What is a Flare System?

Process Safety Disposal System

Relief Discharge Point → Flare Tip
Typical Flare System

Process 1

Process 2

Process 3
Why Flaring?

- Process operational requirement
- Partial/total depressurizing for plant
- Relief of overpressure due to plant upsets/emergency
- Safe disposal of hydrocarbons as required
Continuous Flaring not Desired

- **Environmental Impacts:**
  - Gas Emission to Atmosphere
  - Noise & Odor
  - Thermal Radiation

- **Negative Image Impacts:**
  - Visible Flame
  - Sometimes, Smokey Flames

- **Economic Impacts:**
  - Loss of Valuable HC
  - Energy Loss (Steam/Power)
Saudi Aramco Flaring Minimization Program

SA Master Gas System

SA Corporate Flaring Roadmap

SA Near Zero Flaring

1970s

2000s

2010s
Saudi Aramco’s Flaring Minimization Program

SA Master Gas System

1970s
Saudi Aramco Master Gas System

Flaring at Saudi Aramco, MMSCFD

- 4200 MMSCFD
- 200 MMSCFD

CO₂ 98.4 MMTPA

> 4000 km pipelines
50 GOSPS
7 Gas Plants
3 NGL Plants
13.2 BSCFD Gas

Saudi Aramco: Public
Saudi Aramco Flaring Minimization Program

SA Master Gas System

SA Corporate Flaring Roadmap

1970s

2000s

4000 MMSCFD

95%
SA Corporate Flaring Minimization

Program Components

Measure:
- Accurate FMS Measurement

Monitor:
- Corporate Flare Monitoring System (CFMS)

Mitigate:
- Annual Flaring Minimization Plan (FMP)

Manage:
- Flaring Standards & Procedures
SA Corporate Flaring Minimization-Measure

- Real Time Flare Monitoring System (SAEP-400A)
- In-house developed system to calculate flaring volumes through control valve opening and valve characteristics
- Utilizes existing facilities' PI systems
- Live monitoring displays (Process Book Display)
- Flaring Event Data recording
SA Corporate Flaring Minimization - Monitor

Corporate Flaring Monitoring System (CFMS) Database

Saudi Aramco: Public
SA Corporate Flare Minimization-Mitigate

Site specific annual Flaring Minimization Plan (FMP) approved by facility manager

- Detailed description of the flare system
- Details of source wise flaring amount and reasons
- Policies and procedures of the site
- Long-and short-term mitigation measures
For accountability, consistency and continuous improvement, the Flaring Minimization Program is governed by procedures and standards:

- SAEP-400: Guidelines for Facility Flaring Minimization Plan
- SAEP-400A: Guidelines for Real-Time Flare Monitoring System Development
- SAES-A-102: Ambient Air Quality and Source Emissions Standards

KPI Established to Manage Flaring Loss
Saudi Aramco Corporate Flaring Minimization

Program Components

Measure
Monitor
Mitigate
Manage
Target Met:
50% Flaring Reduction
Saudi Aramco Flaring Minimization Program

SA Master Gas System

SA Corporate Flaring Roadmap

SA Near Zero Flaring

1970s

4000 MMSCFD
95%

2000s

100 MMSCFD
98%

2010s
Near Zero Flaring Technologies

**Upstream**
- ZDT Onshore
- ZDT Offshore
- Intermittent

**Downstream**
- HIPPS
- FGRS
- Emergency
- Purge
Saudi Aramco Near Zero Flaring

Target Met: 50% Flaring Reduction

Corporate Flaring Roadmap

Near Zero Flaring

0.00 0.50 1.00 1.50 2.00 2.50
Flaring as % of raw gas processed


Saudi Aramco: Public
Saudi Aramco Flaring Minimization Program

SA Master Gas System

SA Corporate Flaring Roadmap

SA Near Zero Flaring

1970s

2000s

2010s

4000 MMSCFD

100 MMSCFD

50 MMSCFD

95%

98%

99.5%
Saudi Aramco Achievements

- Associated Gas Utilized by the Master Gas System
  - 4000 MMSCFD

- Flaring Reduction through Corporate Flaring Roadmap
  - 100 MMSCFD

- Flaring Reduction through Near Zero Flaring
  - 50 MMSCFD

- Reduction in CO₂ Emissions
  - 98.4 MMTPA

Saudi Aramco: Public
Saudi Aramco
Flaring Minimization Program

- Master Gas System
- Corporate Flaring Monitoring System
- Near Zero Routine Flaring

2015 Flaring Intensity
(m3 per barrel oil produced)

Source: World Bank
Global Recognition For Saudi Aramco
THANK YOU
Saudi Aramco Flaring Minimization Program

Questions?

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