

SAFETY ASPECT OF CITY GAS DISTRIBUTION

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“ OIL’S SAFETY SLOGAN FOR THE FORTNIGHT ”

PREPARE
TO FAIL

=

FAILING TO
PREPARE

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Relevance of CGD Network

- **Clean Energy Transition:** Transitioning to a gas-based economy is expected to support India's climate action commitment of
 - Net zero emissions by 2070, Reducing emissions intensity by 45% and
 - Cutting total carbon emissions by 1 billion metric tonnes by 2030
- **Natural Gas as Transition Fuel: Natural gas serves as a bridge between traditional and renewable energy sources in India.**
 - It acts as a critical energy source during the transition period, complements renewables and helps meet growing energy demands.
- **Equitable Energy Access:** It will ensure adequate availability and equitable distribution of natural gas across the country.
- **Economical and Safe:** The natural gas pipeline infrastructure provides an economical and safe method for transporting natural gas from production sources to consumption markets.
 - **Benefits of CNG:** Very low levels of emissions, unlikely to ignite due to high ignition temperature, lowest injury and death rate per vehicle mile etc.
 - **Benefits of PNG:** Safe and assured supply, convenient to use, no wastage, no hassle for replacement of cylinder or cylinder booking etc.

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OIL's CGD Joint Ventures



Joint Venture Company	Partners	Geographical Areas (Bid round)
 HPOIL GAS PVT LTD <small>(A JOINT VENTURE OF HPCL & OIL)</small>	HPCL (50%)	Haryana & Maharashtra (8th), Nagaland (12th)
	GAIL Gas Limited (26%), Assam Gas Company Limited (48%)	Assam (including Kamrup Metro, Kamrup, & Cachar) (9th)
 NEOCL <small>North East Gas Distribution Company Limited</small> <small>Fuelling dreams for a sustainable tomorrow</small>	Assam Gas Company Limited (51%)	Assam, Tripura (11th)
 Bharat Petroleum <small>energising lives</small>	 ऑयल इंडिया OIL INDIA	Arunachal Pradesh (12th)

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City Gas Distribution Portfolio

- OIL's CGD initiatives aim to deliver clean energy solutions to homes, businesses, and the automotive sector, contributing to improved air quality and public health.
- Working towards providing piped natural gas to homes and businesses, as well as expanding CNG station networks.

Work program

> 500
CNG stations

> 1.4 Million
PNG connections

Transforming Urban Living with Piped Natural Gas

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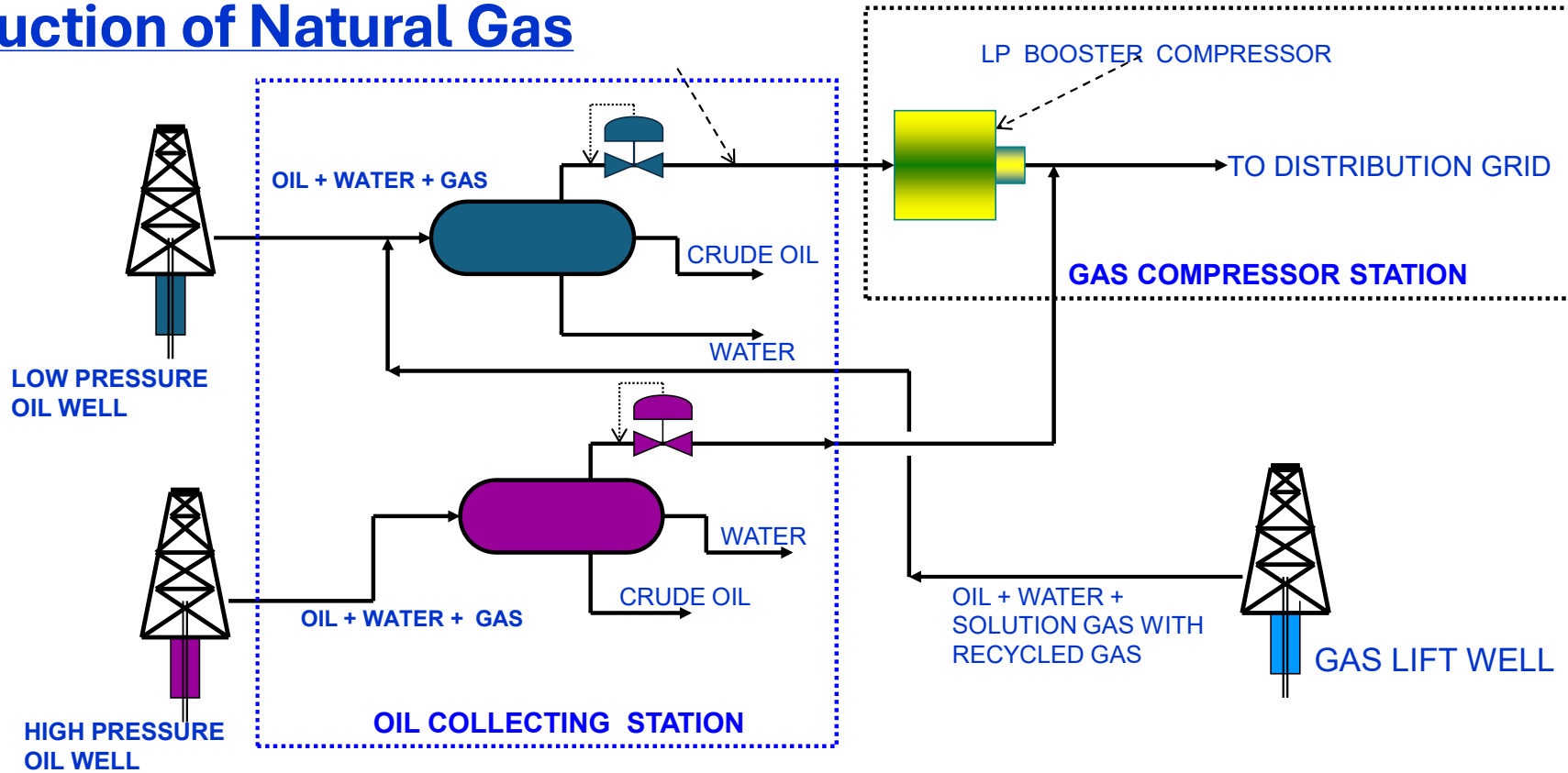
Importance :

Every coin has two sides. As high-quality energy, the city gas brings us the convenience of production and life, but it also means danger when the gas system is abnormal.

Consequence factors:

- Safety
- Economic
- Environmental
- Regulatory
- Corporate Image
- Outage

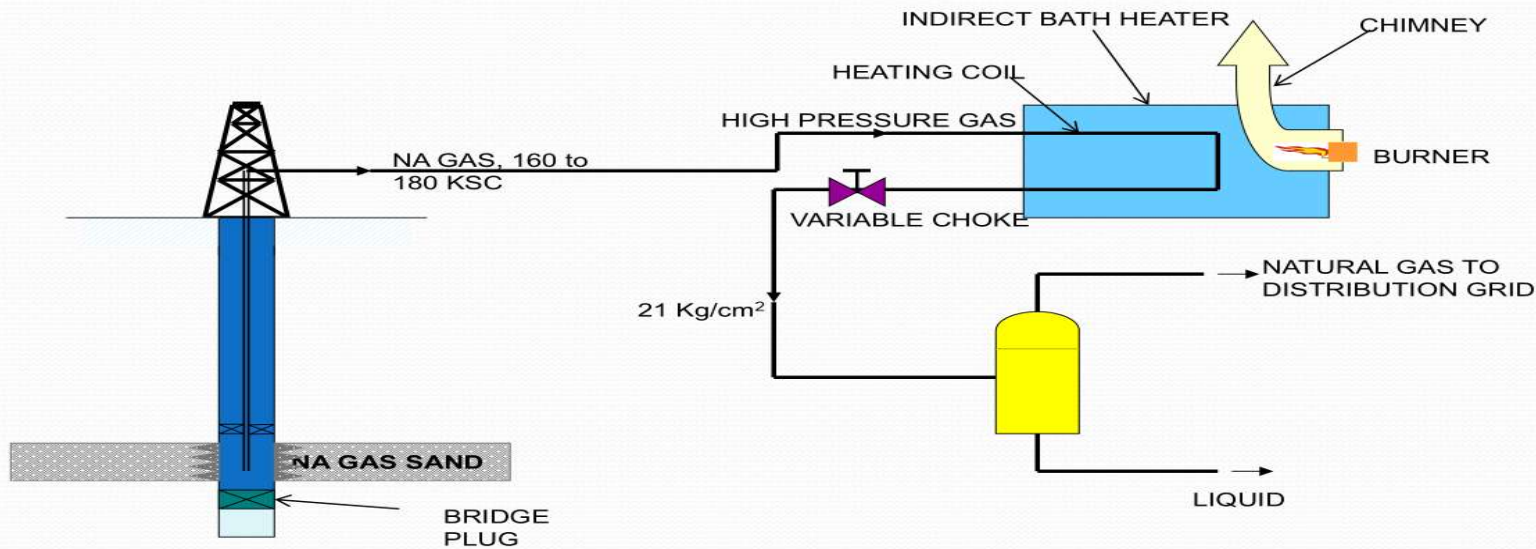
Production of Natural Gas



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Production of Natural Gas

Non Associated Gas



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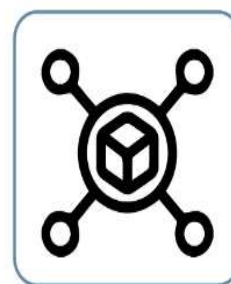
Value Chain of CGD sector



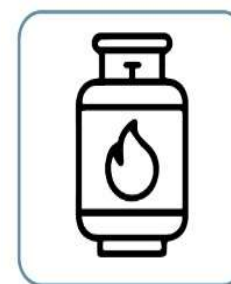
Gas sourcing



Gas
transportation



Gas distribution
network



End customers

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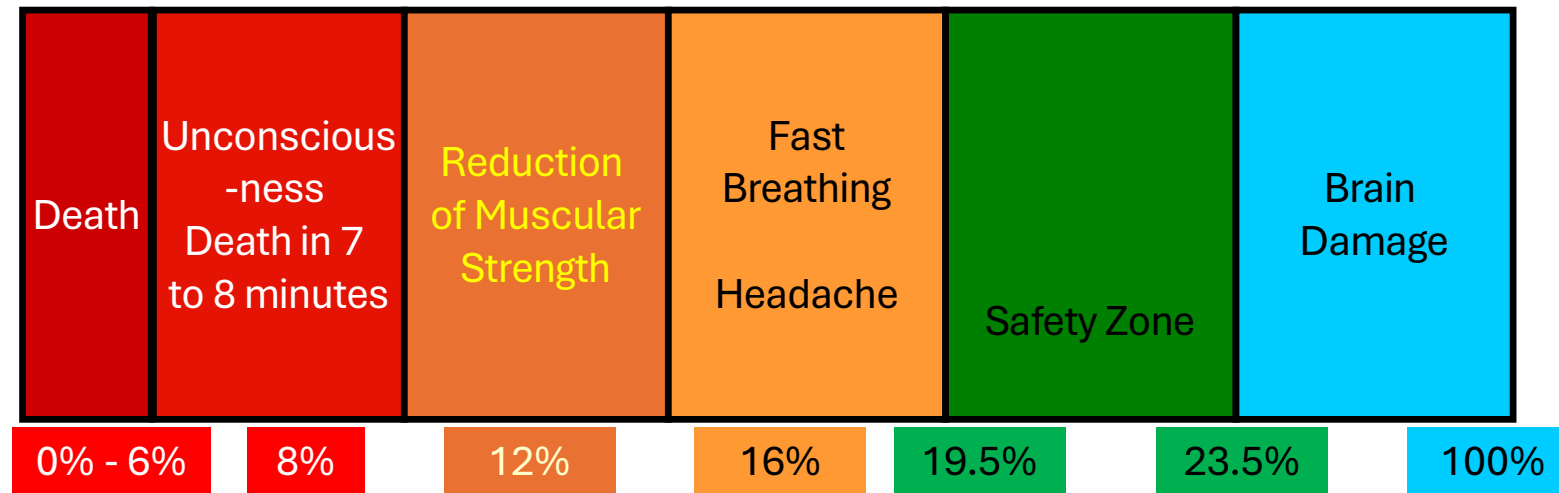
What is Natural Gas ?

- Naturally occurring mixture of Hydrocarbons & Non-Hydrocarbons found in porous formation beneath the earth surface often in association with crude petroleum
- Mixture of C₁ to C₇ hydrocarbons, Mainly CH₄ (Methane)
- Environment friendly fuel (Contains no lead / very less Sulphur)
- At atmospheric pressure and temperature, natural gas is lighter than air.
- Natural gas is colorless, odorless and non-toxic (but Asphyxiate).But may be toxic: H₂S, CO & other impurities.
- Highly flammable.

Hazards of Natural Gas

Natural gas leakage can cause

- Fire
- Explosion
- Radiation hazard
- Asphyxiation



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Natural Gas Transmission – Failure Categorization

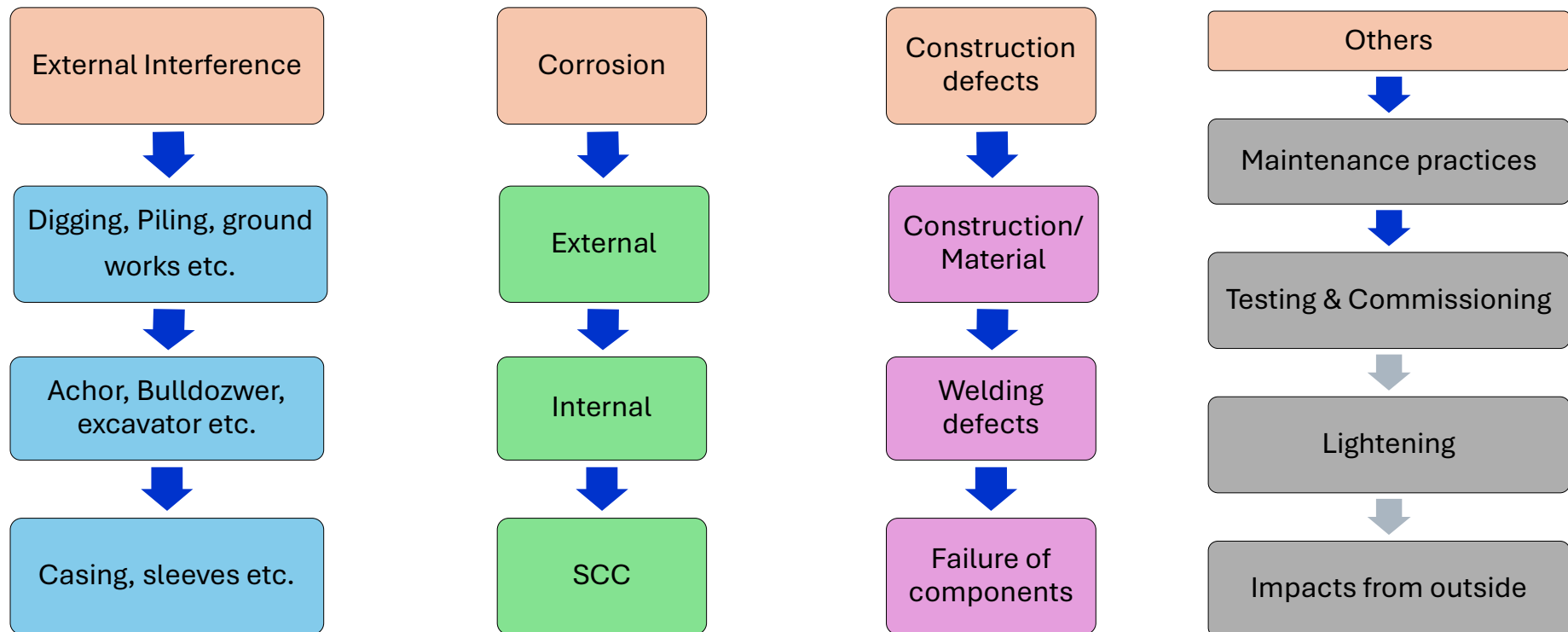
Characteristics of the Pipeline Failure:

- Pinhole/Crack
- Rupture

The Initial Causes of Incident:

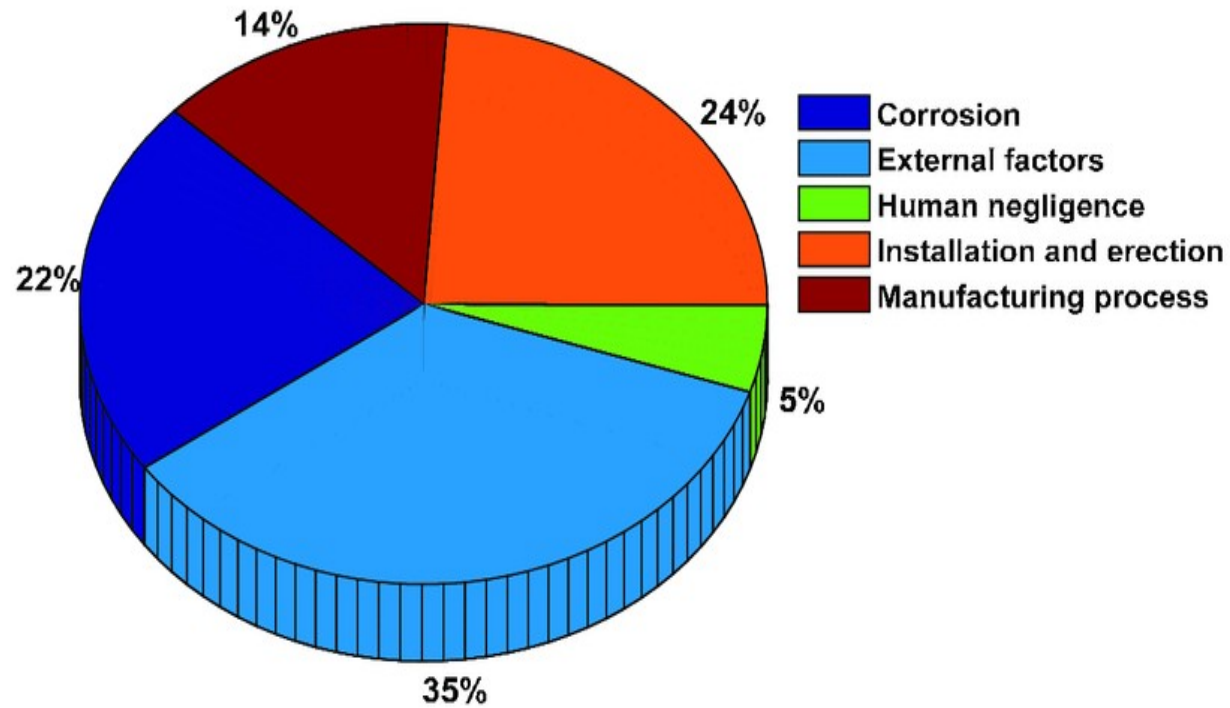
- External Interference
- Corrosion
- Construction Defect/Material Failure
- Hot Tap made by Error
- Ground Movement
- Other and unknown

Natural Gas Transmission – Primary Failure Reasons :



Source: EGIG Report

Sources of pipeline failure :



Source: Internet

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Safety Hazards: CGD



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Safety Management : CGD



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**SAFETY
MANAGEMENT
SYSTEM
ELEMENTS AS
PER OISD-
GDN-206.**

- 1.0 Safety Organization
- 2.0 Employee Participation
- 3.0 Process Safety Information
- 4.0 Process Hazard Analysis
- 5.0 Operating Procedures
- 6.0 Employee Training
- 7.0 Contractors

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**ELEMENTS OF
SAFETY
MANAGEMENT
SYSTEM AS
PER
OISD-GDN-
206.**

8.0 Pre-Start up Safety Review

9.0 Asset Integrity

10.0 Work Permit

11.0 Management of Change

12.0 Incident Reporting & Investigation

13.0 Emergency Planning and Response

14.0 Compliance Audits

Other Safety Aspects as per OISD-STD-226 :

Gas detectors shall be installed at strategic locations.

Inter distance shall be maintained between various facilities.

All vents shall be routed to a safe area

Remote operation/ ESD (Emergency Shutdown) provision facility

For underground steel piping networks, cathodic protection, wrapping/ coating etc shall be applied.

The cast iron pipes shall not be used in the PNG network as a carrier of natural gas

Isolation valve shall be installed to facilitate maintenance of system and to allow for speedy isolation.

Isolation valve shall be installed on both side of rivers and railway track based on requirement.

The PNG pipeline route should avoid: underground utilities, populated buildings, gravel or flood risk, water bodies.

Other Safety Aspects as per OISD-STD-226 :

Warning Markers shall be positioned along entire network.

A marker shall be marked in easily readable Hindi/ English and local language.

The dosing should be such that it is safe for human as well as materials and equipment.

Use of personal protective equipment .

Installation shall be equipped with the facilities for fire protection

Lightening protection shall be provided as per the requirements of the standards/ regulation.

Installation of PE pipe above ground is not recommended and use of flexible conduit is not permitted.

Steel Pipelines and mains shall be tested hydrostatically to a pressure equal to 1.5 times the Maximum Allowable Operating Pressure .

Other Safety Aspects as per OISD-STD-226 :

Pneumatic Testing: Plastic pipelines and mains shall be tested at a pressure not less than 1.5 times the maximum operating pressure.

All the pipelines laid shall be identified in GIS through geo- referenced co-ordinates.

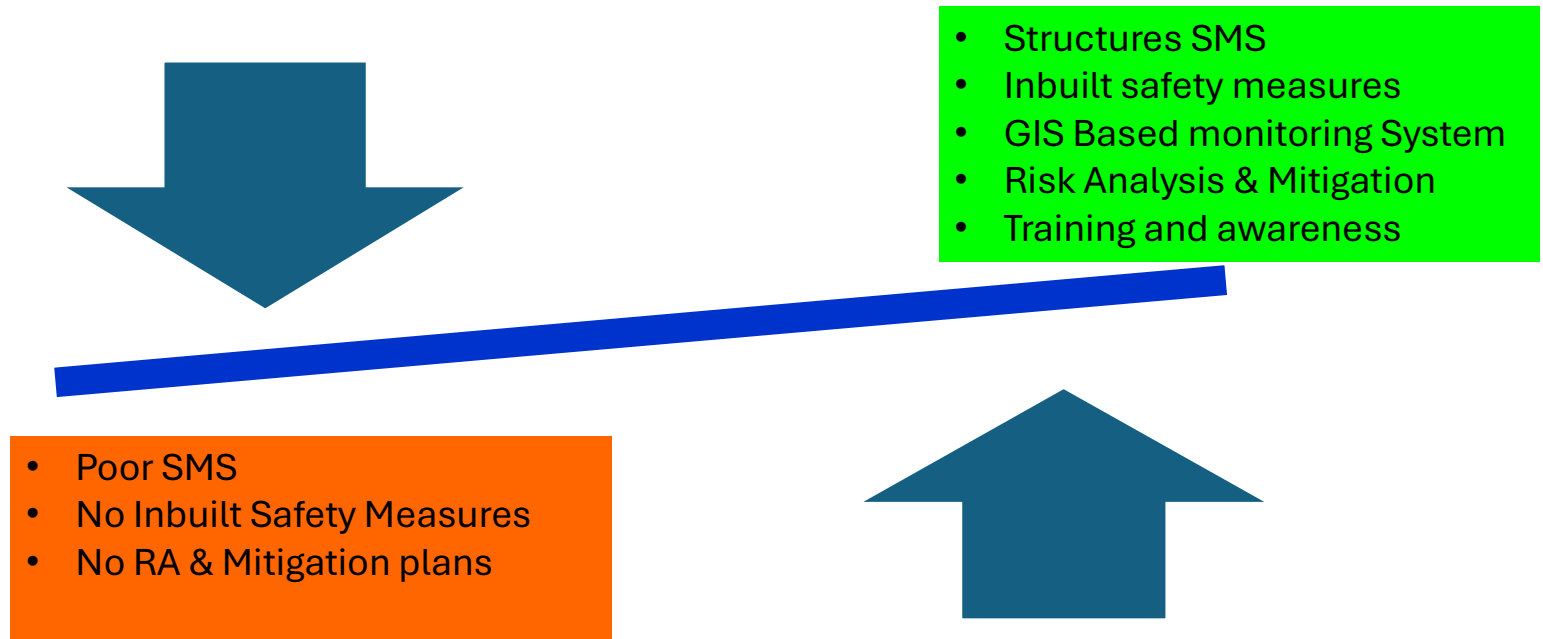
Certificate of fitness, declaring integrity with respect to equipment, facilities, operations & safety procedures, shall be accordingly issued.

The Functional Test of Active/ Monitor Regulator, Slam Shut Valve and Pressure Relief Valve for their proper operation shall be carried out once in a year.

Patrolling schedule shall be such that entire primary network is inspected

Periodic thickness assessment for all CGD network skids and pressure vessels and comparison to baseline values shall be done once a year.

Performance measurement of the system and the program through pipeline integrity management program



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Thanks

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