API RP 90
Recommended Practice
Annular Pressure Management in Offshore Wells

2008 ASME/API/ISO GAS-LIFT WORKSHOP
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Scope of RP 90

- Guideline for managing annular casing pressure in offshore wells
- Modeled after GOM OCS wells, but applicable to similar type wells worldwide
- Performance and risk based methodology to answer the question "Is the pressure on the casing an unacceptable risk?"

Back Ground

- MMS issued NTL Jan 13, 1994
- Proposed regulations published for comment in 2001
- MMS agreed to postpone rulemaking in 2003 to allow develop of RP
- August 2006 RP 90 published
- MMS reviewing for incorporation into regulations

Work Methodology

- Sponsored by API and OOC
- MMS fully involved
- 13 Operating companies actively involved
- Manufacturers
- Engineering Consultants
- Regulatory Consultants
- Over 60 individuals have participated

Basis for API RP 90

- Dual Barrier philosophy for pressure control.
- Maximum Allowable Wellhead Operating Pressure (MAWOP)
- All pressures over 100 psig should be evaluate regardless of the source.
- This document intended to identify and evaluate casing pressures to determine if they are acceptable or should addition action should be taken.

What's Covered

- Type of Wells
  - Fixed Platform Dry Tree Wells
  - Subsea
  - Hybrid
  - Mudline Suspension Wells
- Example well schematics are provided

What's Covered

- Pressure Sources
  - Thermal Pressure
  - Sustained Casing Pressure
  - Operator Imposed Pressure

What's Covered

- For each well type and types of annular pressure:
  - Monitoring
  - Diagnostic Testing
  - Example MAWOP
  - Flow charts to walk you through the needed actions depending on the pressure sources
  - Documentation

What's Not Covered

- Reporting requirements to a Gov't Agency
- Prevention measures
- Remediation measures

Maximum Allowable Wellhead Operating Pressure (MAWOP)

- Measure of how much pressure can be safely applied to an annulus considering:
  - Collapse of the inner tubular
  - Burst of the tubular being evaluated and next outer tubular
- Applicable for all types of annular pressure

Maximum Allowable Wellhead Operating Pressure (MAWOP)

- MAWOP for an annulus is the lesser of the following:
  - 50% of the MIYP of the casing being evaluated; or
  - 80% of the MIYP of the next outer casing; or
  - 75% of the MCP of the inner tubular pipe body
  - The outer most pressure containing casing MAWOP can not exceed 30% of it's MIYP

MAWOP EXAMPLE

		MIYP	Collapse	50% MIYP	30% MIYP	75% Collapse	80% MIYP	MAWOP	% MIYP
		PSIG	PSIG	PSIG	PSIG	PSIG	PSIG	PSIG	
Prod Tubing	3.5", 12.9#, L-80	15,000	15,310	NA	NA	11,483	NA	NA	NA
"A" Annulus	7 5/8",39#, Q-125	14,340	12,060	7,170	NA	9,045	11,472	7,088	49%
"B" Annulus	10-3/4", 55.5#, P=110	8,860	5,950	4,430	NA	4,463	7,088	2,760	31%
"C" Annulus	13 3/8", 68#, K-55	3,450	1,950	1,725	NA	1,463	2,760	1,725	50%
"D" Annulus	18 5/8", 87.5#, K-55	2,250	630	1,125	675	473	1,800	675	30%

Evaluation of Bleed-down/Build-up Tests

- Acceptable
  - Casing pressure below MAWOP and bleeds to zero in 24 hours
  - No action required
- Unacceptable
  - The casing pressure exceeds MAWOP or does not bleed to zero in 24 hours
  - Require further investigation
  - May require repair or mitigation

Operator Imposed Casing Pressure

- Types of Imposed Pressure
  - Gas lift pressure
    - Active gas lift wells exempt from evaluation
  - Nitrogen pressure on risers for thermal insulation and monitoring
  - Packer Backup

Thermal Casing Pressure Evaluation Methods

- Can be used for evaluating operator applied pressure or thermal casing pressure
- Multiple Diagnostic Methods:
  - Shut-in the well; or
  - Operate at a constant production rate and increase or decrease pressure; or
  - Change production rate
- Monitor well for expected casing pressure change

Operator Imposed Casing Pressure

- Imposed pressure below MAWOP is acceptable
- Wells with imposed pressure will always have a thermal component when the well is producing
- Diagnostic testing needing to ensure the thermal pressure is not masking SCP.

Wells on Active Gas Lift

- No specific bleed-down/build up test for evaluating the "A" annulus
  - If the annular volume occupied by gas is 100 bbls and is bled off to zero and 75 bbls of liquids feeds in over 24 hours, the pressure would only increase by 30 psig
- Failure of the well to maintain gas lift design pressure should be investigated
- Other available annuli should be evaluated