


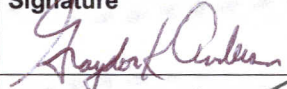


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Environmental Programs Directorate

Standard Operating Procedure

for **Pressure Monitoring of Packer Systems in Monitoring Wells**

APPROVAL SIGNATURES:

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Title: Pressure Monitoring of Packer Systems in Monitoring Wells	No.: SOP-5260	Page 2 of 7
	Revision: 0	Effective Date: 4/14/2010

1.0 PURPOSE AND SCOPE

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

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

These packers must be maintained within a range of pressures in order to 1) hydraulically isolate the water from various zones of a well, and 2) make it possible to sample water from each zone without cross contamination. For these reasons it is necessary to monitor packer pressures on a regular basis, especially shortly after installation, and to repressurize leaking packers to keep them within a safe range of pressures. Leaking packers will be repressurized during scheduled visits (see **4.4 Frequency**). A leak will be defined as “rapid” 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.

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.

The “target pressure,” 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 which the packer should not be allowed to drop, has been set at halfway between the minimum and target pressures. An example table is given in Attachment A. The current table is kept in the Work Package document and in the Packer Maintenance notebook.

2.2 Precautions

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

3.0 EQUIPMENT AND TOOLS

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

- 1) nitrogen gas cylinder(s) (> 2000 psig).
- 2) nitrogen regulator capable of supplying >400 psig.
- 3) pressure safety manifold with relief valve set at 400 psig.
- 4) approximately 20' of flexible tubing between safety manifold and wellhead, rated at >400 psig.
- 5) 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 with the exception that the inflation tubing is of a more rugged and tamper-resistant design. In addition, permanently installed cylinders will be housed in locked cabinets to prevent tampering. Also, pressure relief

Title: Pressure Monitoring of Packer Systems in Monitoring Wells	No.: SOP-5260	Page 3 of 7
	Revision: 0	Effective Date: 4/14/2010

devices on permanent installations shall be set to the Maximum Allowable Working Pressure (MAWP) for the packer system as furnished by the drilling/well maintenance subcontractor who installed the packer.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Procedure for Permanently Installed Gas Cylinder or Tube Trailer

- All**
1. Read the primary pressure on the regulator supplying gas to the packer. This is the right-hand pressure gauge on the regulator. If the primary pressure has dropped below 800 psig, the cylinder must be changed.
 2. Read the secondary pressure on the regulator (left hand gauge). If the secondary pressure has fallen below the minimum packer pressure, the condition must be reported in addition to changing the cylinder. This condition will necessitate that water level data be downloaded and reported by a Field Services Water Level specialist. See **(4.3 Reporting)**.
 3. Close the packer valve at the wellhead, shut off the cylinder valve and bleed the manifold. Remove the regulator and replace the cylinder with a fresh one. [For tube trailers, close off the spent tube(s) and open up the valves on fresh tube(s)].
 4. Reconnect and repressurize the manifold, then open the packer valve at the wellhead.
 5. Verify that the packer pressure stabilizes near the target pressure and make any necessary adjustments.
 6. Leak check any fittings that were changed or adjusted during the procedure (including the cylinder fitting), using soap solution.
 7. Document the date and time of the visit, all pressure readings, and all other activities in the Packer Maintenance notebook. Field Services personnel will be responsible for entering the data into a spreadsheet.

4.2 Procedure for Wells without Permanently Installed Gas Cylinder or Tube Trailer

- All**
1. Open the well cap and read packer pressure.
 2. If packer pressure has fallen below the minimum pressured, the water level data must be downloaded and reported by a Field Services water level specialist. See **(4.3 Reporting)**.
 3. If packer pressure is below or only slightly above the action pressure, repressurization is required.
 4. Attach regulator to a nitrogen cylinder.
 5. Connect safety manifold, and tubing, using whip restraints, finishing at the quick-connect fitting above the packer valve.

Title: Pressure Monitoring of Packer Systems in Monitoring Wells	No.: SOP-5260	Page 4 of 7
	Revision: 0	Effective Date: 4/14/2010

6. Open cylinder valve and pressurize the line to the target pressure with the regulator.
7. 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.
8. Close the packer valve.
9. Close the cylinder valve, bleed the system, and disconnect tubing, safety manifold, and regulator.
10. Leak check all fittings above the well cap.
11. Document the date and time of the visit, all pressure readings, and all other activities in the Packer Maintenance notebook. Field Services personnel will be responsible for entering the data into a spreadsheet.

4.3 Reporting

- All**
1. See **(4.4 Frequency)** for a description of how the Packer Maintenance Table is created and updated. If packer pressure less than the minimum in the Packer Maintenance Table is observed, a chain of further actions and notifications is initiated. Refer to the decision tree in Attachment B. It will be the responsibility of the Project manager to determine if notifications outside of the laboratory (to ENV-RCRA, for example) are required.

4.4 Frequency

- All**
1. Newly installed packers shall be checked daily for at least one week after installation to determine their characteristics. Once the characteristics are known, a schedule for revisiting the well will be determined and documented. This determination will be made during regularly scheduled consultations between Field Services, the Technical lead, and QA personnel. The relevant data for each packer (minimum, maximum, set, and action pressures) as well as visit frequency will be captured in the Packer Maintenance Table. Field Services personnel will maintain and update this table in a spreadsheet. The table will be modified on a monthly basis if needed. Each time that the Table is modified, it will be pasted into the packer notebook.

4.5 Records Management

- All**
1. Field crews shall document packer pressure at time of inspection, nitrogen tank pressure at time of inspection, packer pressure following maintenance, and nitrogen tank pressure following maintenance. Any other activities will also be documented. Records will be kept in the Packer Maintenance notebook and later input into an Excel spreadsheet. The updated spreadsheet will be provided to the groundwater project manager on a weekly basis.

Title: Pressure Monitoring of Packer Systems in Monitoring Wells	No.: SOP-5260	Page 5 of 7
	Revision: 0	Effective Date: 4/14/2010

- Field Services**
2. Maintains and submits records and/or documents generated to the Records Processing Facility according to EP-DIR-SOP-4004, Records Transmittal and Retrieval Process.
 - Packer Maintenance notebook.
 - Excel spreadsheet and/or any related documentation.
 - Packer Maintenance Table
 - Calendar for packer maintenance

5.0 ATTACHMENTS


Attachment A EXAMPLE ONLY. The information in this table is constantly updated based on observed packer performance and maintenance. Current conditions are kept in the packer notebook.

6.0 REVISION HISTORY

Revision No. <i>[Enter current revision number, beginning with Rev.0]</i>	Effective Date <i>[DCC inserts effective date for revision]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>	Type of Change <i>[Technical (T) or Editorial (E)]</i>
0	4/14/10	Former Desk Instruction DSK-05 has been converted to a standard operating procedure to include reporting and record keeping.	T/E

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ATTACHMENT A	
SOP-5260-1 Minimum and Maximum Pressures for all BASKI or Temporary Packers Installed as of 12/16/2009	

Well	Minimum Packer Pressure Required (psi)	Action pressure (psi)	Target pressure (psi)	Maximum Packer Pressure Allowable (psi)
R-10	217	260	305	393
R-12	121	170	220	318
R-16	329	340	355	380
R-17	128	180	230	326
R-20	230	250	260	294
R-23i	120	170	215	308
R-23i (temporary packer) 12/16/09			140	
R-33	141	185	230	321
R-37	124	170	210	295
R-40	116	160	205	295
R-43	131	180	230	330
R-44	126	175	225	326
R-45	125	175	225	325
R-49	135	180	225	310
R-22 Temporary Packers - Upper system	TBD	TBD	150	TBD
R-22 Temporary Packers - Lower system	TBD	TBD	350	TBD

ATTACHMENT B

SOP-5260-1

Decision tree for Packer maintenance.

