

Compressor Seal Emissions: Opportunities for Mitigation

David McCabe
Clean Air Task Force
MAP Session #5
Sept 26, 2019

Scale of Emissions

GHGRP data does not allow us to separate emissions from the NM portion of the Permian and San Juan Basins, and omits small operators / facilities

REPORTING_YEAR	2017
Sum of Methane	Column Labels
Row Labels	Compressors
Onshore natural gas processing [98.230(a)(3)]	3,427
Onshore natural gas transmission compression [98.230(a)(4)]	1,060
Onshore petroleum and natural gas gathering and boosting [98.230(a)(9)]	7,552
430 - Permian Basin	3,537
580 - San Juan Basin	4,015
Onshore petroleum and natural gas production [98.230(a)(2)]	6,311
430 - Permian Basin	5,725
580 - San Juan Basin	586
Underground natural gas storage [98.230(a)(5)]	31
Grand Total	18,380

Scale of Emissions

GHGRP data does not allow us to separate emissions from the NM portion of the Permian and San Juan Basins, and omits small operators / facilities

REPORTING_YEAR	2017
Sum of Methane	Column Labels
Row Labels	Compressors
Onshore natural gas processing [98.230(a)(3)]	3,427
Onshore natural gas transmission compression [98.230(a)(4)]	1,060
Onshore petroleum and natural gas gathering and boosting [98.230(a)(9)]	7,552
430 - Permian Basin	3,537
580 - San Juan Basin	4,015
Onshore petroleum and natural gas production [98.230(a)(2)]	6,311
430 - Permian Basin	5,725
580 - San Juan Basin	586
Underground natural gas storage [98.230(a)(5)]	31
Grand Total	18,380

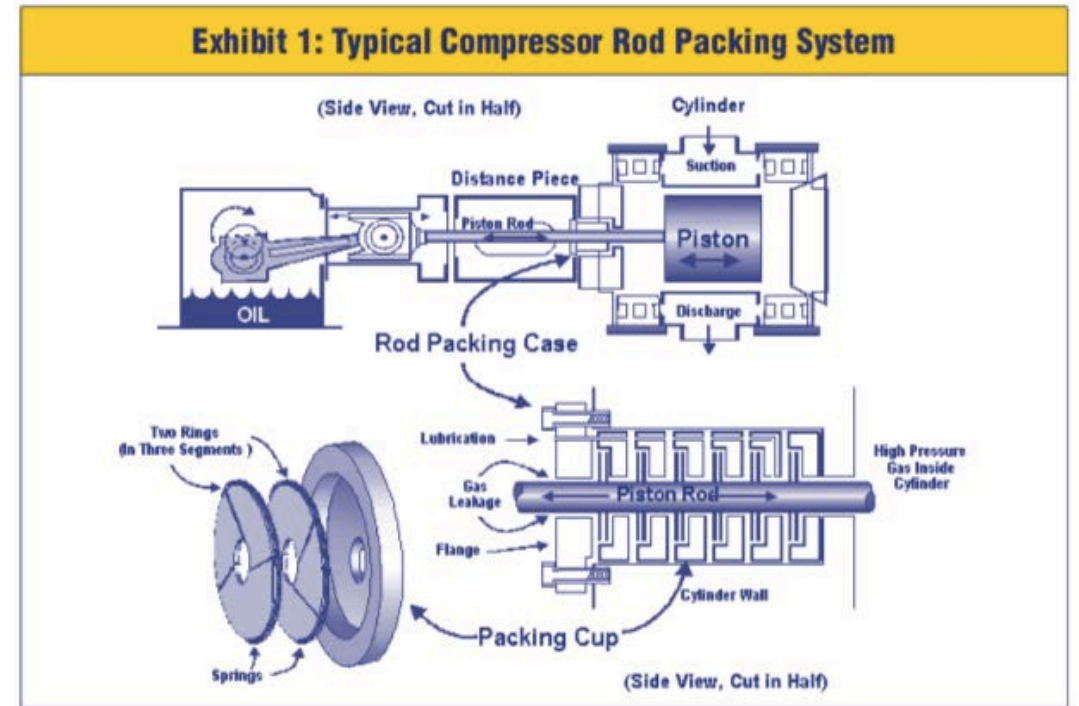
No Standards Apply to Production Compressors

No Standards Apply to pre-2011 Compressors

Reciprocating Compressors: Venting from rod-packing

Mitigation approaches:

- Replace rod packing
- Capture emissions & direct to process
- LDAR approach

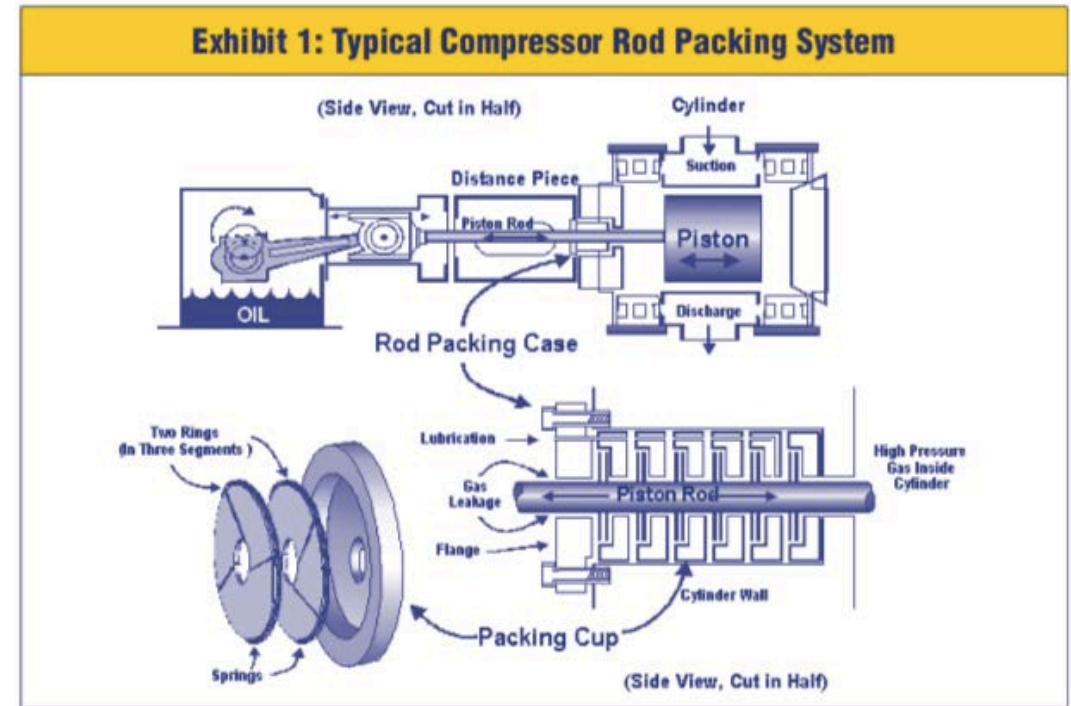


Reciprocating Compressors: Venting from rod-packing

Mitigation approaches:

- Replace rod packing
 - Every 3 years (0000a)
 - At a defined emissions threshold
 - California: 2 scf/min
 - Canada (Federal): 0.81 scf/min
 - BC & Alberta: Fleet Average 0.49

Using Gas Star data and formulas, CATF estimates that a standard requiring replacement at Canadian threshold (0.81 scf/min) has a cost of ~\$260 / metric ton of methane (gas value = US\$1/mcf)



Reciprocating Compressors: Venting from rod-packing

Mitigation approaches:

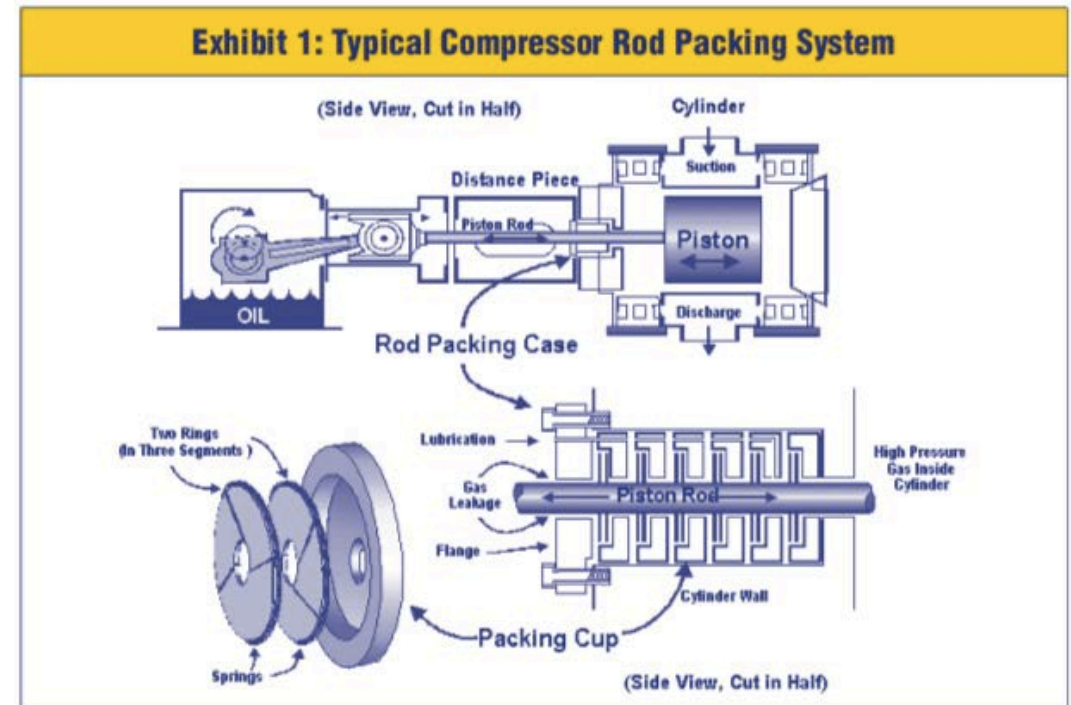
- Replace rod packing
- Capture emissions & direct to process
 - NSPS OOOOa option (e.g. SlipStream)
 - Required of new compressors in Canada

BC: 2021

Alberta: 2022

Federal: 2023

Canadian rules allow apply generally to compressors over size thresholds, and allow control (destruction) in addition to capture for use. Federal vent threshold for new compressors (0.04 scf/min) effectively requires control, but appears to be open to technological improvements in rod packing as an alternative approach.

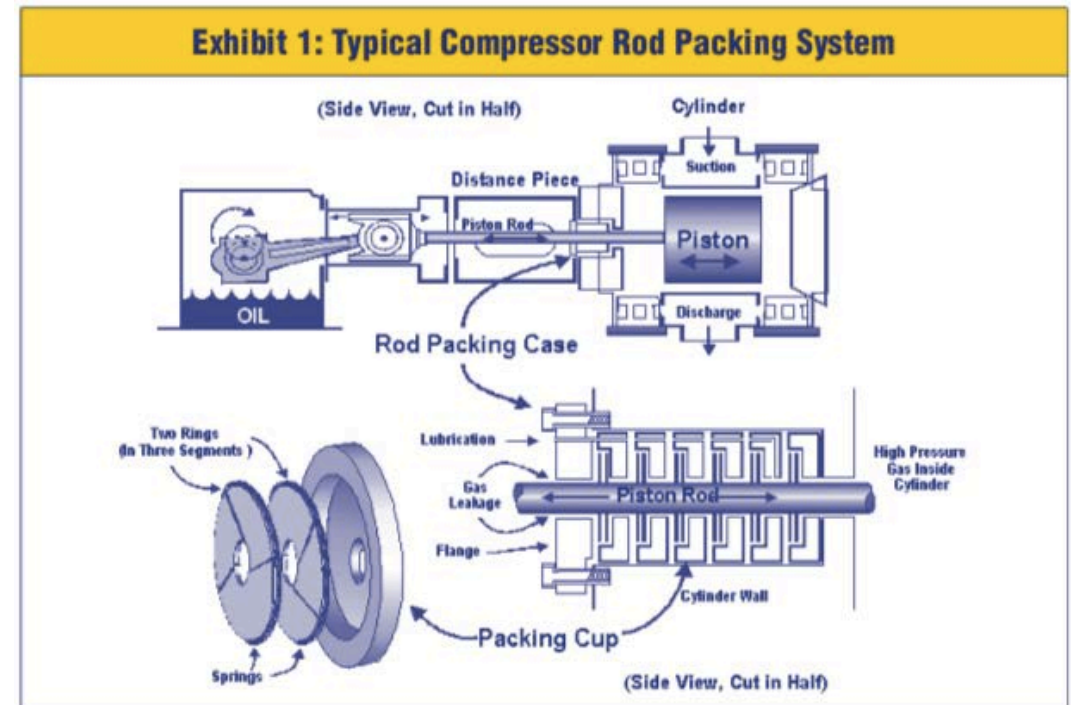


Reciprocating Compressors: Venting from rod-packing

Mitigation approaches:

- Replace rod packing
- Capture emissions & direct to process
- LDAR approach
 - California standards for wellpad compressors

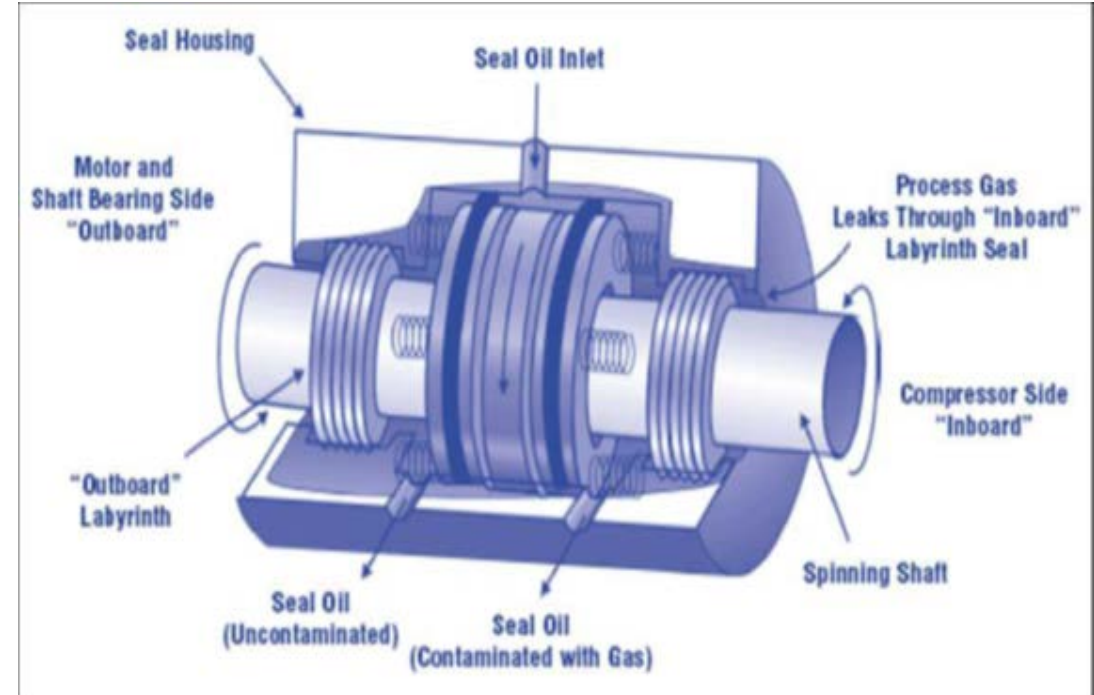
NM has thousands of wellpad compressors, which are not covered by any standard for venting.



Centrifugal Compressors: Wet-seal degassing

Mitigation approaches:

- Switch to dry seal
- Capture emissions & direct to process



Centrifugal Compressors: Wet-seal degassing

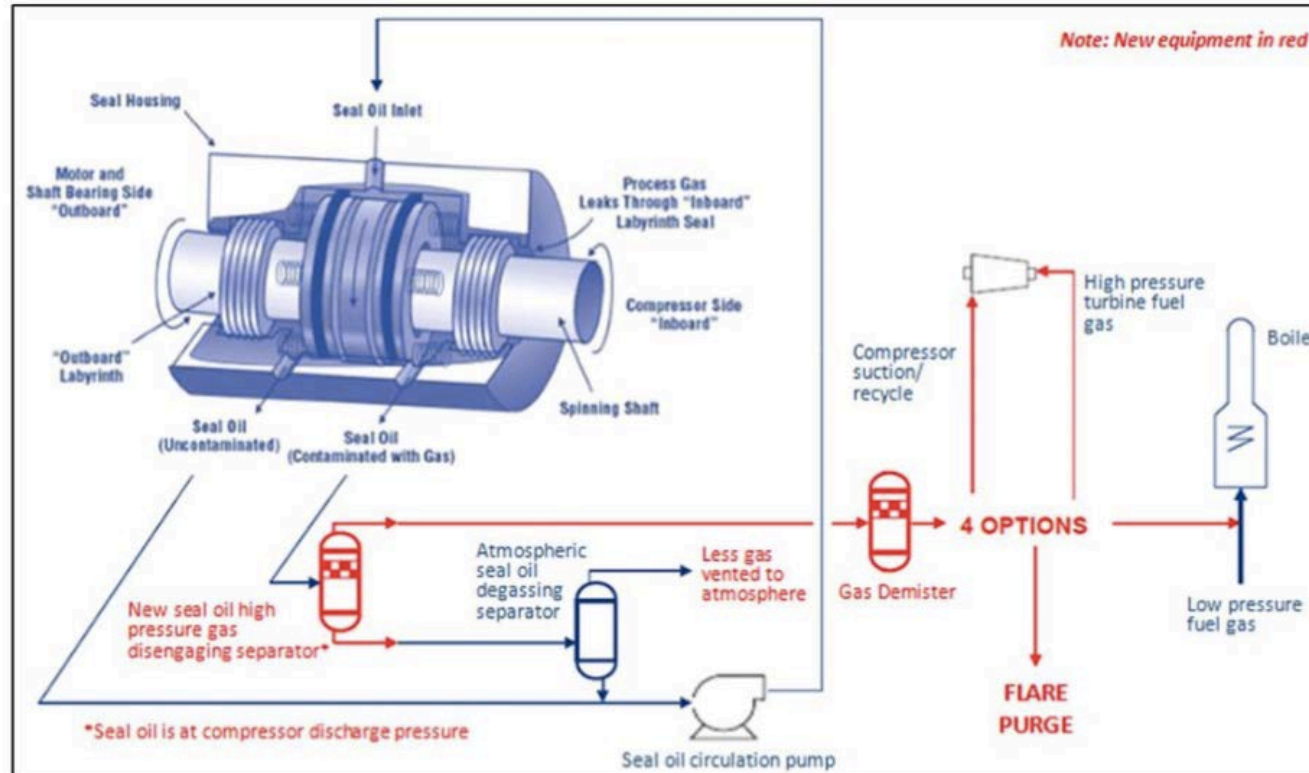


Exhibit 2: General process flow of wet seal degassing recovery system. Existing equipment is shown in blue or black and new equipment for seal oil degassing recovery is shown in red.

Retrofit cost ~\$35,000

Centrifugal Compressors: Wet-seal degassing

GHGRP data indicates that there are still a substantial number of wet-seal compressors in NM

Processing and Transmission in New Mexico

35 of 55 are wet seal – over 2100 tonnes methane

Production and Gathering / Boosting – not state specific

Number of wet seal compressors	Permian basin	San Juan basin
Production	22	0
Gathering & Boosting	13	17