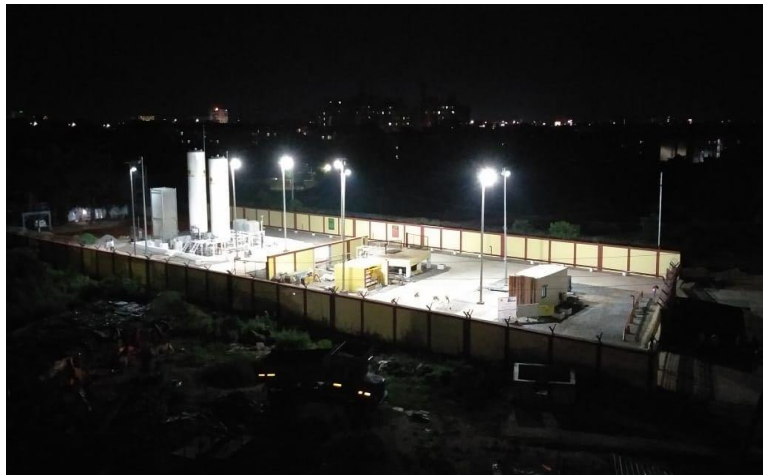




Operation & Safety of LCNG Satellite Station



AMITABH GHORAI
GAIL (India) Limited
CGD, BBSR



BENEFITS OF LCNG SATTELITE STATION

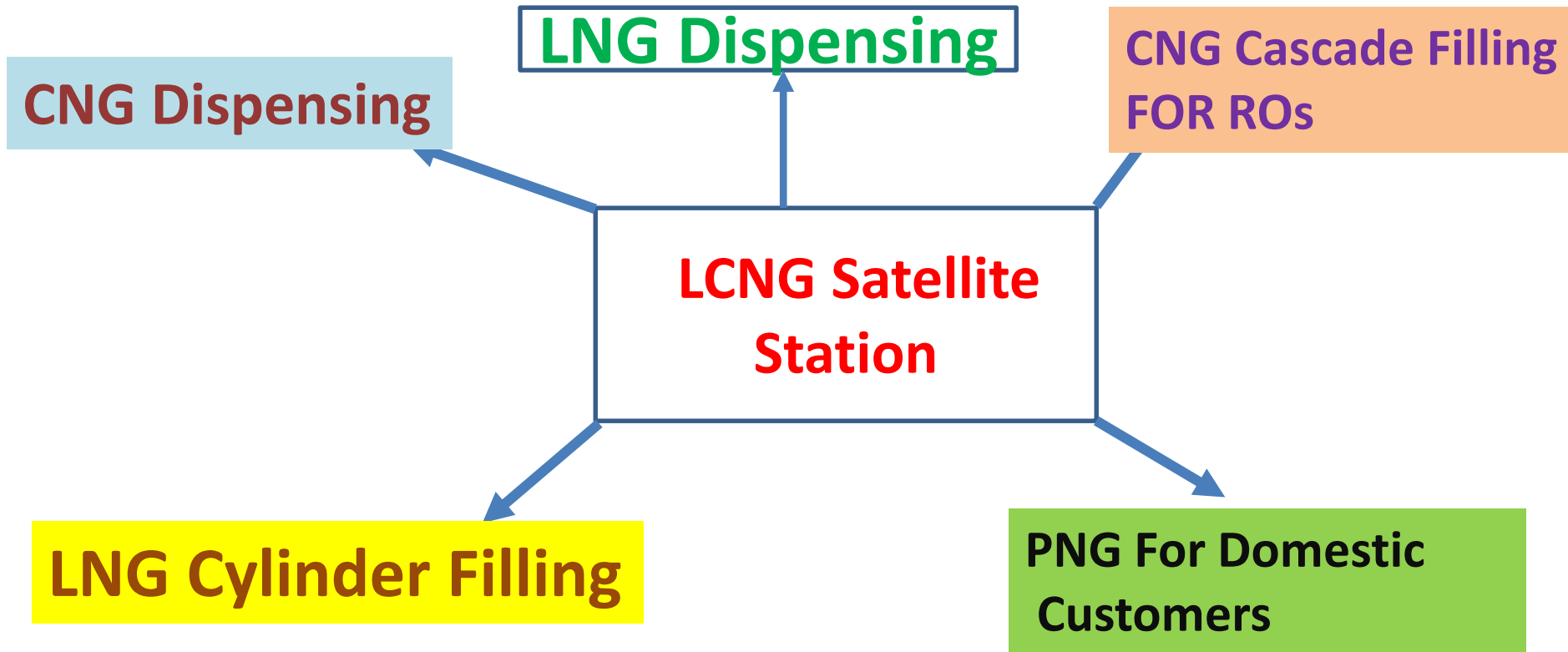
Development of City Gas Distribution where main gas pipeline is not available

Supply of CNG , PNG & LNG in a cost-effective manner

Reduces the uncertainty of gas availability due to bulk storage of LNG

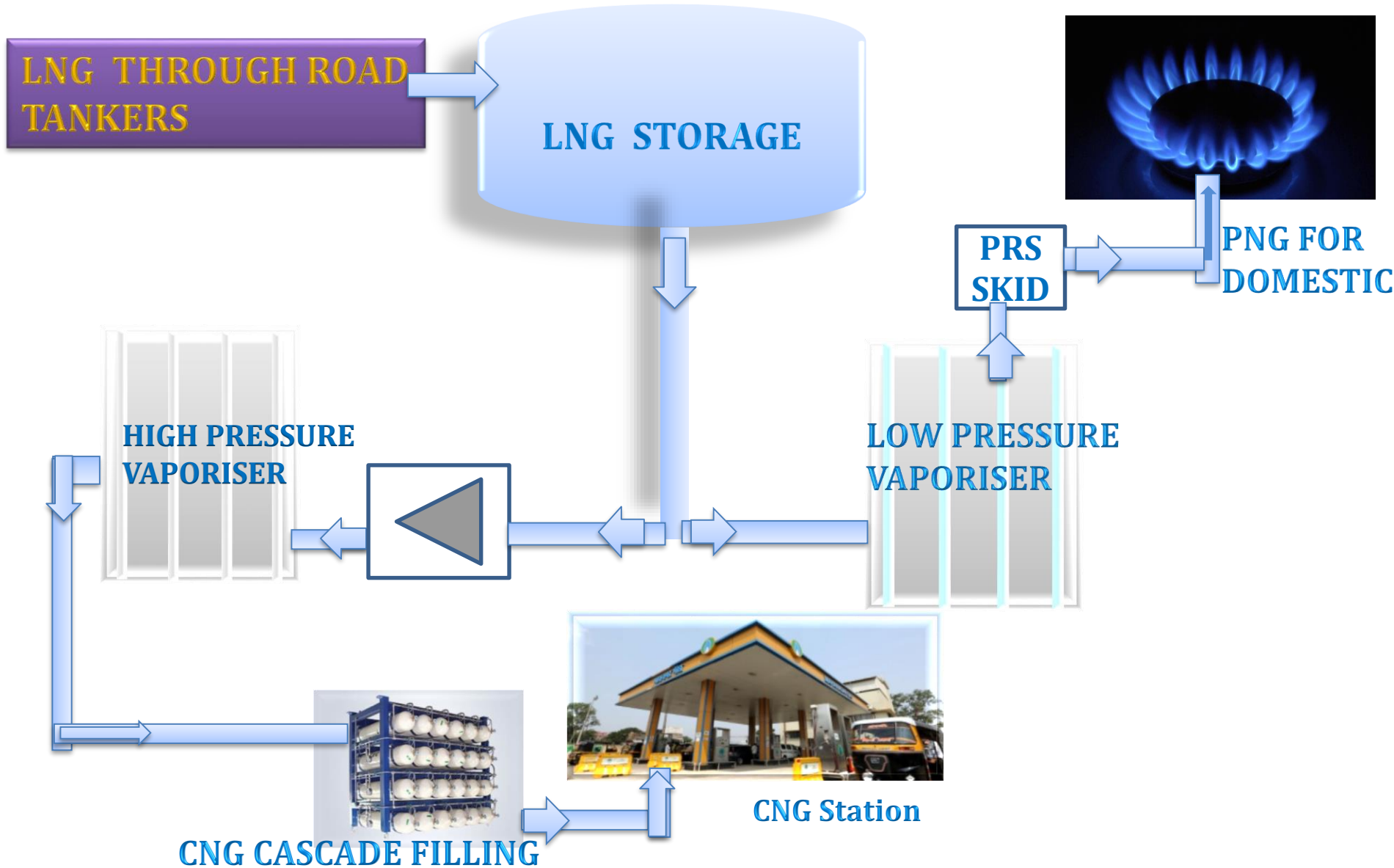


INTEGRATION OF LCNG SATELLITE STATION IN CGD NETWORK





Schematic Diagram of Satellite LCNG Station





AVAILABLE SYSTEMS OF LCNG SATELLITE STATION

- 1. LNG unloading Skid**
- 2. LNG Storage Tank(s)**
- 3. LNG Low Pressure Re-gasification & PRS Skid(For PNG)**
- 4. High Pressure CNG cascade filling(For CNG)**
- 5. Odorizer System(For both PNG & CNG)**
- 6. LNG Cylinder filling System (Future Plan)**



LNG ROAD TANKERS





ROAD TANKER IN-BUILT UNLOADING SYSTEM





LNG UN-LOADING SKID



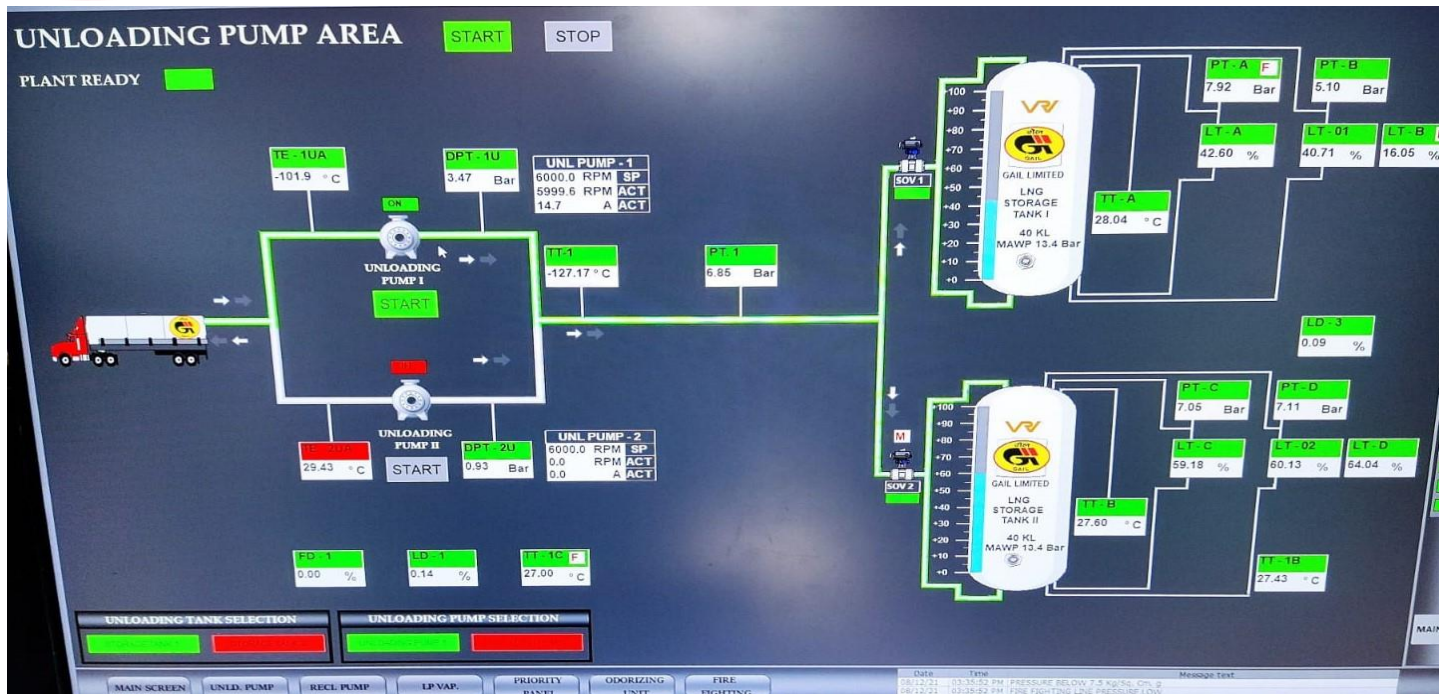
Cryogenic LNG Tanker at Unloading point of the Station



Unloading Pump Skid



LNG UNLOADING SYSTEM OPERATION



- **LNG Unloading Sequence:**

- 1. Connecting the unloading hoses after inspection of documents & tanker physical condition
- 2. Cool down of Unloading skid(including pump & loop)
- 3. Unloading of LNG into storage tanks(Top/Bottom filling)
- 4. Disconnection & clearance for dispatch



LNG STORAGE TANKS



Type of Storage Vessel:
Vertical Double Walled Vacuum
Insulated & Perlite filled
Inner Shell MOC: SS304
Outer Shell MOC: CS
Inner Shell Design Temp:-196 to
+60 DegC
Safety valve set point:13.4 Bar



LNG Tank Pressurization System





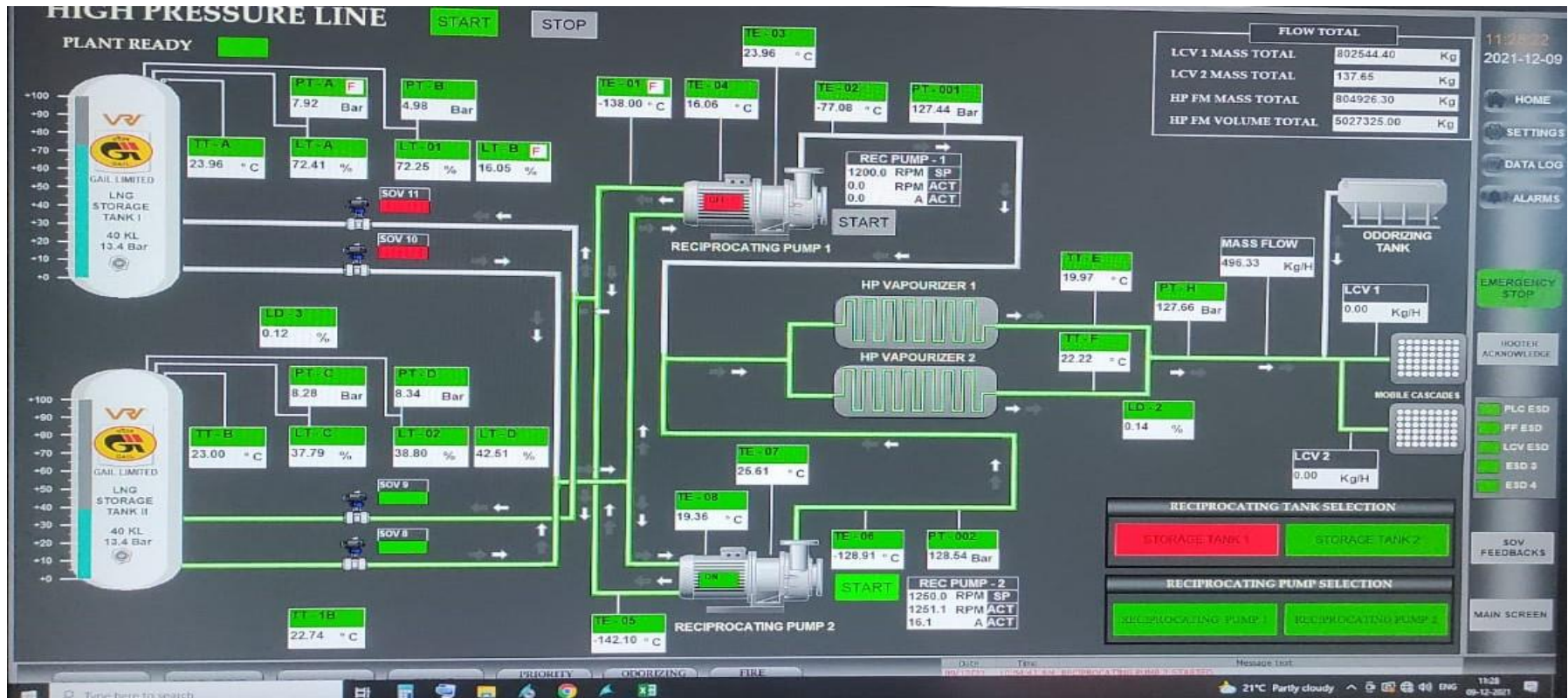
HP CNG FILLING SYSTEM



**High Pressure Pump Capacity-
20LPM @ 250 BAR(each)
Power Consumption- 22 kw**



HP SYSTEM FOR CASCADE FILLING



1. Connecting the mobile Cascade with LCV filling point
2. Lining up HP Vaporizer & Odorant dosing system
3. Cool down of HP pump
4. Start-up of the purging system of HP pump
5. Starting of HP pump with odorant dosing



HIGH PRESSURE CNG CASCADE FILLING SYSTEM



ODORIZER SKID LCNG-2



ODORIZER CAPACITY 500 L
ODORANT-SPOTLEAK 1007
(80% TBM+ 20% MES Blend)
Odorant dosing rate-16-20 ppm(16
mg/m³)
Pump displacement-0.1 CC/Stroke
CNG Stream- 4 stroke/min(@1000 Kg/Hr
CNG Flow)



PNG Supply Skid



VAPORIZER CAPACITY : 250NM3/HR
OPERATING PRESSURE : 10-12 Bar
PRS SKID OPERATING PRESSURE : 4Bar
**GAS METERING : ROTATRY POSITIVE
DISPLACEMENT METER (RPD)**

PNG System Start-up:

- 1. Checking the operating pressure & level of storage tank**
- 2. Lining up of LP Vaporizer & PRS Skid**
- 3. Starting the system from DCS Scada**



SAFETY SYSTEM OF LCNG STATION

SAFETY
IS OUR CORE VALUE

- Safety valves for protection of LNG Tanks, High pressure pump, High pressure Vaporiser & Low Pressure Vaporisers
- Low Temperature sensors inside the Dyke area to sense LNG leakage which closes all SOVs (Solenoid Operated Valves) & put the system in safe shut down mode
- Gas detectors at different locations inside dyke area(5nos). On activation all SOVs will be closed & put the system in safe shut down mode(15% of LEL will initiate alarm & 25% will ensure safe shut-down)
- ESDs (4 Manual hard switch & one soft switch in DCS) on activations lead to Safe shut-down of the station



FIRE FIGHTING SYSTEM OF LCNG

DETAILS OF FACILITIES	CAPACITY
Water Storage	Two Tanks of 50 KL each
Main Fire Water Pumps	03 Nos of 50 M3/Hr Each
Jockey Pumps	02 Nos of 10 M3/Hr Each
Water monitor	07 Nos
Water Cum Foam monitor	04 Nos with 02 nos foam generators
Hose Box with Hose pipe	11 Nos
45 Ltrs mechanical foam cartridge type fire extinguishers	02 Nos
25 kg DCP powder Cartridge type fire extinguishers	02 Nos
9 Kg ABC powder pressure type fire extinguishers	02 Nos
4.5 kg CO2 gas type fire extinguishers	03 Nos
Eye Shower	01 No



PPE Used for handling LNG

- **Head Protection & Face Protection:** Safety helmet with Face Shield
- **Full Body Protection:** Low Temperature suit for protection from spillage of LNG
- **FIRE Protection:** Nomex Suit
- **Foot Protection** - Gum Boot/ Safety Boot
- **Hand Protection** - Insulated Gloves Or Cryogenic Gloves
- **Eye Protection** – Safety goggles
- **Self Contained Breathing Apparatus** – Life Saving Equipment



SPECIAL PRECAUTIONS DURING OPERATION

- **Ensure proper earthing of the tanker during unloading**
- **Ensure use of wheel stopper**
- **Operators & fire man to be present at the time of unloading**
- **Fire extinguishers to be kept ready during unloading**
- **Ensure all safety systems are in working condition & no interlock is in bypass condition**
- **Use of special PPE like thermal insulating gloves etc. to be used**
- **Use of non sparking tools for connection & dis-connection**
- **Round-the –clock monitoring from PLC & SCADA**



ACCIDENTAL RELEASE MEASURE

- Evaluate wind direction and speed to determine the direction of product travel. The vapor cloud may be white, but the color will dissipate as the cloud disperses; however, the fire and explosion hazard is still present! Stay upwind and uphill, if possible, and avoid low lying areas.
- Ensure safe shut down of the system & Stop the source of the release, if safe to do so.
- Do not flush the product down the sewer or drainage systems as it may create an explosion hazard in these confined spaces. LNG will not contaminate soil if spilled as it readily evaporates.
- Do not apply water directly to LNG as it may create vapour mist/vapour cloud. Instead apply foam which covers up the LNG to prevent vapour cloud.
- Notify relevant authorities in accordance with all applicable requirements.

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You*



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