

API Gas-Lift Recommended Practices



Presented by

Cleon Dunham, Oilfield Automation Consulting

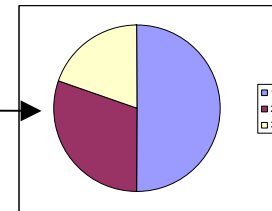
John Martinez, Production Associates

Importance of Gas Lift in Petroleum Industry

From 2003 International Gas Lift Workshop
Kuala Lumpur, Malaysia

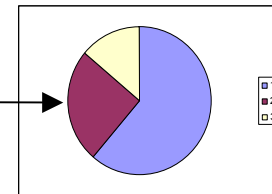
ExxonMobil

- 49% of oil production by artificial lift
- 31% by gas lift



Shell International

- 39% of oil production by artificial lift
- 25% by gas lift



Significant industry thrusts

- Offshore, sub-sea
- Horizontal, often multi-lateral completions
- More and more depleting reservoirs



API 11V Gas Lift Task Group on Gas Lift Equipment

History

Formed in 1979

34 Members from Industry

- **Operating Companies (11)**
- **Service Companies (14)**
- **Consultants (7)** (5 were previously with Operating Companies)
- **Universities (2)**
- **Ad-Hoc Members** (Several others help on specific topics)



API Gas Lift Work Groups

Eight work groups

- **API Specification 11V1 – Gas lift valves, orifices, dummies**
- **API RP* 11V2 – Gas lift valve testing, modeling**
- **API RP 11V5 – Gas lift operations (revision in progress)**
- **API RP 11V6 – Gas lift design**
- **API RP 11V7 – Gas lift valve reconditioning**
- **API RP 11V8 – Gas lift systems**
- **API RP 11V9 – Dual gas lift (development in progress)**
- **API RP 11V10 – Intermittent gas lift (development in progress)**

*** Recommended Practice**



API 11V1

Gas Lift Valves, Orifices

API Specification

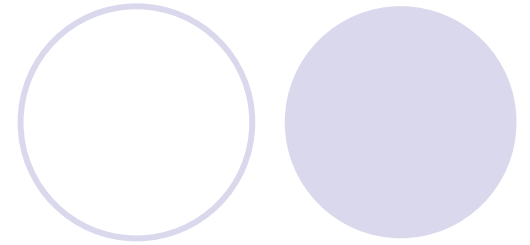
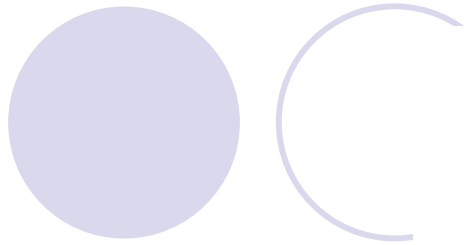
- **Specifications for manufacture and functional testing of gas lift valves, orifices, reverse flow valves, and dummy valves**
- **Chair: Wayne Mabry, Schlumberger**

Status

- **2nd Edition: Feb. 1995**
- **Reaffirmed: Jan. 2000**
- **Document: 37 pages, \$87.00**
- **Status: Active**

Future plans

- **To be replaced by ISO Standards**
 - **ISO 17078.1 (mandrels)**
 - **ISO 17078.2 (flow control devices)**
 - **ISO 17078.3 (running/pulling/kick-over tools, and latches)**



Side Pocket Mandrels





API RP 11V2

Gas Lift Valve Testing, Modeling

API Recommended Practice

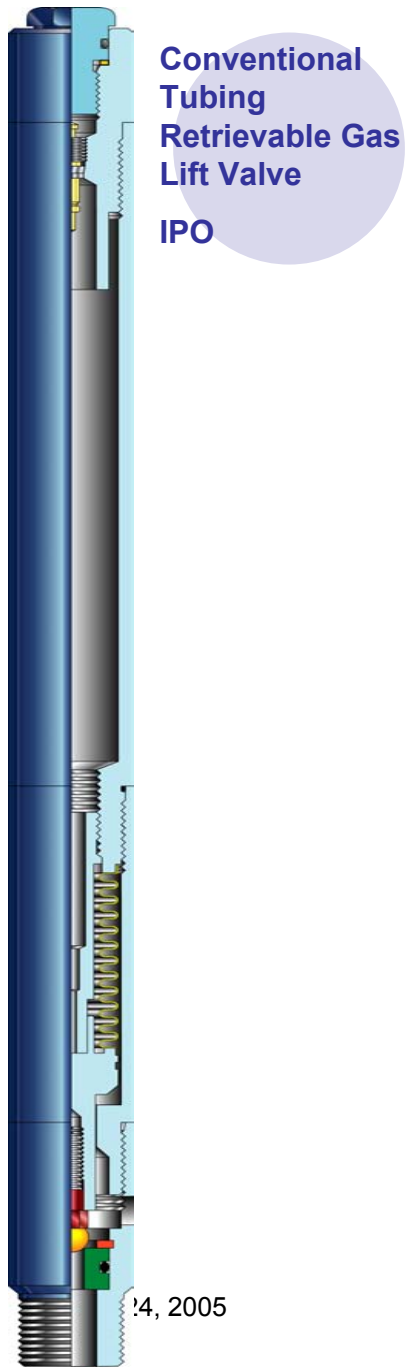
- Recommended practices for flow performance testing and development of performance models for IPO & PPO gas lift valves
- Chair: Ken Decker, Decker Technology

Status

- 2nd Edition: Mar. 2001
- Document: 56 pages, \$80.00
- Status: Active

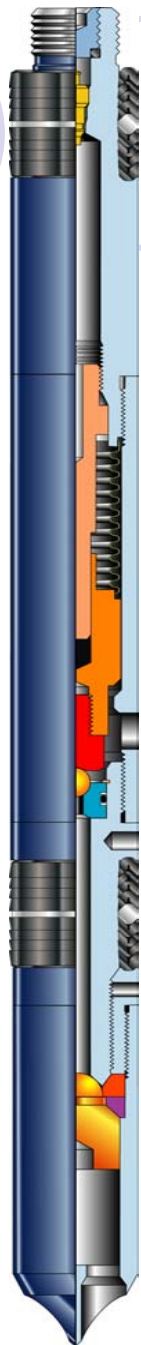
Future plans

- To be replaced by ISO Standard
 - ISO 17078.2 (flow control devices)



Conventional
Tubing
Retrievable Gas
Lift Valve
IPO

4, 2005



Wireline
Retrievable Gas
Lift Valve
IPO

2005 Spring Gas



Wireline Retrievable
Gas Lift Orifice
Valve

10p



Wireline
Retrievable
Dummy Valve



API RP 11V5 Gas Lift Operations

API Recommended Practice

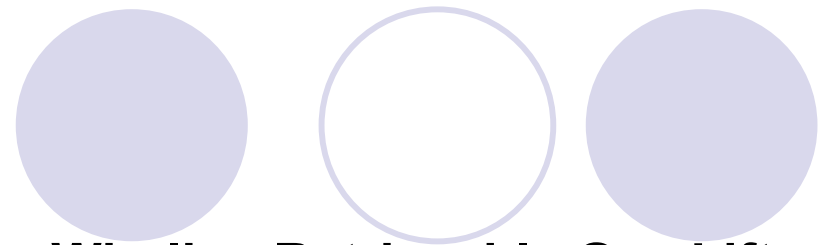
- Recommended practices for unloading, kickoff, adjustment, troubleshooting, and location of problems for gas lift operations
- Chair: Cleon Dunham, OAC

Status

- 2nd Edition: Jun. 1999
- Document: \$87.00
- Status: Active

Future plans

- Currently being updated and expanded
- Hope to re-publish in 2005



Wireline Retrievable Gas Lift Equipment

- Side Pocket Mandrels
- Gas Lift Valves
- Valve Latches
- Kick-over Tools
- Running Tools
- Pulling Tools



API RP 11V6 Gas Lift Design

API Recommended Practice

- Recommended practices for design of continuous flow, single string gas lift systems using injection pressure operated (IPO) gas lift valves
- Chair: Joe Clegg, Consultant

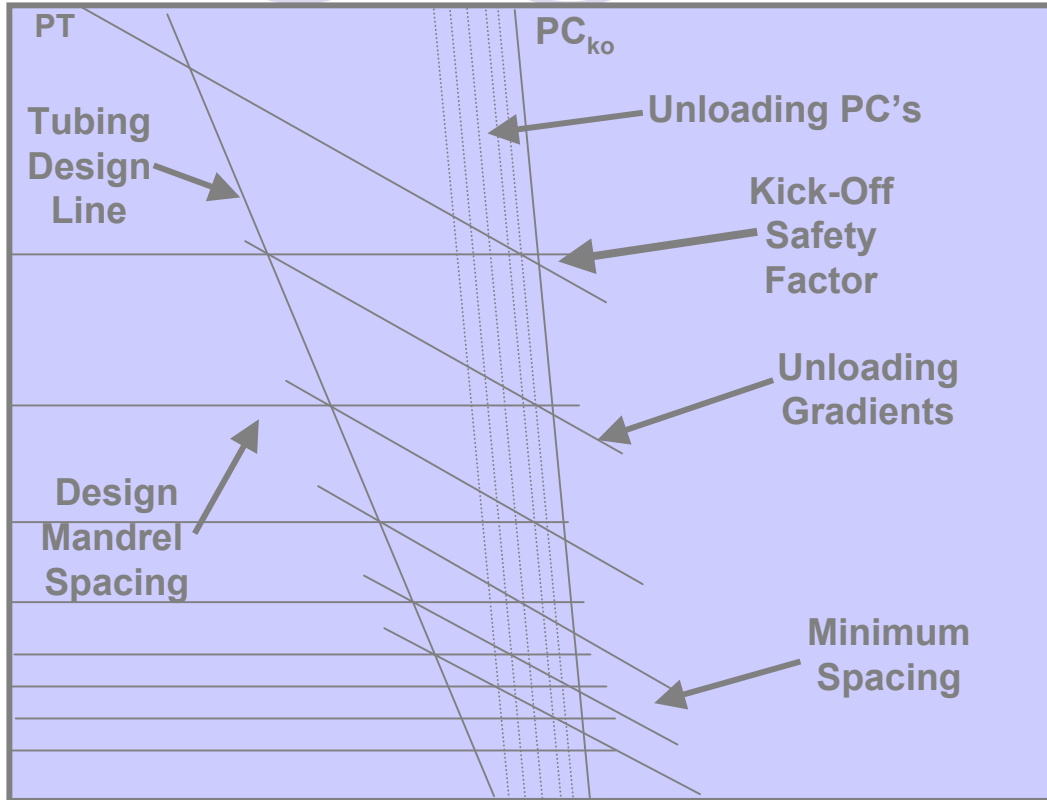
Status

- 2nd Edition: Jul. 1999
- Document: \$117.00
- Status: Active

Future plans

- Maintain document as is

Gas Lift Design Challenges



- **Must be able to kick-off the well.**
- **Must be able to unload the well.**
- **Must not damage any valves.**
- **After unloading, must keep unloading valves closed.**
- **Must be able to operate:**
 - **Deep**
 - **Stable**
 - **Optimum**



API RP 11V7

Gas Lift Valve Reconditioning

API Recommended Practice

- Recommended practices for repair and reconditioning, testing, and setting used gas lift valves
- Chair: John Martinez, Production Associates

Status

- 2nd Edition: Jun. 1999
- Document: \$82.00
- Status: Active

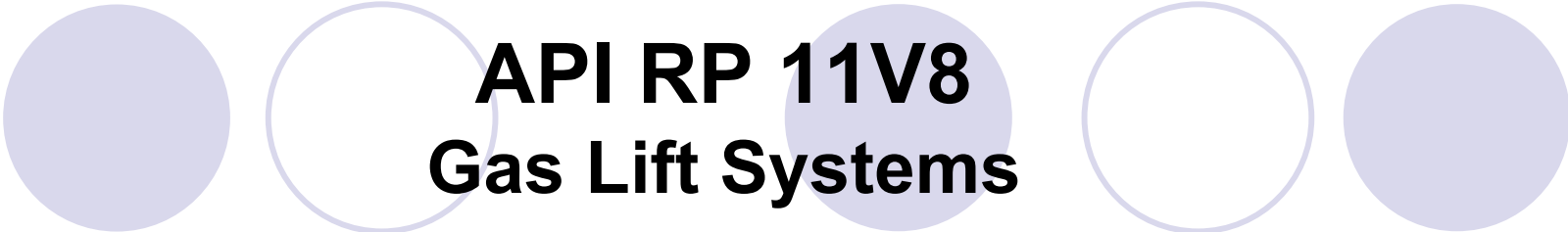
Future plans

- To be replaced by ISO Standard
 - ISO 17078.2 (flow control devices)



Gas Lift Valve Reconditioning Challenges

- Which components have failed?
- Why did they fail?
- Can some components be re-used?
- They must be thoroughly tested before re-use.



API RP 11V8 Gas Lift Systems

API Recommended Practice

- Recommended practices for designing and predicting the performance of a gas lift system
- Chair: John Martinez, Production Associates

Status

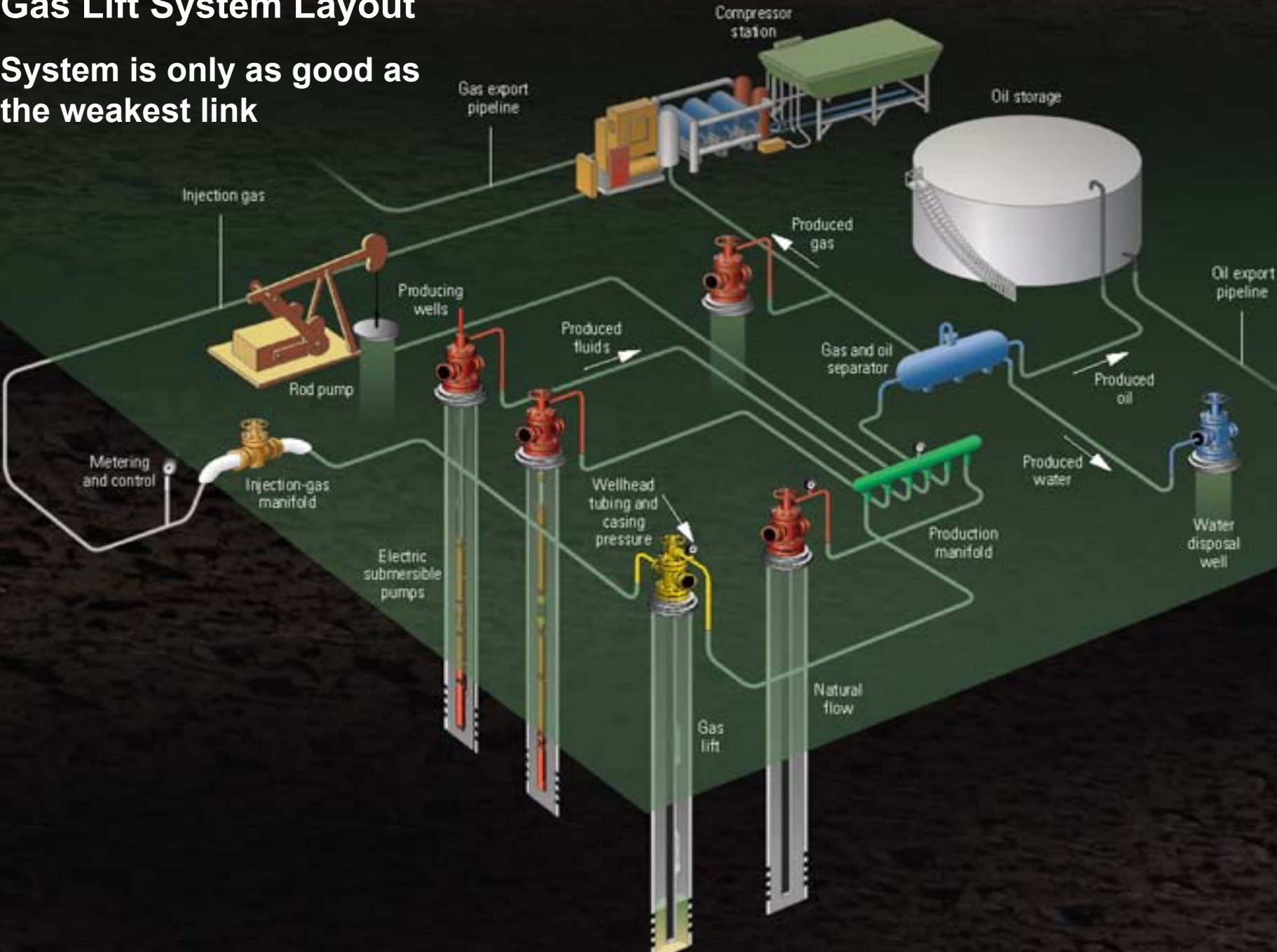
- 1st Edition: Sep. 2003
- Document: 79 pages, \$90.00
- Status: Active

Future plans

- Review status in 5 years (2008)

Gas Lift System Layout

System is only as good as the weakest link





API RP 11V9 Dual Gas Lift

API Recommended Practice

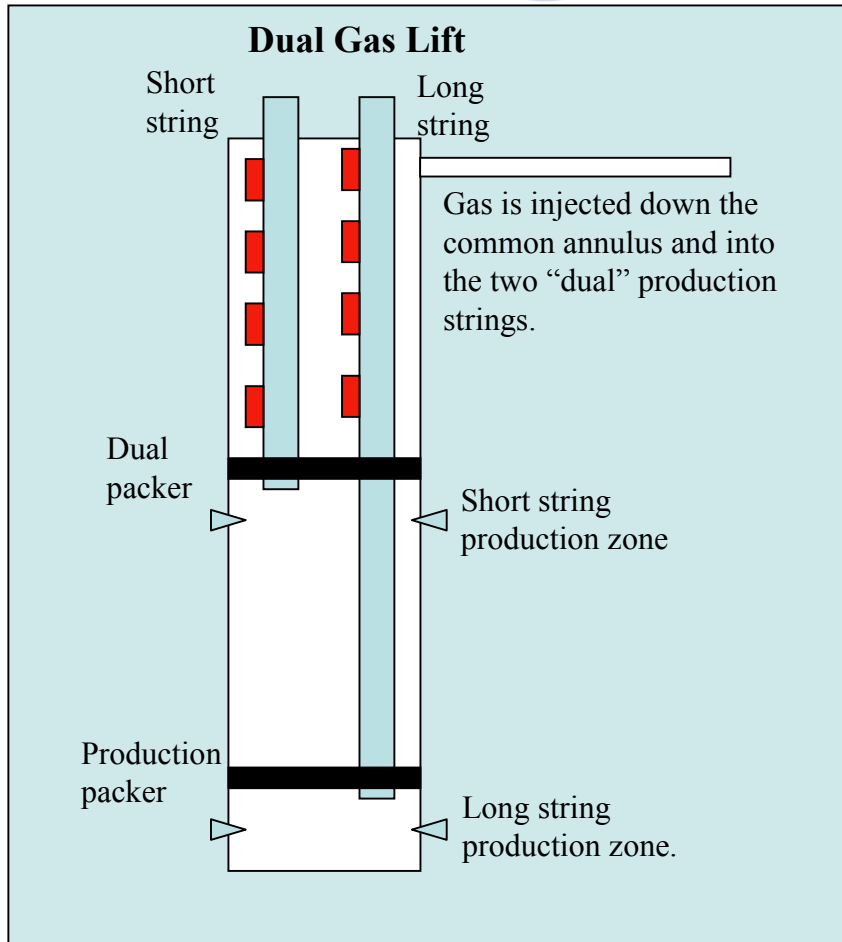
- Recommended practices for design and operation of dual gas lift systems
- Chair: Cleon Dunham, OAC

Status

- Under development

Future plans

- Hope to publish in 2005 or 2006



Dual Gas Lift Challenges

- Continuously injecting in both sides of the dual
- Injecting deep in both sides
- Testing and diagnosing problems with both sides
- Choosing the correct gas lift equipment

Recommended Practice Focuses On:

- Design
- Operation
- Troubleshooting
- Optimization



API RP 11V10 Intermittent Gas Lift

API Recommended Practice

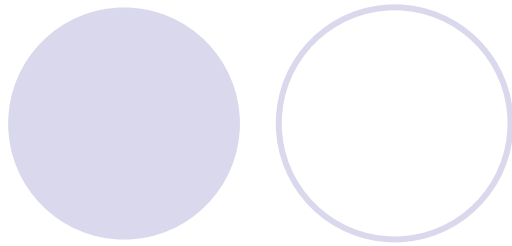
- Recommended practices for design and operation of intermittent gas lift systems
- Chair: Ali Hernandez, PDVSA

Status

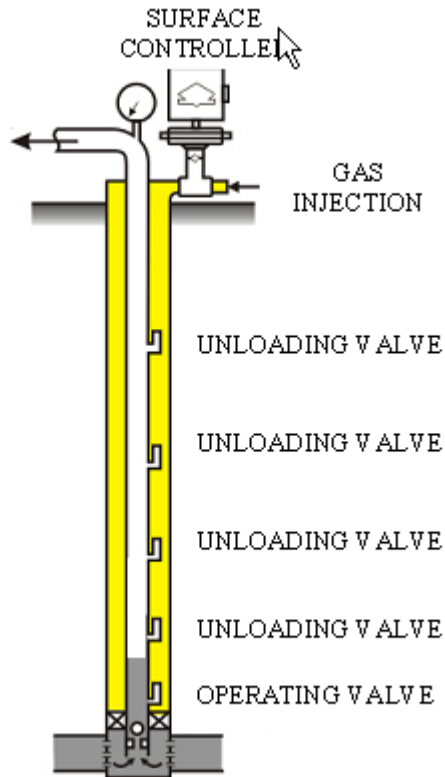
- Under development

Future plans

- Hope to publish in 2005 or 2006



Intermittent Gas Lift Challenges



- Injecting gas at the correct cycle frequency to optimize production
- Injecting the correct amount of gas per cycle
- Operating each well without upsetting other wells in the system

Recommended Practice Focuses On:

- Design
- Operation
- Troubleshooting
- Optimization

Obtaining and Using API Documents

To obtain copies of these documents:

- Go to the **API web site**
- http://api-ep.api.org/filelibrary/Catalog2004_web.pdf
- Go to **Series 11 for Production Equipment**
- Page down to **11V documents**
- Order via: www.global.ihs.com
- Or FAX an order to **1-303-397-2740**

These documents are good as:

- **A basis for training classes**
- **Reference documents**

Developing a New API Document

Process

Approx. Time (Months)

New idea by Task Group 11V	2 – 4
Approved by API Committees 11	2 – 4
New Work Group appointed (volunteers)	2 – 4
Developed by Work Group 11Vx	24 - 48
Approved by Task Group 11V	3 – 6
Voted by Committee 11	3 – 6
Reworked to address comments	3 – 6
Re-voted by Committee 11	3 – 6
Approved by API	3 – 6
Published by API	3 – 6
Total	48 – 96



Looking to the Future

Other gas lift topics may be addressed in the future

- **Gas lift design using production pressure operated (PPO) gas lift valves**
- **Gas lift system and well automation**
- **Surface controlled downhole gas lift systems**
- **Standard gas lift symbols and abbreviations**
- **Selection of artificial lift equipment**
- **Other topics as requested by industry**



Looking to the Future

To continue support of existing API gas lift documents and develop new ones, we need

- **Active interest and participation by industry gas lift personnel – Operators, Suppliers, Others**

Good news

- **Some members of API gas lift subcommittee have participated since day #1 so they bring a wealth of experience (4 members)**
- **Some are young enthusiastic engineers (4 members)**
- **Some are from other countries (7 members)**
- **Several are also helping to lead and actively participate on the ISO gas lift international standards committee, so continuity exists (9 members)**