GREEN GAS LIMITED

PRESENTATION
ON
SAFETY MEASURES
ADOPTED TO PREVENT
DISASTERS IN CGD NETWORKS

dated : 01.07.2014

Details of Green Gas Ltd.

- MoP&NG has mandated GAIL & IOCL to form a joint venture for City Gas Distribution (CGD) activities in Agra, Lucknow, Western UP & Uttaranchal, in Aug' 2005
- GGL was incorporated on 07th Oct' 2005 as a Joint Venture (JV) of GAIL (India) Limited & Indian Oil Corporation Limited
- GGL commercially started CGD Business activities in Agra & Lucknow GA in Apr' 2006
- GGL currently provides Natural Gas to Automotive customers as CNG and to Domestic, Commercial & Industrial customers as PNG

Physical Performance

Particulars	UoM	Agra	Lucknow
CNG Station	Nos.	**06**	**08**
Compression Capacity	Kg/Day	**81,000**	**97,500**
Domestic Customers	Nos.	**3500**	**900**
Steel Pipeline	Km	**12.57**	**55.25**
MDPE Pipeline	Km	**152.68**	**96.72**
Commercial Customers	Nos.	**06**	**01**
Industrial Customers	Nos.	**NIL**	**03**

Disaster - Definition

- **PNGRB: "disaster" means an occurrence of such magnitude as to create a situation in which the normal patterns of life within an industrial complex are suddenly disrupted and in certain cases affecting the neighborhood seriously with the result that the people are plunged into helplessness and suffering and may need food, shelter, clothing, medical attention protection and other life sustaining requirements;**

Disaster - causes

- Natural causes
  - Natural calamity :
    Floods,
    Earthquakes
- Man Made Causes because of
  - Ignorance,
  - carelessness,
  - cost cutting

City Gas Distribution – A Schematic

Transmission Main Line Pressure ~ 60 bar

City Gas Station

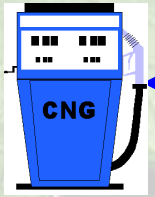
Transportation Pipeline Pressure 19 bar

District Pressure & Regulating Station (DPRS)

PE Pipeline Pressure ~ 4 bar

CNG Stations

CNG Dispensing Pressure 190 - 200 bar



Regulating & Metering Stations

Geysers

GI / Cu Piping Pressure 21 mbar

Kitchen Burners

ABOUT CNG

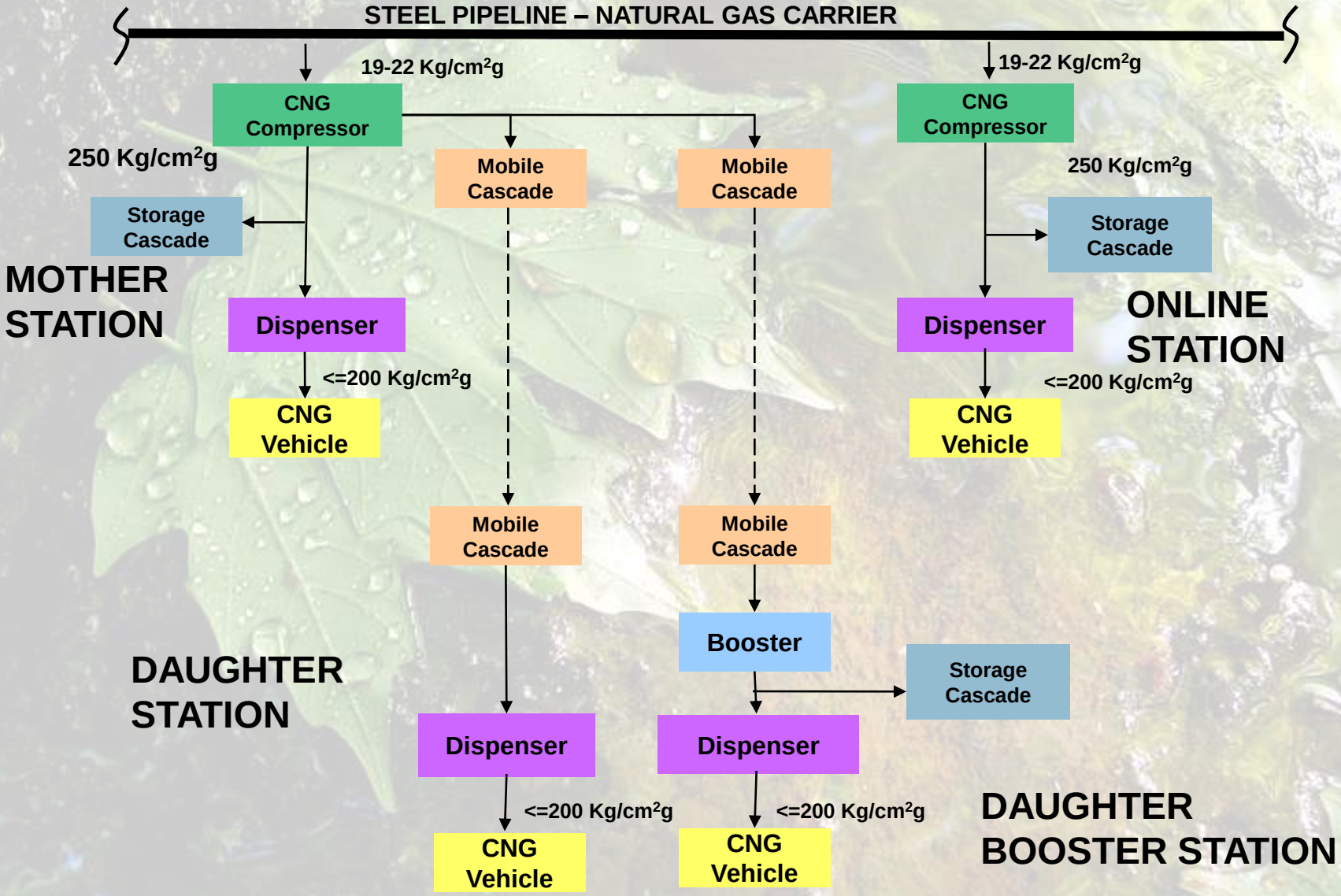
- Less Polluting
- Safe fuel
- Economical fuel

Properties	Unit	Petrol	Diesel	LPG	CNG
Relative density	Water = 1	0.74	0.84	0.55	-
Relative density	Air =1	-	-	1.285	0.64
Auto Ignition Temperature	Degree C	360	280	374	540
Flammability Range	% in Air	1-8	0.6-5.5	2.2-9.0	5-15
Flame Temperature	Degree C	2,030	1,780	1,983	1,900
Octane Number	-	87	-	93	

HAZARDOUS NATURE OF CNG

- Colourless
- Odourless
- Highly Inflammable
- May cause asphyxiation upon inhalation
- Stored at high pressures

CNG VALUE CHAIN



TYPE OF CNG STATIONS

- Mother station
- On line station
- Daughter booster station
- Daughter station

Description of station

- **MOTHER STATION**

  At Mother Station natural gas is tapped from a pipeline. This gas is then compressed by a compressor. This compressed gas (CNG) is then dispensed through dispensers at the station. Also some of it is transported by a road vehicle (LCV) to a Daughter/Daughter Booster station.

- **ONLINE STATION**

  At Online Station natural gas is tapped from a pipeline. This gas is then compressed by a compressor. This compressed gas (CNG) is then dispensed through dispensers at the station only.

- **DAUGHTER BOOSTER STATION**

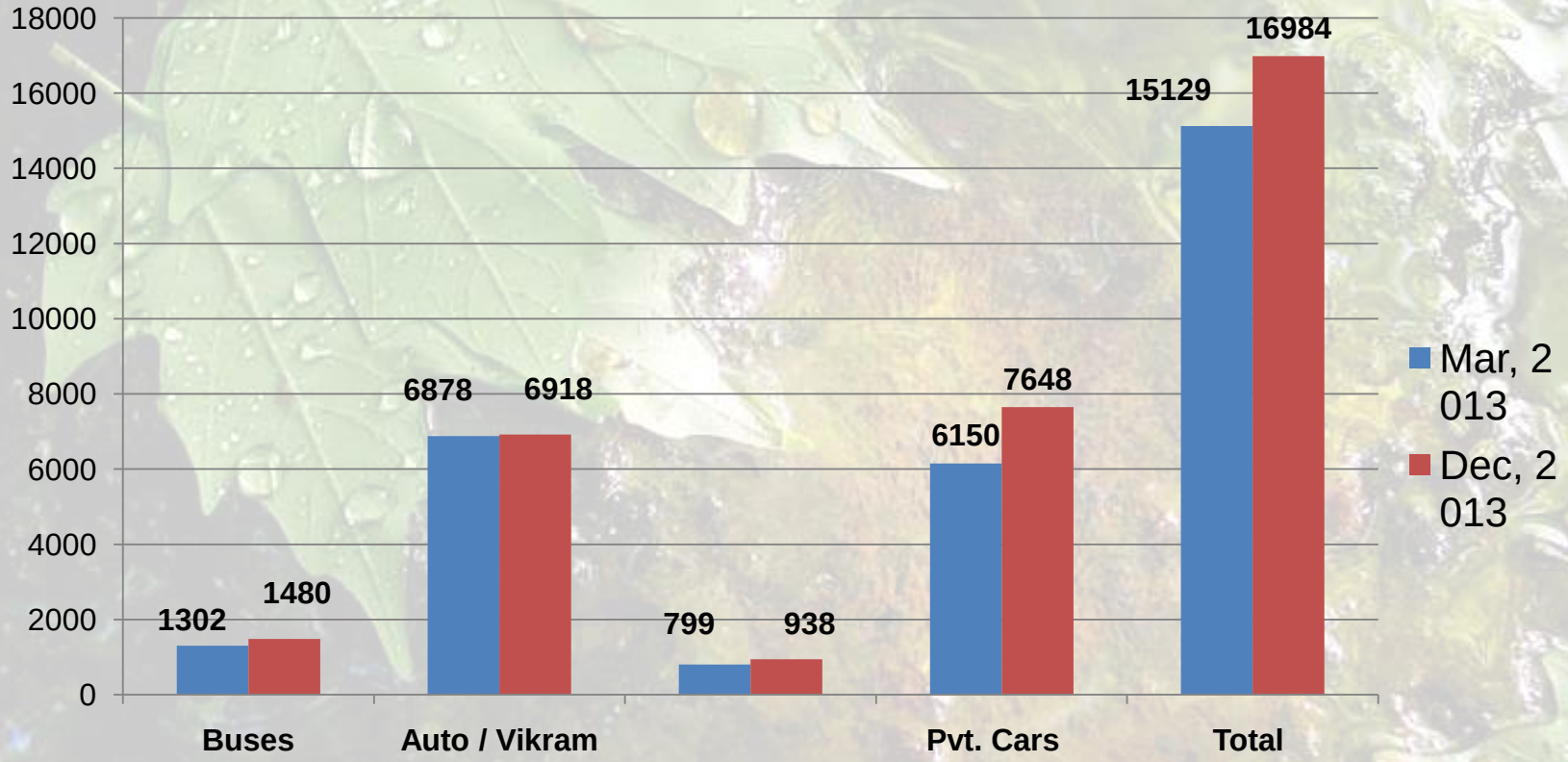
  Storage cylinders (LCV), filled at the mother stations and transported to the daughter booster station is then dispensed to the vehicles through booster compressors.

- **DAUGHTER STATION**

  Filling at these stations is done from dispensers directly connected to LCV, which are being filled at Mother stations

CNG Vehicles Trend – Lucknow

CNG Vehicle Type	Buses (UPSRTC + City buses+ school buses+ Pvt buses)	Auto / Vikram	Taxies / School Van	Pvt. Cars	Total
Mar, 2013	1302	6878	799	6150	15129
Dec, 2013	1480	6918	938	7648	16984



SAFETY

Where:

- Transportation
  - Through Pipeline network (CS/MDPE)
  - Through LCV's
- Installations
- Equipments

When:

During-

- Design
- Construction
- Erection and commissioning
- Operations

SAFETY: PIPELINE(Design phase)

- NG pipelines designed in accordance with ASME B 31.8
- Line pipes manufactured as per API 5L
- All components of the pipeline shall be designed to be suitable and fit for purpose throughout the design life.
- Consideration shall also be given to loading due to following while selecting nominal wall thickness, t, as per ASME B31.8 as appropriate:

  - Overburden loads

  - Dynamic and seismic loads

  - Internal pressure fluctuations

  - Geo-technical loads (including slides, differential settlement of piping, loss of support, and

  - thermal effect of the pipeline on soil properties.

SAFETY: PIPELINE(Design phase)

- buoyancy control and stability analysis for submerged pipelines

- Various design factors to be incorporated considering different location class for different facilities, corrossion allowance etc
- Mill test,Notch toughness test, Fracture test etc
- Pipeline coated with 3 LPE coating.
- Valves used In buried section of pipelines are butt welded only and not flange types
- Sectionalizing valves are preferably full bore ball valves in accordance with API 6D
- Provision of Insulating Joints (IJ's)
- Proper anchors and supports
- Use of spiral wound metallic gaskets in flange joints
- QA/QC through TPIA

SAFETY: PIPELINE(Construction phase)

- Selection of Qualified contractors for work execution
- WQT and WPS before welding job as per API 1104
- Continuous monitoring of job through PMC along with company representative
- Non Destructive testing (NDT) including radiographic examination(100%)
- Pipeline laid with minimum soil cover of 1.2m.
- Use of concrete slab/ casing pipes at crossing and critical locations
- Minimum 300 mm clearance from other utilities
- Hydrotesting/ pneumatic testing for CS/MDPE pipeline
- Inertization through Nitrogen purging before gas charging

SAFETY: PIPELINE(Construction phase)

- Following any additional conditions imposed by land owning agencies
- Use of Fire Extinguishers During commissioning of P/L.
- Installation of markers/warning boards along the P/L route displaying Emergency Nos.
- Warning Mat (with emergency contact nos) is laid along with P/L 300 mm above pipeline.
- Sectionalizing valves at Max 3 km distance for steel and 1 km for MDPE pipelines
- Use of PPE's
- Barricading the site.

SAFETY: PIPELINE(O&M phase)

- Daily patrolling of the entire network
- Round the clock manning of SV stations
- Availability of fire extinguishers at SV stations
- Information/ updation to district administration, civic authorities.
- Liasioning with utility companies
- CP testing for pipeline health.
- Test lead points at every km
- Checking of gas leaks in valve chambers and flange joints.
- Emergency Response Vehicle
- Management of critical spares
- Use of work permit system
- Coating survey by pearson/DCVG/CAT or CIPS
- Odourization

SAFETY: Transportation through LCV

- TREM card
- LCV driver training on safe operations
- Availability of extinguishers
- Fire fighting training
- CNG cylinders in rigid metallic frame
- Engaging /disengaging hoses through quick connect couplings
- Guidelines of motor vehicles act
- Regular checking of vehicles
- Spark arrestors installed on LCV's
- Use of wheel chokes and earthing of LCV's during filling.

SAFETY : CNG INSTALLATIONS (STATIONS) (Design/construction Phase)

- The CNG Stations are designed as per Best National & International Codes and Standards.
- Safety measures at CNG stations in accordance with OISD 179
- Platforms and crossovers shall be provided for ease of operation and maintenance of above ground piping where required
- High Tension (HT) pole structure, Transformers, Breakers and Motor Control Centre (MCC) etc shall be located in non hazardous area.
- Ingress and Egress designed for smooth access of fire tenders etc. in case of emergency.
- Minimum Inter-distances between various station facilities and utilities shall be as per OISD 179.
- Identification of emergency assembly points

INTER-DISTANCES

INTER DISTANCES
BETWEEN VARIOUS FACILITIES OF NATURAL GAS HANDLING AT INSTALLATION

Distance From (in meters)	1	2	3	4	5	6	7
1. CNG Compressor	-	3	2	3	6	6	T-1 (Min-3)
2. CNG Dispensing Unit	3	-	2	4	6	4	-Do-
3. Storage cascade	2	2	-	T-1	T-1	T-1 (Min-6)	-Do- (Min-4)
4. Outer boundary wall/ CLF	3	4	T-1	-	6	4	-Do-
5 MS/HSD dispenser	6	6	T-1 (Min-6)	6	-	6	-Do-
6. Vent of MS/HSD u/g storage tanks	6	4	T-1 (Min-4)	4	6	-	6
7. Filling point of MS/HSD	----------T-1(Min-3)----------					6	-

SAFETY : CNG INSTALLATIONS (STATIONS) (Design/construction Phase)

- Proper industry type boundary masonry wall at least three (3) mtrs high including 0.6 mtrs barbed wire on top shall be provided all around the major installation
- Fencing of compressor and LCV areas
- Provision of crash guards around dispensing areas.
- All utility piping at Station shall comply with the requirement of ASME B31.3.
- Where buried pipes come above ground, the anti-corrosion coating on the buried pipe will continue for a length of at least 300 mm above ground.
- Insulating joints shall be provided to electrically isolate the buried pipeline from the above ground pipeline and station piping
- Isolation valves in station inlet piping

SAFETY : CNG INSTALLATIONS (STATIONS) (Design/construction Phase)

- Lightening protection shall be provided as per the requirements of IS:2309
- All electrical equipment, systems, structures pole lights control panel and fencing , etc. are suitably earthed in accordance with IS 3043.
- All the compressors, motors, switches, starters etc. installed in the premises are of flameproof construction conforming to IS:2148.
- Switch gear Room is provided at the premises as per Indian Electricity Rules.
- Installation of remote ESD switches for high pressure gas compressor packages
- Approval of station layout and Licence from PESO

SAFETY : CNG INSTALLATION STATION (operation Phase)

- Display of safety sign boards
- No filling while passenger on board
- Regular checking of vehicles
- Leakage checks
- Automation
- Remote operation of extinguishers in dispensing areas
- Regular maintenance of fire extinguishers
- Availability of extinguishers in excess to recommended of OISD 179
- Regular checking of all electrical connections

FIRE EXTINGUISHER REQUIREMENT

Location	Type of Extinguishers
Dispensing Unit	1 x 10 kg. DCP & 1 x 4.5 kg. CO-2
Compressor (Mother/Online station)	1 x 10 kg. DCP, 1x 75 kg DCP & 2 x 45 kg. Co-2 Flooding System
CNG Storage	1 x 10 kg. DCP
Cascade refuelling Area	1 x 10 kg. DCP
LCV	1 x 10 kg. DCP
MCC/ Electrical Installation	{ 1 x 4.5 kg CO2 25 Sq.M floor area }

SAFETY : PNG installations

- Installation of warning plates
- Clamping of GI piping at every 1m
- Welded risers above 20m/40m
- Regulators with UPSO and OPSO
- No concealed piping
- Specific colour coding (yellow)
- DPRS provided with redundancy, PSV's, Active & monitor regulator, slam shut valves

SAFETY EQUIPMENT (DESIGN PHASE)

- All electrical components installed in compressors/ dispensers are PESO approved and of flameproof type
- Gas compressors have gas detectors and flame detectors installed
- ESD switched on compressors and dispensers.
- Isolation valves for cutting gas supply
- Vibration sensors
- PSV's in each stage of compressors and in dispensers as well as cascades
- Safety interlocks for all critical parameters on compressor/dispenser

SAFETY EQUIPMENT (DESIGN PHASE)

- Alarms and trips
- Use of fire resistant belts for power transmission
- Trips for accidental opening of compressor package doors
- Automated DCP flooding system for compressor units
- Dispensers provided with breakaway couplings
- All vents at suitable height.
- Cascade cylinders provided with burst discs

SAFETY : EQUIPMENTS (operation Phase)

- Regular calibration of gas detectors and flame detectors
- Regular calibration of PSV's, PT's, TE's, gauges etc
- Equipments maintained through Experienced manpower/OEM's
- Use of OEM spares
- Hydrotesting of cascades
- Pressure vessel testing
- Maintenance as per recommended schedule

SAFETY IN OPERATIONS

- Proper Ingress and Egress.
- Queuing of vehicles.
- Avoiding over crowding of vehicles inside station
- Checking suitability of vehicles for filling.
- Disembarking of passengers.
- Ensuring keys are removed.
- Awareness among vehicle owners, auto drivers.
- Calibration of SV's, PG's, PT's, TT's, GD's, FD's etc

Other Safety Initiatives

- HSE policy
- ERDMP
- Classification of emergencies
- Emergency Response Team
- MOU on mutual aid
- ERV
- Hazop study
- QRA study
- Regular training on safe operations
- Fire fighting drills
- Mock drills
- Safety committee meetings

Other Safety Initiatives

- Emergency control centre
- Display of MSDS at strategic points
- Accident/ Emergency reporting procedures
- Assembly point for head count
- Display of emergency contact nos/ hospitals/ police stations/ fire stations
- Screening of safety films at CNG stations
- Safety awareness programs for PNG consumers
- Distribution of safety pamphlets
- Celebration of fire service week/ fire & Safety week for safety awareness

Mutual Aid Agreement

Fire Fighting Training

Fire Fighting Training

Consumer Awareness programs

Safety Pamphlets: Customer Awareness

ग्रीन गैस लिमिटेड

(गेल (इण्डिया) लिमिटेड एवं इण्डियन ऑयल कॉर्पोरेशन का संयुक्त उद्यम)

रजिस्टर्ड कार्यालय – फॉरच्यूना टॉवर, द्वितीय तल,
10, राणा प्रताप मार्ग, लखनऊ – 226001
फोन – 0522–4088530

गैस भरवाते समय वाहन चालकों के लिये निर्देश

क्या करना चाहिये

- ✓ स्टेशन में प्रवेश के पहले यह सुनिश्चित करें कि वाहन में ड्राइवर के अलावा कोई व्यक्ति/सवारी न हों।
- ✓ स्टेशन में प्रवेश के दौरान वाहन में लगे सभी उपकरण जैसे टेप, रेडियों, लाइट्स आदि बंद हो।
- ✓ वाहन को हमेशा हैण्ड ब्रेक या गियर में खड़ा करें।
- ✓ सुनिश्चित करें कि वाहन की चाभी निकाल दी गई है।
- ✓ सुनिश्चित करें कि वाहन में कोई सामान न रखा हो।
- ✓ सुनिश्चित कर लें कि वाहन से गैस रिसाव तो नहीं हो रहा है।
- ✓ गैस रिसाव चेक करने के लिये हमेशा साबुन का पानी/झाग इस्तेमाल करें।
- ✓ वाहन का सी.एन.जी. रजिस्ट्रेशन प्रमाण पत्र हमेशा रखें और मांगने पर दिखाऐं।
- ✓ स्टेशन में आने और जाने के लिये निर्देशित रास्तों का ही उपयोग करें।
- ✓ सुनिश्चित कर लें कि वाहन से नोज़ल हटा दिया गया है।

क्या नहीं करना चाहिये

- ✗ स्टेशन पर मोबाइल फोन का उपयोग न करें।
- ✗ 200 कि.ग्रा./से.मी.^{2} के प्रेशर से अधिक गैस भरवाने का अनुरोध न करें, यह खतरनाक हो सकता है।
- ✗ वाहन में कोई ज्वलनशील पदार्थ न रखें।
- ✗ स्टेशन पर धूम्रपान न करें।
- ✗ गैस रिसाव चेक करने के लिये मोमबत्ती या माचिस का उपयोग न करें।
- ✗ गैस भरवाते समय डिस्पेन्सर और वाहन के पास न खड़े रहें।
- ✗ वाहन में कोई ऐसी वस्तु न रखें जिससे स्टेशन का कोई उपकरण प्रभावित हो।

आपकी सुरक्षा आपके हाथ

आपातकालीन स्थिति में उपयोग किये जाने वाले नंबरः

ग्रीन गैस लिमिटेडः
लखनऊ अग्निशमनः
लखनऊ पुलिसः

लखनऊ शहर में सी.एन.जी. वितरण स्टेशनों की सूची

1. जी.जी.एल. मदर स्टेशन, अमौसी, हवाई अड्डे के सामने, लखनऊ
2. जी.जी.एल. मदर स्टेशन, विभूतिखण्ड, (यू.पी.एस.आर.टी. सी. डिपा), गोमती नगर, लखनऊ
3. कोको सी.एन.जी स्टेशन, विभूतिखण्ड, निकट बैंक ऑफ इण्डिया भवन, गोमती नगर, लखनऊ
4. इन्दिरा ओटो आई.बी.पी. सी.एन.जी स्टेशन, पी.पी.–1, सेक्टर–एम, आशियाना कालोनी, लखनऊ
5. त्रीकुटा सी.एन.जी फिलिंग स्टेशन, कानपुर हरदोई बाईपास रोड निकट बुद्धेश्वर चौराहा, लखनऊ
6. स्टेण्डर्ड फ्युल्स सी.एन.जी. स्टेशन, सीतापुर रोड़, मडियाँव, लखनऊ

Reporting of Emergencies

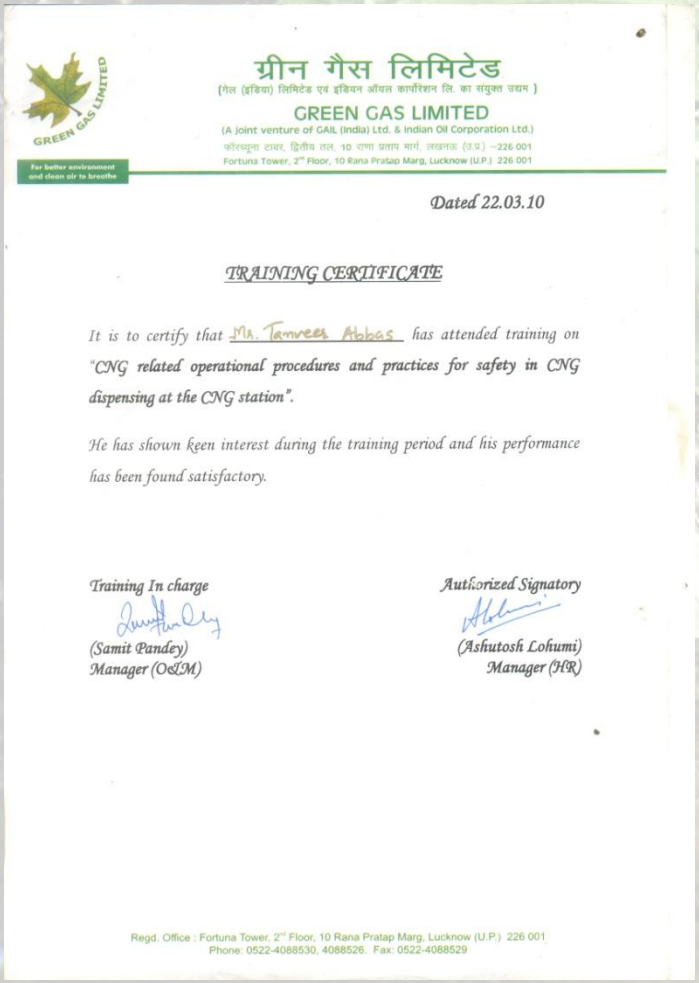
Reporting Format					
	Type-I Near Miss Incident	Type- II Without loss of Production, Supply or Human Life	Type-III With loss of Production, Supply or Human Life	Type-IV Fire	Type-V Explosion/Fire/Gas Leakage/other emergencies involving public
Location	✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓
First witnessed by	✓	✓	✓	✓	✓
Details of Incident	✓	✓	✓	✓	✓
Action Taken	✓	✓	✓	✓	✓
Reporting Authority	Operator or (O&M)	Operator or (O&M)	Shift I/C	HSE Officer	Section I/C
Internal investigating Authority	Head (HSE)	Head (HSE)	Head (O&M)	Head (HSE)	Head of Station
External Investigation	X	X	✓	✓	✓
Reports to PNGRB	X	X	✓ (*)	✓(*)	✓(*)

✓ To be filled in reported

X Not required to be reported

(*) shall also include the history of Type-I & Type-II incidents

Training certification



ग्रीन गैस लिमिटेड
(गेल (इंडिया) लिमिटेड एवं इंडियन ऑयल कार्पोरेशन लि. का संयुक्त उद्यम)
GREEN GAS LIMITED
(A joint venture of GAIL (India) Ltd. & Indian Oil Corporation Ltd.)
फॉरच्युना टावर, द्वितीय तल, 10 राणा प्रताप मार्ग, लखनऊ (उ.प्र.) –226 001
Fortuna Tower, 2nd Floor, 10 Rana Pratap Marg, Lucknow (U.P.) 226 001
For better environment and clean air to breathe

Dated 22.03.10

TRAINING CERTIFICATE

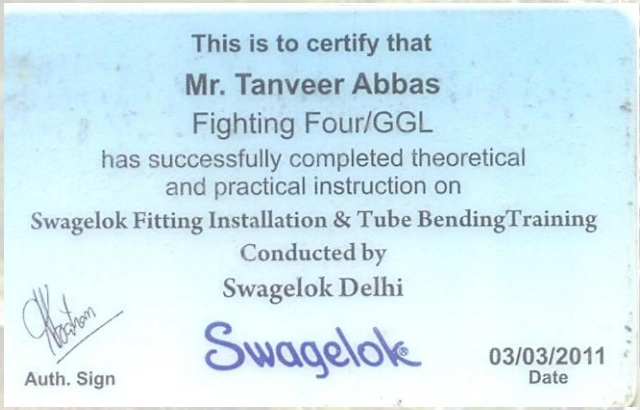
It is to certify that Mr. Tanveer Abbas has attended training on "CNG related operational procedures and practices for safety in CNG dispensing at the CNG station".

He has shown keen interest during the training period and his performance has been found satisfactory.

Training In charge
(Samit Pandey)
Manager (O&M)

Authorized Signatory
(Ashutosh Lohumi)
Manager (HR)

Regd. Office : Fortuna Tower, 2nd Floor, 10 Rana Pratap Marg, Lucknow (U.P.) 226 001
Phone: 0522-4088530, 4088526. Fax: 0522-4088529

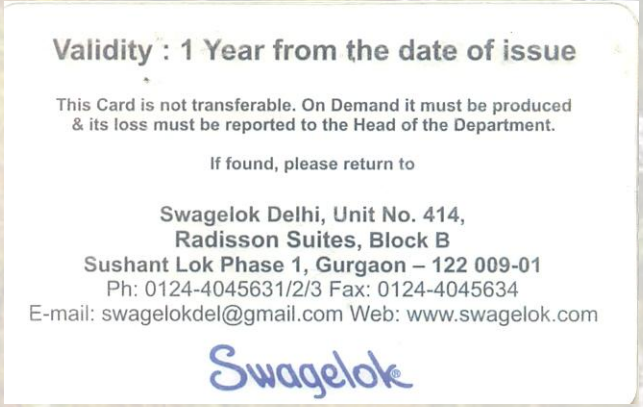


This is to certify that
Mr. Tanveer Abbas
Fighting Four/GGL
has successfully completed theoretical
and practical instruction on
Swagelok Fitting Installation & Tube BendingTraining
Conducted by
Swagelok Delhi

Auth. Sign

Swagelok

03/03/2011
Date



Validity : 1 Year from the date of issue

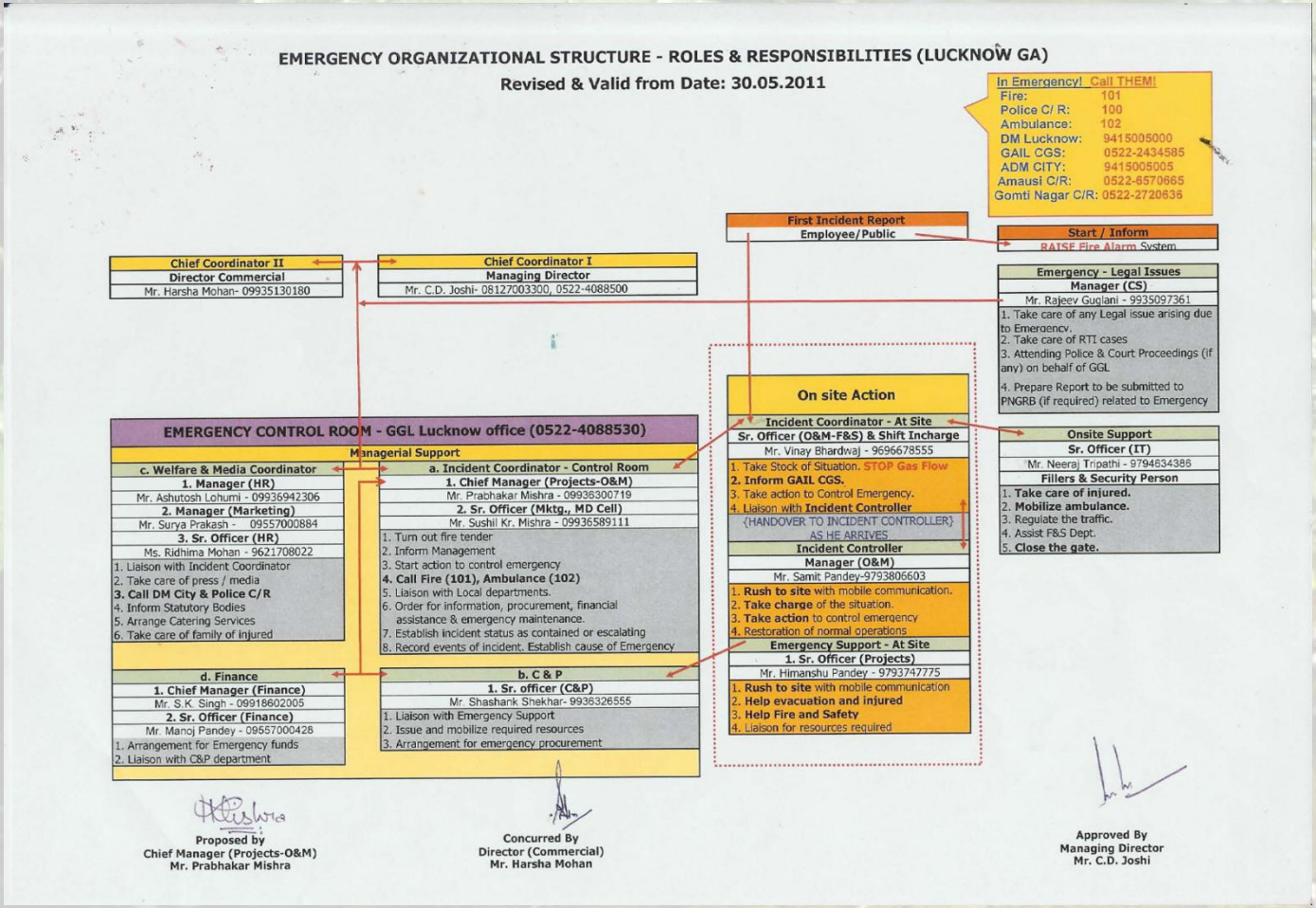
This Card is not transferable. On Demand it must be produced
& its loss must be reported to the Head of the Department.

If found, please return to

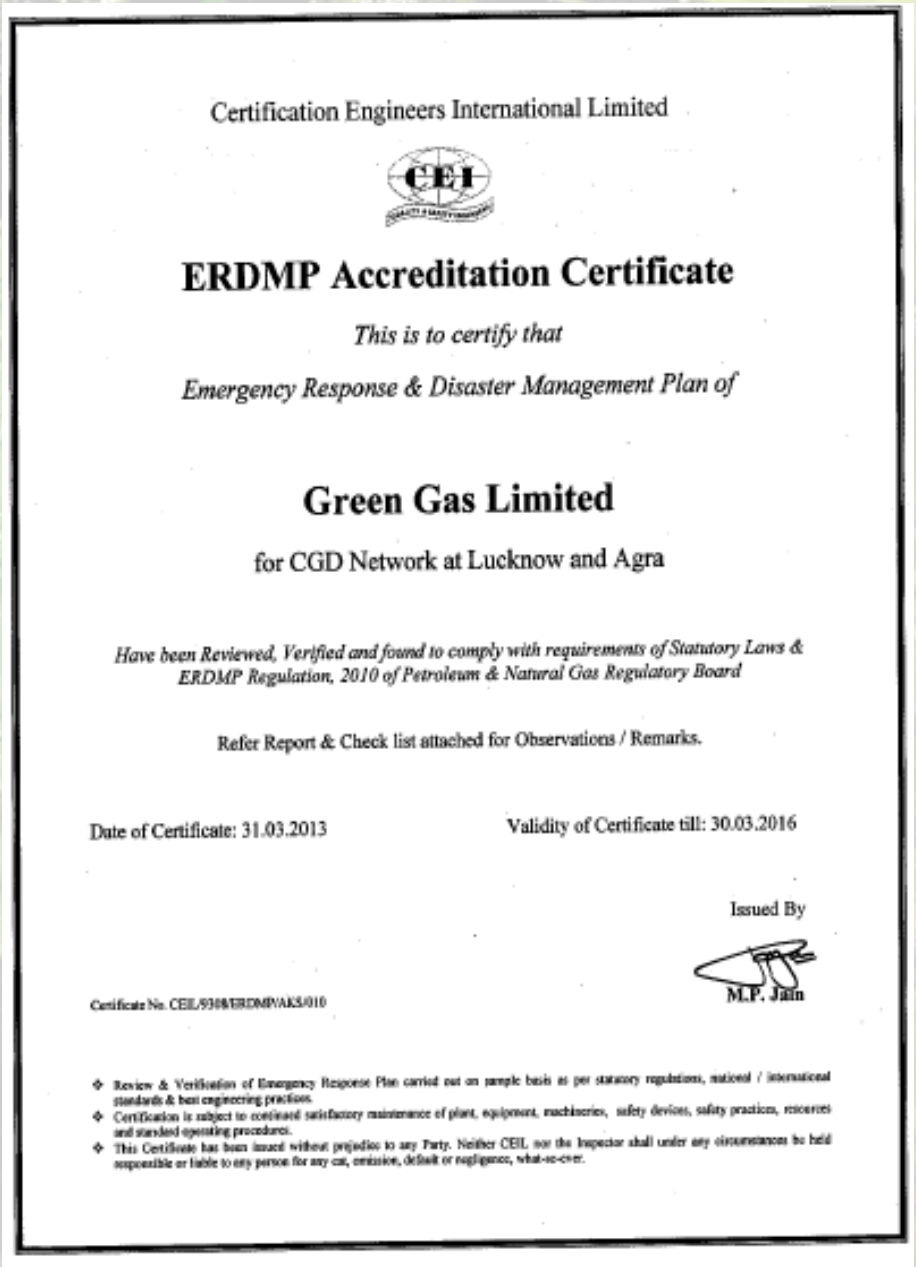
Swagelok Delhi, Unit No. 414,
Radisson Suites, Block B
Sushant Lok Phase 1, Gurgaon – 122 009-01
Ph: 0124-4045631/2/3 Fax: 0124-4045634
E-mail: swagelokdel@gmail.com Web: www.swagelok.com

Swagelok

Emergency Organization structure



GGL – ERDMP Accredited



Certification Engineers International Limited

CEI

ERDMP Accreditation Certificate

This is to certify that

Emergency Response & Disaster Management Plan of

Green Gas Limited

for CGD Network at Lucknow and Agra

Have been Reviewed, Verified and found to comply with requirements of Statutory Laws & ERDMP Regulation, 2010 of Petroleum & Natural Gas Regulatory Board

Refer Report & Check list attached for Observations / Remarks.

Date of Certificate: 31.03.2013

Validity of Certificate till: 30.03.2016

Issued By

M.P. Jain

Certificate No. CEIL/9308/ERDMP/AKS/010

- Review & Verification of Emergency Response Plan carried out on sample basis as per statutory regulations, national / international standards & best engineering practices.
- Certification is subject to continued satisfactory maintenance of plant, equipment, machineries, safety devices, safety practices, resources and standard operating procedures.
- This Certificate has been issued without prejudice to any Party. Neither CEIL nor the Inspector shall under any circumstances be held responsible or liable to any person for any act, omission, default or negligence, what-so-ever.

CHALLENGES AHEAD

- Carrying out onsite mock drills.
- Improper maintenance of CNG vehicles: unprotected battery terminals, use of local spares, loose electrical connections
- Fitness certificate from RTO to incorporate CNG data, electrical suitability.
- Pipeline-third party excavation- Utility corridor with centralized data bank.
- Accountability of all and not just the company.
- Limited hydro-testing facilities in cities.
- Frequently changing geography due to flyovers, metros, road widening
- Limited space availability : valve sections, DPRS

THANK YOU

-SAMIT PANDEY
Manager (PROJ, O&M)