



# Monitoring Well Packer System Reinflation

Effective Date:	12/16/2015
Next Review Date:	12/16/2018

Hazard Class:  Low  Moderate  High/Complex

Usage Mode:  Reference  Use Every Time (UET)  Both Reference & UET

**Approval Signatures:**

Name	Z#	Signature	Date
Name: Alan Macgregor Title: Group Leader	112808	/s/ Alan Macgregor	12/15/2015
Name: Craig Douglass Title: Deputy Program Manager	216051	/s/ Craig Douglass	12/16/2015

**Classification Review:**  Unclassified  UCNI  Classified: \_\_\_\_\_

Name	Z#	Signature	Date
Billy Turney	112765	/s/ Billy Turney	11/30/2015

**REVISION HISTORY**

<b>Document No./Revision No.</b>	<b>Issue Date</b>	<b>Action</b>	<b>Description</b>
EP-DIV-SOP-20006,R0	4/14/10	New	Former desk instruction DSK-05 has been converted to a standard operating procedure to include reporting and record keeping.
EP-DIV-SOP-20006,R0	11/3/11	New	New Document Control number assigned; Supersedes SOP-5260, R0; Included a link to current wellhead pressure settings engineering drawing CAP-WELLS-DWG-102Y231909 in section 2.1 Introduction; Deleted (Attachment A) example table Minimum and Maximum Packer Pressures for all Baski or Temporary Packers Installed as of 12/16/2009; Renamed Attachment B, Decision Tree for Packer Maintenance to Attachment 1.
EP-DIV-SOP-20006,R0 IPC-1	1/5/12	IPC-1	Added clarification of pressure setting maintenance for temporary packers.
ER-SOP-20006, R0	12/16/15	New	Edits to maintain consistency with other packer procedures and roundsheet. Added description of vapor packer systems.

**TABLE OF CONTENTS**

<u>Section</u>	<u>Page</u>
TITLE PAGE .....	1
CHANGE SUMMARY .....	2
TABLE OF CONTENTS .....	3
1. PURPOSE .....	4
2. SCOPE .....	4
3. BACKGROUND AND PRECAUTIONS.....	4
3.1 Background .....	4
3.2 Precautions .....	5
4. REFERENCES.....	5
5. EQUIPMENT AND TOOLS .....	6
6. ACRONYMS .....	6
7. PERFORMANCE – WELL PACKER SYSTEM REINFLATION.....	7
7.1 Reinflation for Wells with Permanently Installed Gas Cylinder or Tube Trailer.....	7
7.2 Reinflation for Wells without Permanently Installed Gas Cylinder or Tube Trailer .....	8
7.3 Frequency .....	9
7.4 Reporting.....	10
7.5 Records Management.....	10
8. ATTACHMENTS .....	10

**1. PURPOSE**

This standard operating procedure (SOP) states the responsibilities and describes the process for reinflating BASKI™ sampling system packers and temporary packers installed in water and vapor wells that are owned by the Environmental Programs Directorate.

**2. SCOPE**

This procedure applies to packers which have a liquid inflation chamber as well as to packers of an older design which are inflated only by nitrogen. This procedure also applies to temporary inflatable packers of any manufacture.

**3. BACKGROUND AND PRECAUTIONS**

**3.1 Background**

Packers must be maintained within a range of pressures in order to 1) hydraulically isolate the water or vapor from various zones of a well, and 2) make it possible to sample water or vapor from each zone without cross contamination. For these reasons it is necessary to monitor packer pressures on a regular basis (as per ER-RS-20278, *Packer Pressure Roundsheet*, or other observation), especially shortly after installation, and to repressurize leaking packers to keep them within a designated operational range of pressures. Leaking packers will be repressurized during scheduled visits (see 7.3, Frequency). A leak will be defined as “rapid” (for a water system), if the leak rate is sufficient to exhaust a standard nitrogen gas cylinder in less than one month. Rapidly-leaking packers will be equipped with a pressurized cylinder or tube trailer permanently connected and regularly checked. Vapor packer systems are used only for sampling and are removed thereafter.

Each packer has a minimum pressure needed to function properly, and a maximum pressure above which it may be permanently damaged. This pressure range is determined by the drilling/well maintenance subcontractor at the time the packer is installed, based on the detailed characteristics of each well and the positions of the screens.

**3.1 Background (continued)**

The “target pressure” for a water system, which is the desired pressure for the packer to operate, has been set at halfway between the minimum and maximum pressures. The “action pressure,” which is the pressure below the packer that should not be allowed to drop, has been set at halfway between the minimum and target pressures. Packer pressure is monitored by Field Services personnel to ensure packer pressure remains within the operating range established for each individual well. Wellhead pressure settings (packer pressure specifications) for Baski systems may be found in CAP-WELLS-DWG-102Y231909. Wellhead pressure settings (packer pressure specifications) for temporary packers are maintained by Field Services and updated as needed.

Vapor packer systems are set to either 140 psi (single packer) or 300 psi (dual packer).

**3.2 Precautions**

These instructions do not replace or supersede any other procedures or required documents, such as Standard Operating Procedures (SOPs) and Integrated Work Documents (IWDs). For example, documents pertaining to driving and towing, general field work, hand tool use, and pressure systems must be observed during packer maintenance.

**4. REFERENCES**

ER-RS-20278, *Packer Pressure Roundsheet*

EP-DIR-AP-10003, *Records Management Procedure for ADEP Employees*

CAP-WELLS-DWG-102Y231909

**5. EQUIPMENT AND TOOLS**

For most situations, this task may be accomplished with a field truck carrying the following:

- Nitrogen gas cylinder(s) (>2000 psig).
- Nitrogen regulator capable of supplying >400 psig.
- Packer Inflation pressure safety manifold with relief valve set at the appropriate pressure for a given packer (see CAP-WELLS-DWG-102Y231909).
- Soap solution for leak testing.

This is a dedicated set of equipment consisting of regulator, safety manifold, and tubing, all with matching quick-disconnect fittings, and whip restrainers. All parts will be stored together and will not be used for other activities.

For situations in which a gas cylinder (or tube trailer) is permanently connected to the wellhead, the equipment is identical. In addition, installed cylinders will be housed in locked cabinets to prevent tampering.

**6. ACRONYMS**

IWD	Integrated Work Document
SOP	Standard Operating Procedure
TL	Technical Lead
OM	Operations Manager
QA	Quality Assurance

**7. PERFORMANCE – WELL PACKER SYSTEM REINFLATION**

**7.1 Reinflation for Wells with Permanently Installed Gas Cylinder or Tube Trailer**

**Field Team Member**

- [1] **UNLOCK** and **REMOVE** well cover.
  
- [2] **READ** the primary pressure on the regulator supplying gas to the packer (right hand gauge).
  
- [3] **IF** the primary pressure has dropped below 800 psig,  
**THEN** the cylinder must be changed.
  - [A] **CLOSE** the packer valve at the wellhead, shut off the cylinder valve and bleed the manifold via the manual vent valve on the pressure safety manifold.
  
  - [B] **REMOVE** the regulator.
  
  - [C] **REPLACE** with a fresh cylinder and **REINSTALL** regulator. For tube trailers, close off the spent tube(s) and open up the valves on fresh tube(s).
  
  - [D] **RECONNECT** the manifold.

**NOTE** *The secondary pressure should correspond to the gauge on the wellhead, directly monitoring the packer pressure. This situation would not occur if the cylinder gets replaced at 800 psig. See Reporting requirements in ER-RS-20278, Packer Pressure Roundsheet.*

- [4] **READ** the secondary pressure on the regulator (left hand gauge).
  
- [5] **IF** the secondary pressure has not fallen below the minimum identified on the Packer Pressure Roundsheet,  
**THEN PROCEED** to 7.1 [10].
  
- [6] **IF** the secondary pressure has fallen below the minimum pressure,  
**THEN REPORT** the condition to the Technical Lead (TL) and Operations Manager (OM) in addition to changing the cylinder.
  
- [7] **RE-PRESSURIZE** the manifold to the midpoint pressure of the operating range,  
**THEN OPEN** the packer valve at the wellhead.

**7.1 Reinflation for Wells with Permanently Installed Gas Cylinder (continued)**

- [8] **ENSURE** that the packer pressure stabilizes at or near the target pressure and make any necessary adjustments.
- [9] **LEAK CHECK** any fittings that were changed or adjusted during the procedure (including the cylinder fitting) using soap solution.
- [10] **DOCUMENT** the date and time of the visit, all pressure readings, and all other activities in the ER-RS-20278, *Packer Pressure Roundsheet*.
- [11] **REPLACE** well cover and lock.

**7.2 Reinflation for Wells without Permanently Installed Gas Cylinder or Tube Trailer**

**Field Team Member**

- [1] **REMOVE** the well cover and **READ** packer pressure.
- [2] **IF** packer pressure is between the midpoint and upper limit of the operating range, **THEN PROCEED** to 7.2 [12].
- [3] **IF** packer pressure has fallen below the minimum pressure, **THEN REPORT** the condition in accordance with the requirements in ER-RS-20278, *Packer Pressure Roundsheet*.
- [4] **IF** packer pressure is below the lower limit of the operational range or the minimum packer pressure, or only slightly above the action pressure, **THEN RE-PRESSURIZE** packer.
- [5] **ATTACH** pressure safety manifold to a nitrogen cylinder.
- [6] **CONNECT** safety manifold and tubing using whip restraints, finishing at the quick-connect fitting above the packer valve.
- [7] **OPEN** cylinder valve and pressurize the line to the target pressure with the regulator.
- [8] **OPEN** the packer valve until the packer pressure gauge stabilizes. It should read the same as the pressure at the regulator, allowing for approximately  $\pm 5\%$  inaccuracy of a typical gauge.



**7.2 Reinflation for Wells without Permanently Installed Gas Cylinder (continued)**

[9] **CLOSE** the packer valve.

[10] **CLOSE** the cylinder valve, **BLEED** the pressure safety manifold using the manual vent valve, and **DISCONNECT** tubing, safety manifold, and regulator.

[11] **LEAK CHECK** all fittings above the well cover.

**NOTE** *Field Services personnel will be responsible for entering the data into a spreadsheet.*

[12] **DOCUMENT** the date and time of the visit, all pressure readings, and all other activities in ER-RS-20278, *Packer Pressure Roundsheet*.

[13] **REPLACE** well cover and lock.

**7.3 Frequency**

**Field Team Member**

[1] **CHECK** newly installed packers (or packers that have been deflated and/or reconfigured) daily for at least one week after installation to determine their characteristics.

**NOTE 1** *The schedule determination will be made during regularly scheduled consultations between Field Services, the TL, and Quality Assurance (QA) personnel.*

**NOTE 2** *The pressure monitoring frequency/schedule for all packers is maintained and updated by Field Services.*

**NOTE 3** *The relevant data for each packer (minimum, maximum, target and action pressures) are maintained as described in 3.1, Background.*

[2] **DETERMINE** and **DOCUMENT** a schedule for revisiting the well once the characteristics are known.

**7.4 Reporting**

**Field Team Member**

- [1] **UPDATE** the Packer Maintenance Table in accordance with 7.3, Frequency.
- [2] **IF** packer pressure is observed at less than the minimum in the Packer Maintenance Table,  
**THEN INITIATE** actions and notifications in accordance with ER-RS-20278, *Packer Pressure Roundsheet*.

**7.5 Records Management**

**Field Team Member**

- [1] **DOCUMENT** packer pressure and nitrogen tank pressure at time of inspection and following maintenance.
- [2] **DOCUMENT** any other activities. Records will be kept per ER-RS-20278, *Packer Pressure Roundsheet* and later input into an Excel spreadsheet.
- [3] **PROVIDE** the updated spreadsheet to the groundwater project manager on a weekly basis.

**Field Services Personnel**

- [4] **MAINTAIN** and **SUBMIT** records and/or documents generated to the Records Processing Facility according to EP-DIR-AP-10003, *Records Management Procedure for ADEP Employees*:
  - Packer Maintenance notebook
  - Excel spreadsheet and/or any related documentation
  - Packer Maintenance Table
  - Calendar for packer maintenance

**8. ATTACHMENTS**

None