceptable individual risk level of 1.0, 10⁻⁶/ year is mainly confined within the plant boundary. All the relevant safety norms with latest technology shall be incorporated to ensure safe operation of the terminal. In view of the above, it may be opined that the proposed project in totality may be considered environmentally safe.