



Best HSE Practices in Hydrocarbon Installations and Pipelines

By
S. P. Garg
General Manager (HSE)
Head Corporate HSE Deptt
GAIL (India) Limited
Email: sp.garg@gail.co.in

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

1

Hydrocarbon Industries

- Hydrocarbon industries are mainly categorized into following segments:
 - ✓ Exploration and Production - Upstream
 - ✓ Refining - Downstream
 - ✓ Gas Processing and Transportation Cross County P/Ls - Midstream

- Inherent hazardous properties of hydrocarbons pose risk to human life, property and environment during Exploration, Production, Refining & Transportation.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

2

Hazards of Hydrocarbon Installations & Pipelines

- With globalization and rapid industrialization, there is significant jump in Oil & Gas/Hydrocarbon production across the India after post-Independence, which is associated with a non-speculative risk of
 - ✓ Fires
 - ✓ Explosion
 - ✓ Toxicity
 - ✓ Environment Damageetc.

- Catastrophic results are evident from incidents which occurred in various hydrocarbon installations and pipelines in India and world wide.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

3

Learning Experience & Lessons – Past Catastrophic Incidents



Flixborough

1 June 1974

A 20 inch diameter temporary by-pass pipe Jack-knifed and failed under thermal expansion stress.

40 of 120 tonnes of cyclohexane escaped into the congested reactor support structure.

Within two minutes, the vapor cloud ignited and a Detonation Class VCE took place (35 tons TNT equiv).

- ✓ Modification Control
- ✓ Deploy suitably trained, educated and responsible people
- ✓ Know what you don't know

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

4

Learning Experience & Lessons – Past Catastrophic Incidents

Piper Alpha 1988

Piper Alpha was a North Sea oil production platform operated by Occidental Petroleum (Caledonia) Ltd.

The platform began production in 1976, first as an oil platform and then later converted to gas production.

An explosion and the resulting oil and gas fires destroyed it on 6 July 1988, killing 167 men, with only 61 survivors.

- ✓ Adherence to Permit to Work System.
- ✓ Need for Safety Training.
- ✓ Proper isolation of plant for maintenance.
- ✓ Limit inventory on installation and in pipelines.
- ✓ Emergency Shutdown Valves.
- ✓ Fire & Explosion Protection
- ✓ Evacuation and Escape



"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

5

Learning Experience & Lessons – Past Catastrophic Incidents

Jaipur 29 October 2009

Heavy leakage of Motor Spirit, subsequently there was a massive explosion followed by a huge fire ball covering entire installation.

- ✓ Specific Standard Operating Procedures
- ✓ Management of Change
- ✓ Training and Competency
- ✓ Emergency Preparedness
- ✓ Communication

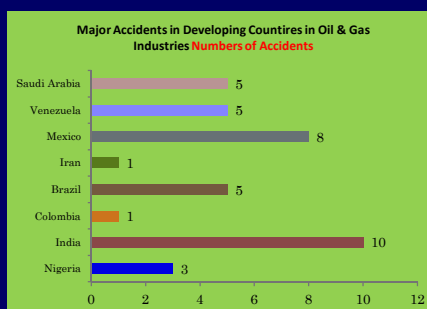
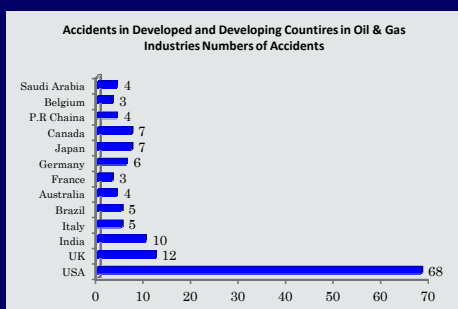


"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

6

Accident Statistics - Worldwide

- Out of 319 Major Industrial Accidents occurred worldwide since 1917 to 2009, 195 Industrial Accidents happened in Hydrocarbon/Oil and Gas Industries.
- Major accidents which occurred in Indian Oil & Gas Sector are considerably high.



Reference: Chemical Engineering Journal, Efthimia K. Mihailidou, Konstantinos D. Antoniadis & Marc J. Assael (November 2012):*The 319 Major Industrial Accidents Since 1917*.Page 530) based on UNEP Data Base.

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas “ 7

Accident Statistics - India

Date of Accident	Place of Accident	No. of Human Injuries	No. of Deaths	No. of People Evacuated	Substance Involved	Financial Losses
23/08/2013	Visakhapatnam**	20	24	NA***	Gas	NA**
29/10/2009	Jaipur	150	12	500000	Oil	Rs. 280 Cr
22/03/1999	Bombay High	-	-	-	Gas	42*
15/09/1997	Visakhapatnam	100	60	60000	LPG	18*
11/06/1990	Nagothane	22	31	-	Ethane/Propane	31*
11/11/1988	Bombay	16	35	-	Oil	-
12/12/1987	Maharashtra	23	25	-	Naphtha	-

.....IOCL Hazira, Numaligarh Refineries, HPCL Refinery_____

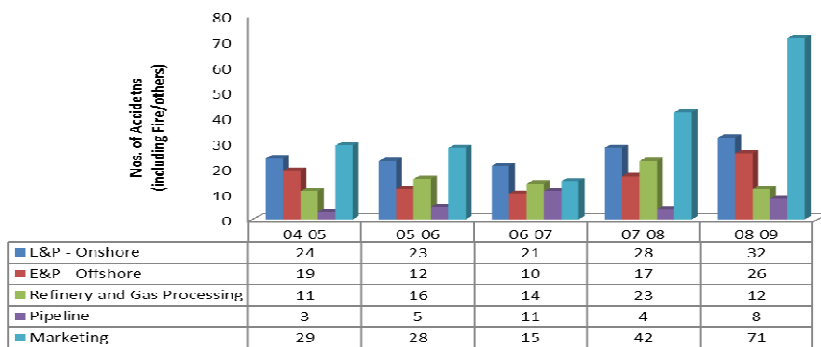
*(M €) Total cost converted to Euros in 2011 prices, according to the Marshall and Swift cost values: these are standard annual indexes that allow the conversion of cost prices from one year to another.

Reference: Chemical Engineering Journal, Efthimia K. Mihailidou, Konstantinos D. Antoniadis & Marc J. Assael (November 2012):*The 319 Major Industrial Accidents Since 1917*.Page 530) based on UNEP Data Base.

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas “ 8

Accident Statistics - India

Accident Statistics (OISD) - Oil & Gas Segment

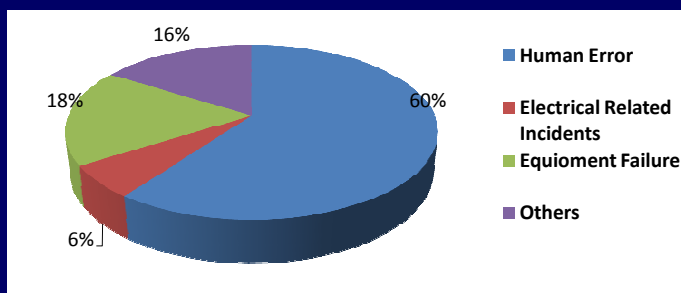


- Oil Industry Safety Directorate under Ministry of Petroleum and Natural Gas, Government of India organized analysis of accidents considering their own criteria.
- 504 nos. of accident/incident occurred in hydrocarbon/Oil & Gas Installations, in India.

Reference: Oil Industry Safety Directorate Publication 2005.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

Cause Analysis of Incidents (OISD)



- Human Error – It covered those incidents in which human failure has been directly associated with the incident, like non compliance to laid down safety norms and procedures, fall/slippage, improper inspection, lack of training and supervision, negligent driving & others.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

Need for Best Safety Practices

Adoption of Best Safety Practices is the need of hour to control and minimize the speculative risk to Human, Property and Environment through effective Health, Safety & Environment Management System

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

11

Development of Safety Management System- Accident Causation Theory

- Initial approach : Accidents are act of God.
- Accident causation models were originally developed in order to assist people who had to investigate accidents, so that such accidents could be investigated effectively.
- One of the first industrial accident causation theories was presented by H.W.Heinrich in 1931. This model is now commonly known as Domino theory.



- He established that 88% of the accidents were due to 'unsafe acts', 10% due to 'unsafe conditions and 2% due to other reasons.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

12

Development of Safety Management System- Accident Causation Theory

- Later, a generic safety management system was also established having four elements i.e PLAN, DO, CHECK and FEEDBACK.
- The first safety management system applications were based on the Occupational Health and Safety Management System (BS 8800) and the Dutch Safety Checklist for Contractors (SCC) Standard.
- In addition, the International Labour Organization (ILO) published instructions on Occupational Health and Safety Systems (ILO OHS 2001).
- In India OISD Standard 206 on "Safety Management System" came up in the year 2001.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

13

Safety Management System – OISD 206

Safety Management System:

- | | |
|-------------------------------------|---|
| 1. Safety Organisation | 2. Employees Participation |
| 3. Process Safety Information | 4. Process Hazard Analysis |
| 5. Operating Procedures | 6. Training |
| 7. Contractors | 8. Pre-Start up Safety Review |
| 9. Mechanical Integrity | 10. Work Permit |
| 11. Management of Change | 12. Incident Investigation and Analysis |
| 13. Emergency Planning and Response | 14. Compliance Audit |
| 15. Occupational Health | 16. Off-the job Safety |
| 17. Customers and Products | 18. Road Transportation |
| 19. Trade Secrets | |

(OISD Standard 206, Published by Oil Industry Safety Directorate, Ministry of Petroleum & Natural Gas, Government of India)

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

14

GAIL's HSE Management System

18 elements have been identified to be part of Health, Safety and Environment Management System which are applicable to all activities of GAIL (India) Limited.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

Best Safety Practices adopted by GAIL

GAIL (India) Ltd

CORPORATE HEALTH, SAFETY AND ENVIRONMENT (HSE) POLICY

GAIL is committed to promote globally comparable levels of Health, Safety & Environment Management System in the areas of its business of Exploration and Production of Hydrocarbons, Transmission and distribution of Natural Gas, Production of LHC, Transmission of LPG, Petrochemicals, Generation of Power etc., with focus on improving harmony with environment through Sustainable Development. The safety and occupational health of its employees and external stakeholders are of paramount importance and all these attributes are embedded within the core organizational values of the organization. GAIL provides appropriate levels of training to employees to ensure that they are able to fulfill HSE responsibilities.

With regard to HSE objectives, GAIL accords highest priority to:

- » Establish and implement a HSE management system comparable to best in the industry.
- » Design, construct, operate and maintain its facilities as per the best practices available to ensure safety of all stakeholders, plant, projects and surroundings.
- » Promote eco-friendly activities.
- » Comply with all statutory rules and regulations on safety, occupational health, environmental responsibility and go beyond in setting internal targets.
- » Delegate power to all level employees to implement company's HSE policy.
- » Set tangible and measurable targets for monitoring the performance of HSE.
- » Provide structured training to all employees for HSE best practices.
- » Communicate policy to all employees and external stakeholders.
- » Continuously review the policy's relevance with respect to business development and for continual improvement of HSE management system.

(B. C. TRIPATHI)
Chairman & Managing Director

Date of Review: 29.09.2011

गैल (इंडिया) लिमिटेड

निगमित स्वास्थ्य संरक्षा एवं पर्यावरण नीति

गैल सतत विकास हेतु पर्यावरण के साथ सामंजस्य पर ध्यान केंद्रित करते हुए हाइड्रोकार्बन के अन्वेषण और उत्पादन, प्राकृतिक गैस के संवहन और वितरण, तरल हाइड्रोकार्बन-उत्पादन, एनपीजी संवहन, पेट्रोकेमिकल, विद्युत उत्पादन आदि में संलग्न, संस्था एवं पर्यावरण प्रबंधन प्रणाली के विश्वस्तरीय मानकों को बराबर देने के लिए प्रतिक्रम है। कर्मचारियों और बाहरी संस्थाओं की संस्था एवं व्यावसायिक स्वास्थ्य संबंधित महत्वपूर्ण है और ये सभी विशेषताएं कंपनी के संगठनात्मक मूल्यों में शामिल हैं। गैल कर्मिकों को समुचित प्रशिक्षण उपलब्ध कराया जाता है ताकि ये स्वास्थ्य, संस्था एवं पर्यावरण सम्बंधी उत्तरदायित्वों को निभा सकें।

स्वास्थ्य, संस्था एवं पर्यावरण उद्देश्यों के संबंध में गैल निम्न की सर्वोच्च प्राथमिकता प्रदान करता है:

- » उद्योग जगत के श्रेष्ठ के संगठनों के समन्वय स्वास्थ्य, संस्था एवं पर्यावरण प्रबंधन प्रणाली को स्वस्थित और कार्यात्मक करना।
- » सभी संरचनाओं, संयंत्रों, परिवहनकों तथा आवासों की सुरक्षा सुनिश्चित करने हेतु उपलब्ध सर्वोत्तम प्रदर्शकों के अनुसार अपनी सुविधाओं का डिजाइन, निर्माण, संभालन तथा रख-रखाव करना।
- » पर्यावरण अनुकूल गतिविधियों को बरतना।
- » संस्था, व्यावसायिक स्वास्थ्य और पर्यावरण उत्तरदायित्व संबंधी सभी वैधानिक विधियों एवं विनियमों का अनुपालन करना तथा उद्युक्त अधिकाधिक सम्प-निर्धारण।
- » कंपनी की स्वास्थ्य, संस्था एवं पर्यावरण नीति के कार्यान्वयन हेतु सभी स्तरों के कर्मिकों को सहितियों का प्रत्यायोजन करना।
- » स्वास्थ्य, संस्था एवं पर्यावरण निष्पत्तन की जांच/रीक्षण हेतु प्रस्था एवं मान्य जा सक्ने वाले स्तर निर्धारित करना।
- » सभी कर्मिकों को योग्यतया रूप से स्वास्थ्य, संस्था एवं पर्यावरण की श्रेष्ठ प्रदर्शकों का प्रशिक्षण वितरण।
- » सभी कर्मिकों और बाहरी संस्थाओं को नीति सुनिश्चित करना।
- » लगातार वितरण के परिष्कार में नया स्वास्थ्य, संस्था एवं पर्यावरण प्रबंधन प्रणाली में निरंतर सुधार हेतु नीति की प्रामाणिकता की वातावरण स्वीकृति करना।

(बी.सी. त्रिपाठी)
अध्यक्ष एवं प्रबंध निदेशक

दिनांक: 29.09.2011

Corporate HSE Policy, signed by CMD

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

Best Safety Practices adopted by GAIL

Leadership & Commitment:

- *HSE Index – One of MOU parameter of GAIL with Government of India*
- *Sub-Committee of Board for HSE review*
- *“HSE Review” as compulsory agenda in all Board of Directors meetings.*
- *Monthly / Weekly HSE review by respective site in-charges*
- *Frequent site visits of Corporate officials to check HSE awareness*
- *Safety Index of Installations is one of the element linked with PRP.*
- *Formulation of Policies and Guidelines*
- *Strict enforcement of Safety Rules and Regulations*
- *Various HSE Campaigns to strengthen HSE Culture of organization*
- *Encouragement to employees for reporting Near Miss Incidents*

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas”

17

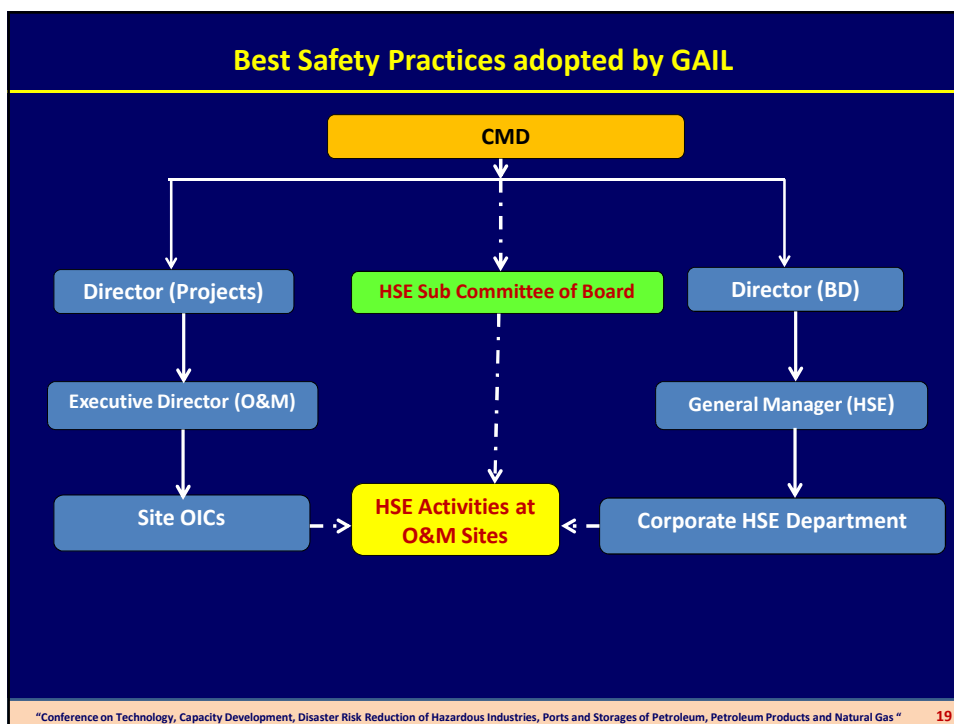
Best Safety Practices adopted by GAIL



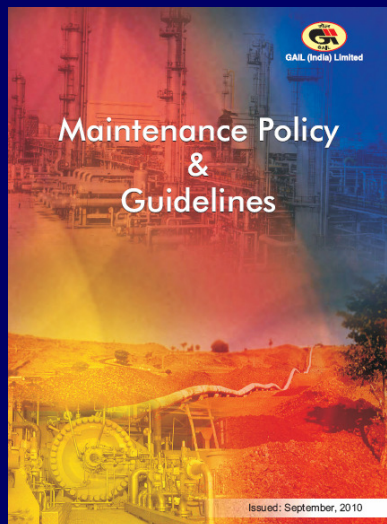
Visit of HSE sub Committee at Usar Gas Processing Plant

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas”

18



Best Safety Practices adopted by GAIL

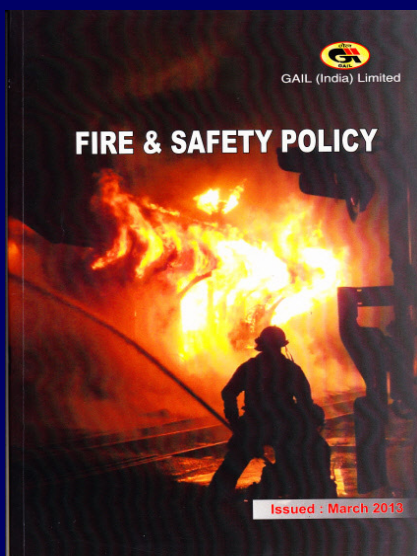


GAIL (India) Limited

Index

Contents	Page
1.0 Introduction	3
2.0 Scope	3
3.0 Objectives & Targets	4
4.0 Philosophy	5
5.0 Guidelines for Monitoring & Maintenance	
5.1 General	7
5.2 Pipelines, Terminals & Associated Facilities	10
5.3 Compressor Stations / Booster Stations	18
5.4 Gas Processing Units (GPIUs)	19
5.5 Petrochemical Complex (PC)	21
6.0 Safety	24
7.0 Spares Philosophy	26
8.0 Management of Change	28
9.0 Amendment / Deviation	28
10.0 Explanatory Notes	29
11.0 Appendix	30

Best Safety Practices adopted by GAIL



GAIL (India) Limited, Corporate HSE

CONTENTS

Sl.	Topics	Page No.
1.	Fire Protection System: a. Siting of F&S Systems, Equipment & Appliances b. Maintenance Policy c. Maintenance Schedule d. Spares / stock philosophy	5
2.	HSE Management System & Personal Safety a. Safety Management System b. Personal Safety c. Road Safety	13
3.	Emergency Planning a. Development of Emergency Plan (Onsite & Offsite) b. Awareness of plan (Govt., Mutual aid and Employees) c. Training to key role players d. Periodic mock drills e. Periodic Review of Plan Documentation f. Communication System	19
4.	Fire & Safety Training a. Training Plan b. F&S Training at Work Centers c. F&S Training through OTI d. Experience Sharing Workshop by Corporate HSE e. Techniques of F&S Training at Work Centers f. Roles & Responsibilities g. Training Modules	21
5.	Employee Participation in F&S management a. Observance of Fire week, Safety week, Environment day etc. b. Safety Suggestion Scheme c. Reporting of Incidents / Accidents d. Safety procedure compliance e. Plant Safety Committee	28
6.	References: a. Applicable OISD Standards / Guidelines b. Applicable BIS Standards c. Applicable NFPA Codes	33
7.	Abbreviations:	41
8.	Annexures: a. Annexure – I: Guidelines on Life of F&S Equipment & Appliances b. Annexure – II: Guidelines on Safety Signs & Livestock c. Annexure – III: Punitive Fines	

- Fire and Safety Policy - Page 2 of 42

Best Safety Practices adopted by GAIL

Emergency Planning and Response:

- Risk Analysis and Hazop Study and compliances of recommendations.
- Preparation of ERDMP, third party Accreditation and Board approval.
- Preparation of Crisis Management Plan, a holistic approach to handle all probable crisis scenarios by top management team.
- Emergency Exercise based on Scenarios given in Risk Analysis.
- Conducting Emergency Exercise to check preparedness on quarterly basis.
- Review of performance by Officer In-Charge of unit.
- Ensuring compliance of observations/recommendations.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

23

Best Safety Practices adopted by GAIL



APPROACHING LPG VAPOUR CLOUD
EQUIPPED WITH LOW TEMP SUIT.

AREA COOLING & VAPOUR DISPERSION
ACTIVITY IN PROGRESS

LEAK ARREST JOB IN PROGRESS

COMMAND & CONTROL

Emergency Preparedness Exercise being organized at Installation

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

24

Best Safety Practices adopted by GAIL

Training and Awareness:

- Establishment of GTI, Noida to train manpower at all levels covering entire range of activities including Health, Safety and Environment.
- Committed to impart internal or external training to all employees once in a year.
- Internal HSE Training System is set up at work Centers in accordance with guidelines of OISD 154.
- Training ground for live fire fighting training on various simulations like column fire, tank fire etc. at Pata & Vijaipur.
- Monthly "Critical Safety Campaign" at sites on HSE topics.
- Publication of Journal on HSE.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

25

Best Safety Practices adopted by GAIL



Fire & Safety Training to Contract Employees

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

26

Best Safety Practices adopted by GAIL



A view on Fire Fighting Training imparted to Employees

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas” 27

Best Safety Practices adopted by GAIL



Employees Participating in Critical Safety Campaign

“Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas” 28

Best Safety Practices adopted by GAIL

Personnel Safety:

- *System of Job Safety Analysis and Hazard Assessment is in place with the aim of preventing personal injury.*
- *Standardization of PPEs by senior level committee for uniform implementation across GAIL.*
- *Preparation of PPE Matrix for all critical jobs.*
- *Compulsory use of basic personal protective equipment like safety helmet & safety shoes etc.*
- *Use of special safety gadgets e.g. Breathing apparatus, gas masks, fire proximity suit, PVC suit mandatory based on nature of hazards involved in the job.*

Best Safety Practices adopted by GAIL



SH		Personal Protective Equipments - वन्य संसा उपकरण												
SN	Description विवरण	Head Gear	Eye Protection	Hand Protection	Foot Protection	Ear Protection	Respiratory Protection	Skid Resistance	Slip Resistance	Heat Protection	Chemical Protection	Electric Protection	Other	Other
1	Compressor Station अंडर रीटर													
2	भण्डारण वाहक / वाहन / वाहन													
Major Jobs - महत्वपूर्ण काम														
1	Welding वेल्डिंग													
2	Welding/Grinding वेल्डिंग/ग्राइंडिंग													
3	Cleaning of Filters फिल्टर सफाई													
4	Removal of Pigs पिग्स हटाना													
5	Acid handling एसिड संभालना													
6	Electrical Job इलेक्ट्रिकल काम													
7	Working at Height उंची पर काम													
8	Extinguisher Maintenance अग्निशमक संभालना													
9	General Maintenance सामान्य संभालना													
10	Hot Surface Maintenance गर्म सतह संभालना													

Display of Personal Protective Equipment Matrix

Best Safety Practices adopted by GAIL

Compliance Audit:

- Third Party Safety Audit - Once in a Year
- **OISD Audit**
- Inter Unit Safety Audit by multi disciplinary group – Once in a Three Years
- **Internal Safety Audit – Once in a Quarter**

- **Audit Checklist – OISD 145**
 - ✓ Organization and Administration
 - ✓ Industrial Hazards Control
 - ✓ Employees Training
 - ✓ Fire, Accident and Near miss
 - ✓ Fire Protection
 - ✓ Coating Condition
 - ✓ Cathodic Protection/Soil Testing
 - ✓ UT Survey
 - ✓ Internal Corrosion
 - ✓ Pigging
 - ✓ CPL Survey
 - ✓ Mainline Valve
 - ✓ Pipeline Patrolling
 - ✓ Telecom and Telemetry
 - ✓ Electrical System
 - ✓ Contingency Plan

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

31

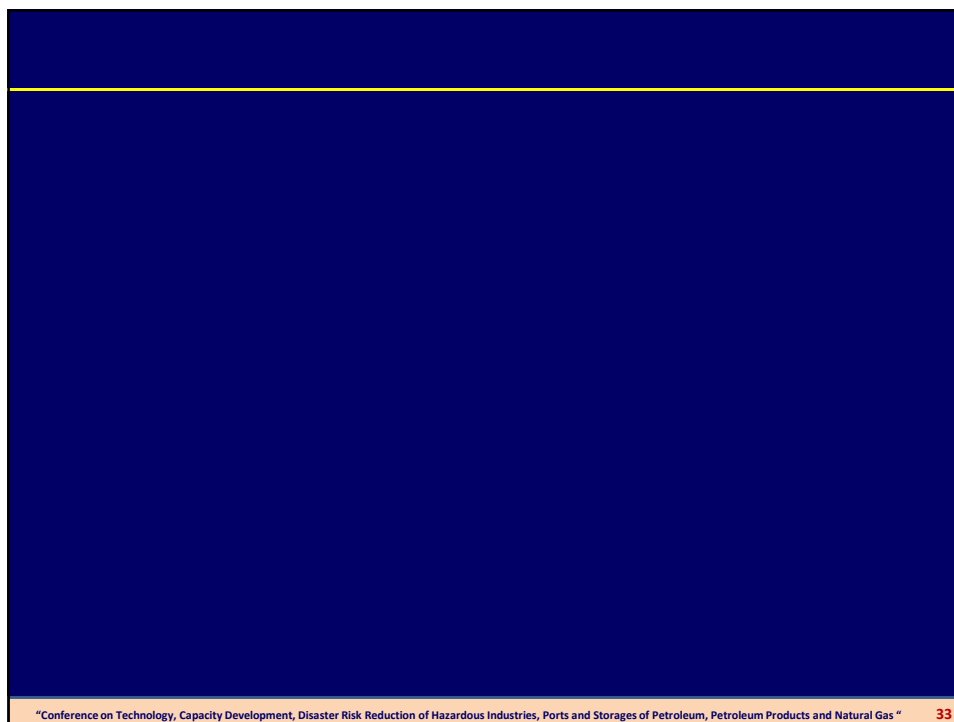
Safety Performance

- *HSE Policy states "GAIL accords highest priority to set tangible and measurable targets for monitoring the performance on HSE".*

- *HSE index is the yardstick for evaluating HSE performance of all 29 O&M work centres. HSE index is calculated based on 13 measurable parameters which are allotted weightage out of maximum 100 percentage according to their importance.*

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

32



Safety Performance – HSE Index

Safety Index	Rating Category
98.5 % & Above	Excellent
98.0 % & Above	Very Good
97.0 % & Above	Good
96.0 % & Above	Fair
Below 96.0 %	Poor

Computed HSE Index of GAIL is put up to Board of Directors as compulsory Board Agenda Point, every month.

BBS Approach to HSE Culture at GAIL



Behaviour Based Safety (BBS) is the "application of science of behaviour change to real world problems". BBS "focuses on what people do, analyses why they do it, and then applies a research-supported intervention strategy to improve what people do."

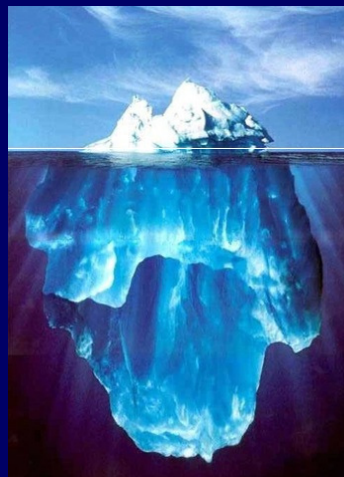
Source: Internet

BBS Approach to HSE Culture at GAIL

A Model for Culture

■ Visible

■ Invisible



■ Behaviour

- Attitudes
- Perceptions
- Values
- Beliefs

BBS Approach to HSE Culture at GAIL

Need for BBS

Research and experience indicate that:

1. 90% or more of the accidents are due to unsafe human acts or behaviors;
1. 50% of the unsafe behaviors are identified or noticeable at any plant installation at any given point of time
2. 25-30% of safety awareness is lacking among employees which gets reflected in their unsafe behaviors;
3. Unsafe behaviors are at the core of any near misses, injury, accidents. If we control unsafe behaviors, we may not even have near misses.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

37

Geller's – 10 Paradigm Shift – Total Safety Culture

From failure oriented to achievement oriented

Most safety programs keep a record of safety failures. In contrast, productivity records are stated in achievement terms.

From outcome focused to behaviour focused

Companies as well as individuals are rewarded for outcomes; consequently attention is focused on outcomes. Geller suggests a scoring system based on what people do for safety.

From top-down Initiative/control to bottom-up involvement

It is the people on-the-line who know where the safety problems are. Given a chance and appropriate encouragement, they can have the most influence on safe behaviours and at correcting at-risk behaviours and practices.

From rugged individualism to teamwork

Safety requires the kind of team approach that companies use for quality and production.

From a piecemeal to a systems approach

Any long-term improvements can only be achieved by attention to all aspects of the corporate culture.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

38

Geller's – 10 Paradigm Shift – Total Safety Culture

From fault finding to fact finding

An injury or near injury provides an opportunity to investigate facts from all aspects of the system that could have contributed to the incident.

From reactive to proactive

Investigating the events that preceded an accident.

From quick fix to continuous improvement

There is no quick fix for most injury prevention programs. Significant change can only be achieved by a commitment by every individual and every level.

From priority to value

Rather than using slogans such as, "Safety is a priority," it should be an enduring value. Safe work practices should occur regardless of the demands of a particular day. Safe work should be the enduring norm.

From OSHA regulations to corporate responsibility

Rather than doing "safety stuff" because government regulations require it, encouraging workers to achieve their own self-initiated goals.

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

39

Thanks

"Conference on Technology, Capacity Development, Disaster Risk Reduction of Hazardous Industries, Ports and Storages of Petroleum, Petroleum Products and Natural Gas "

40