Breakout Session

Selection of Artificial Lift for Gas Well Deliquification

Facilitator: Cleon Dunham
Oilfield Automation Consulting
Introduction

- An effort is being led by the Artificial Lift R&D Council (ALRDC) to help the industry develop a set of recommended practices for the selection of artificial lift methods for gas well deliquification.

- The information is being developed by artificial lift experts from the industry. A detailed outline of the planned document and the progress so far can be seen on: www.alrdc.com

  **www.alrdc.com ==> Recommendations ==> Gas Well Deliquification ==> Artificial Lift Selection**

- A meeting will be held on Thursday, Feb. 28, 2008, the day after the 2008 Gas Well Deliquification Workshop, to move this project along.
- People who are interested in helping with this effort are invited to attend.
Breakout Session Outline

The purpose of this breakout session is to:

- Review the progress to date in developing the recommended practices.
- Introduce the current team members.
- Solicit ideas on additional information to be covered in the recommended practices.
- Solicit additional industry artificial lift personnel to serve on the team.
- Solicit ideas on how the recommended practices can best be distributed and implemented.
Outline of the Project

Section 1 --- Guidelines for Creating an Optimum Artificial Lift Selection Process

1. Introduction
1.1 Know Your Business
1.2 Know Your Company
1.3 Know Your Economics
1.4 Know Your Staff
1.5 Know Your Suppliers
1.6 Know Your Reservoirs
1.7 Know Your Wells
1.8 Know the Performance of Your Wells
1.9 Know Your Surface System

These sections are drafted. Comments are welcome.
Outline of the Project

Section 2 --- General Guidelines for Artificial Lift Systems

2 Introduction
2.1 Fundamentals of Gas Well Deliquification
2.2 Pertinent Types of Artificial Lift
2.3 How to Use Artificial Lift Screening Tools
2.4 Limits, Typical Costs, and Life Expectancies of Each Type of Artificial Lift Technology
   2.4a --- Sucker Rod Pumping
   2.4b --- Progressing Cavity Pumping
   2.4c --- Electrical Submersible Pumping
   2.4d --- Hydraulic Pumping

Sections in Yellow are drafted. Comments are welcome.
Outline of the Project

Section 2 --- General Guidelines for Artificial Lift Systems

2.4 Limits, Typical Costs, and Life Expectancies of Each Type of Artificial Lift Technology

2.4e --- Tubing Plungers
2.4f --- Casing Plungers
2.4g --- Soap Sticks
2.4h --- Batch Chemical
2.4i --- Continuous Chemical
2.4j --- Velocity Strings
2.4k --- Surface Compression

Sections in Yellow are drafted. Comments are welcome.
Outline of the Project

Section 2 --- General Guidelines for Artificial Lift Systems

2.4 **Limits, Typical Costs, and Life Expectancies of Each Type of Artificial Lift Technology**

2.4l --- Continuous Gas-Lift

2.4m --- Intermittent Gas-Lift

2.4n --- Vortex Flow???

2.4o --- Liquid Injection

Sections in Yellow are drafted. Comments are welcome.
Outline of the Project

Section 3 --- Guidelines for Selecting the Most Appropriate Artificial Lift System for Your Application

3  Introduction
3.1 Pertinent Issues to Consider
3.2 Use Artificial Lift Selection Tools
3.3 Check Artificial Lift Economics
3.4 Choose the Artificial Lift System Supplier
3.5 Choose the Specific Artificial Lift System

Sections in Yellow are drafted. Comments are welcome.
Outline of the Project

Section 4 --- Guidelines for Optimum Application of Each Artificial Lift System

4 Introduction

4.1 Recommended Practice Guidelines for Installation, Operation, Maintenance

4.2 Automation, Surveillance, Optimization

4.3 Training

Sections in Yellow are drafted. Comments are welcome.
## Current Team Members

### Introduce current team members

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Section 1</td>
<td>Cleon Dunham</td>
</tr>
<tr>
<td>2</td>
<td>Introduction</td>
<td>Cleon Dunham</td>
</tr>
<tr>
<td>2.1</td>
<td>Fundamentals of Gas Well Deliquification</td>
<td>Jim Lea, Cleon Dunham</td>
</tr>
<tr>
<td>2.2</td>
<td>Pertinent Types of Artificial Lift</td>
<td>Jim Lea, Cleon Dunham</td>
</tr>
<tr>
<td>2.3</td>
<td>How to Use Artificial Lift Screening Tools</td>
<td>Jim Lea, Cleon Dunham</td>
</tr>
<tr>
<td>2.4</td>
<td>Limits, Typical Costs, and Life Expectancies of Each Type of Artificial Lift Technology</td>
<td>Cleon Dunham</td>
</tr>
<tr>
<td>2.4a</td>
<td>Sucker Rod Pumping</td>
<td>Jim Lea, Norm Hein, Tom vanAkkeren, Andy Cordova</td>
</tr>
<tr>
<td>2.4b</td>
<td>Progressing Cavity Pumping</td>
<td>To Be Determined, R&amp;M Energy Sys.</td>
</tr>
<tr>
<td>2.4c</td>
<td>Electrical Submersible Pumping</td>
<td>Rick Webb, Steven Breit, Centrilift, Reda</td>
</tr>
<tr>
<td>2.4d</td>
<td>Hydraulic Pumping</td>
<td>Bryan Dotson, James McAdams, Weatherford</td>
</tr>
</tbody>
</table>
Current Team Members

Introduce current team members

- **2.4e --- Tubing Plungers**
  - Bill Hearn

- **2.4f --- Casing Plungers**
  - Bill Hearn

- **2.4g --- Soap Sticks**
  - Dan Casey

- **2.4h --- Batch Chemical**
  - James Archer, Sam Toscano, Jose Macias, Weatherford

- **2.4i --- Continuous Chemical**
  - James Archer, Sam Toscano, Jose Macias, Weatherford

- **2.4j --- Velocity Strings**
  - Larry Harms

- **2.4k --- Surface Compression**
  - Larry Harms

- **2.4l --- Continuous Gas-Lift**
  - Boots Rouen, Cleon Dunham

- **2.4m --- Intermittent Gas-Lift**
  - Boots Rouen, Cleon Dunham

- **2.4n --- Vortex Flow**
  - Norm Hein

- **2.4o --- Liquid Injection**
  - Jim Lea, Francisco Alhanati
Current Team Members

Introduce current team members

3 Introduction
3.1 Pertinent Issues to Consider
3.2 Use Artificial Lift Selection Tools
3.3 Check Artificial Lift Economics
3.4 Choose the Artificial Lift System Supplier
3.5 Choose the Specific Artificial Lift System

Cleon Dunham
Jim Lea, Cleon Dunham
Jim Lea, Cleon Dunham
To Be Determined
Bryan Dotson
Jim Lea, Cleon Dunham
Current Team Members

Introduce current team members

4 Introduction
4.1 Recommended Practice Guidelines for Installation, Operation, Maintenance
4.2 Automation, Surveillance, Optimization
4.3 Training

Cleon Dunham
Jim Lea, Brian Dotson, Cleon Dunham
Cleon Dunham, Greg Stephenson
Jim Lea
Objective of the Session

Solicit ideas on additional information to be covered in the recommended practices.

- After looking at the outline of the project, what other information should be covered in the recommended practice document?
  - Other artificial lift methods?
  - Other guidelines for selection?
  - Other guidelines for application and implementation?
Objective of the Session

Solicit additional industry artificial lift personnel to serve on the team.

- After looking at the outline of the project, what other people should be invited to be part of the team?
  - Operating Company personnel?
  - Service Company personnel?
  - University personnel?
  - Consultants?
  - Others?
Objective of the Session

Solicit ideas on how the recommended practices can best be distributed and implemented.

- Web site
- Text Book
- Notebooks
- PowerPoint presentations
- Special general workshop
- Workshops for individual companies
- General training programs
- Training programs for individual companies
- Other methods
### Attendees for the Breakout Session

<table>
<thead>
<tr>
<th>Person</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin Rogers</td>
<td>Centrilift</td>
</tr>
<tr>
<td>Les Reid</td>
<td>Centrilift</td>
</tr>
<tr>
<td>Brian Dugan</td>
<td>Centrilift</td>
</tr>
<tr>
<td>Dustin Welch</td>
<td>ConocoPhillips</td>
</tr>
<tr>
<td>Jim Hacksma</td>
<td>Consultant</td>
</tr>
<tr>
<td>Jeffrey Everson</td>
<td>Foster-Miller</td>
</tr>
<tr>
<td>Eddie Morris</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Jim Tate</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Jim Whitehead</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Allen Smithhart</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Jeff Kephart</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Sean Keller</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Rog Myers</td>
<td>Pioneer Natural Resources</td>
</tr>
<tr>
<td>Lloyd Martin</td>
<td>Sampson</td>
</tr>
<tr>
<td>Gary Smallwood</td>
<td>Samson</td>
</tr>
<tr>
<td>Tasso Magalhae</td>
<td>Schlumberger</td>
</tr>
<tr>
<td>Jason Kamphaus</td>
<td>Schlumberger</td>
</tr>
<tr>
<td>Jun Xu</td>
<td>Shell</td>
</tr>
<tr>
<td>Nina Teff</td>
<td>Shell Oil Company</td>
</tr>
<tr>
<td>Cleon Dunham</td>
<td>Oilfield Automation Consulting</td>
</tr>
<tr>
<td>Rick Webb</td>
<td>Wilson Artificial Lift</td>
</tr>
</tbody>
</table>

(Coordinator)
Summary of Discussion

• Topics that might be addressed in the Artificial Lift Selection Document
  – Describe where to place a tail pipe below the packer.
  – Discuss artificial lift systems that work below the packer.
  – Discuss how to drill and complete wells to make it easier for artificial lift.
    • Directional wells, casing size, etc.
  – Discuss capillary strings.
  – Discuss jet pumps.
  – Discuss downhole gas/water separation.
  – Provide a list of companies that provide each type of artificial lift.

• Method of distributing the recommended practices
  – In training courses.
  – On CD’s.
  – Use a Network with Google.
  – Develop a program for input of data about wells and aid with selection of artificial lift.

• People who might assist with this process
  – Jim Curfew, Quicksilver
Copyright

Rights to this presentation are owned by the company(ies) and/or author(s) listed on the title page. By submitting this presentation to the Gas Well Deliquification Workshop, they grant to the Workshop, the Artificial Lift Research and Development Council (ALRDC), and the Southwestern Petroleum Short Course (SWPSC), rights to:

- Display the presentation at the Workshop.
- Place it on the www.alrdc.com web site, with access to the site to be as directed by the Workshop Steering Committee.
- Place it on a CD for distribution and/or sale as directed by the Workshop Steering Committee.

Other uses of this presentation are prohibited without the expressed written permission of the company(ies) and/or author(s) who own it and the Workshop Steering Committee.
Disclaimer

The following disclaimer shall be included as the last page of a Technical Presentation or Continuing Education Course. A similar disclaimer is included on the front page of the Gas Well Deliquification Web Site.

The Artificial Lift Research and Development Council and its officers and trustees, and the Gas Well Deliquification Workshop Steering Committee members, and their supporting organizations and companies (here-in-after referred to as the Sponsoring Organizations), and the author(s) of this Technical Presentation or Continuing Education Training Course and their company(ies), provide this presentation and/or training material at the Gas Well Deliquification Workshop "as is" without any warranty of any kind, express or implied, as to the accuracy of the information or the products or services referred to by any presenter (in so far as such warranties may be excluded under any relevant law) and these members and their companies will not be liable for unlawful actions and any losses or damage that may result from use of any presentation as a consequence of any inaccuracies in, or any omission from, the information which therein may be contained.

The views, opinions, and conclusions expressed in these presentations and/or training materials are those of the author and not necessarily those of the Sponsoring Organizations. The author is solely responsible for the content of the materials.

The Sponsoring Organizations cannot and do not warrant the accuracy of these documents beyond the source documents, although we do make every attempt to work from authoritative sources. The Sponsoring Organizations provide these presentations and/or training materials as a service. The Sponsoring Organizations make no representations or warranties, express or implied, with respect to the presentations and/or training materials, or any part thereof, including any warranties of title, non-infringement of copyright or patent rights of others, merchantability, or fitness or suitability for any purpose.