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# Potash Well Requirements

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Guideline PNG049

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January 2022

Revision 1.0

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Governing Legislation:

Acts: *The Oil and Gas Conservation Act*

*The Mineral Resources Act, 1985*

Regulations: *The Oil and Gas Conservation Regulations, 2012*

*The Subsurface Mineral Conservation Regulations*

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**Record of Change**

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## 1. Introduction

This Guideline is intended to support the potash industry by identifying the specific regulatory requirements administered by the Ministry of Energy and Resources (ER) that apply to wells licensed under *The Oil and Gas Conservation Act* (OGCA). Its purpose is to list specific criteria that apply to potash wells and development and to identify and clarify where exemptions are in place for potash wells and development. Licensees are responsible for monitoring changes in the OGCA and its Regulations and Directives as they occur, and ER will reflect the changes that impact this guideline in a timely manner.

Questions on *Guideline PNG049: Potash Well Requirements* (Guideline PNG049) can be directed to the ER Service Desk at 1-855-219-9373 or [ER.servicedesk@gov.sk.ca](mailto:ER.servicedesk@gov.sk.ca).

## 2. Definitions

**Backfill Well:** means a well that is used for backfilling mine workings back down into the mine.

**Grout Well:** means a well that is used to eliminate water influx at potash operations.

**Integrated Resource Information System (IRIS):** means the online system used to license wells and report data within Saskatchewan.

**Potash:** refers to several forms of potassium salts, including the product potassium chloride (KCl). Note that the definition of subsurface minerals in *The Subsurface Mineral Conservation Regulations* is inclusive of all natural mineral salts of boron, calcium, lithium, magnesium, potassium, sodium, bromine, chlorine, fluorine, iodine, nitrogen, phosphorus and sulfur, and their compounds, occurring more than 60 metres below the surface of the land.

**Potash Exploration Well:** means a well that is drilled to evaluate the reserves and grade of the potash deposit, listed as “Potash Test Well” in IRIS.

**Potash Freeze Hole:** means a well that has a primary purpose to isolate subsurface fluid communication by ground freezing near a wellbore, typically used in relation to a mine shaft hole (for conventional potash mining) development.

**Potash Restricted Drilling Area (PRDA):** means a potash restricted drilling area established pursuant to *The Oil and Gas Conservation Regulations, 2012* (OGCR).

**Potash Solutioning Well:** means a well that is used to inject fluid (typically water) into the potash ore to dissolve the potash and/or produce the potash-rich brine to surface in the solution mining operation. It is interchangeable with “potash solution mining well”.

**Potash Waste Brine:** means waste brine generated from potash mining operations as defined in *Directive PNG008: Disposal and Injection Well Requirements*.

**Potash Waste Disposal Well:** means a well that is used to dispose potash waste brines recovered from potash operations.

**Unlicensed Well:** means a well that does not have an individual licence associated to it under the OGCR.

**Whipstocks:** means additional wellbores used to control directional drilling.

### 3. Governing Legislation

The information outlined in this Guideline is referenced from requirements found in the following regulations, directives and guidelines established under the OGCA and *The Mineral Resources Act, 1985* (\*):

- *The Oil and Gas Conservation Regulations, 2012* (OGCR)
- *The Subsurface Mineral Conservation Regulations* (SMCR)\*
- *Directive PNG001: Facility Licence Requirements* (Directive PNG001)
- *Directive PNG003: Well Survey Requirements* (Directive PNG003)
- *Directive PNG005: Casing and Cementing Requirements* (Directive PNG005)
- *Directive PNG008: Disposal and Injection Well Requirements* (Directive PNG008)
- *Directive PNG009: Public Notice Requirements* (Directive PNG009)
- *Directive PNG010: Well Logging Requirements* (Directive PNG010)
- *Directive PNG013: Well Data Submission Requirements* (Directive PNG013)
- *Directive PNG014: Incident Reporting Requirements* (Directive PNG014)
- *Directive PNG015: Well Abandonment Requirements Directive* (Directive PNG015)
- *Directive PNG016: Acknowledgement of Reclamation Requirements* (Directive PNG016)
- *Directive PNG017: Measurement Requirements for Oil and Gas Operations* (Directive PNG017)
- *Directive PNG018: Detailed Site Assessment Requirements* (Directive PNG018)
- *Guideline PNG023: Submission of Drill Cuttings: Oil, Gas and Potash Wells* (Guideline PNG023)
- *Guideline PNG024: Reclassification and Recompletion* (Guideline PNG024)
- *Directive PNG032: Volumetric, Valuation and Infrastructure Reporting* (Directive PNG032)
- *Directive PNG033: Phase II Environmental Site Assessment* (Directive PNG033)
- *Guideline PNG044: Stratigraphic Isolation of Fresh Water Formations During Well Abandonment* (Guideline PNG044)
- *Directive PNG076: Enhanced Production Audit Program* (Directive PNG076)
- Minister's Order: Confidentiality for Production-injection Solution Well Set ([MRO 23-21](#))
- Minister's Order: Interim Requirements for Potash Wells ([MRO 291/21](#))

It is the responsibility of all licensees as specified in the legislation, to be aware of and be in compliance with all requirements prior to submitting any application.

#### 4. Potash Well Types and Requirements/Exemptions

All potash well types must meet the following requirements:

- The appropriate ER Field Office must be contacted during drilling operations for safety and emergency issues or variations in drilling programs as per the OGCA, OGCR and Directives;
- All potash well types are subject to Directive PNG005;
- A Reclassification/Recompletion Application must be submitted and approved through IRIS prior to making a change to the classification/completion pool associated to that well as per Guideline PNG024;
- If a well is discovered to be damaged or inadequate for its intended purpose and repair is required to proceed with operations, the licensee must first notify the appropriate ER Field Office and apply for a well repair authorization through IRIS. More information on applying for a well repair authorization can be found on the [www.saskatchewan.ca](http://www.saskatchewan.ca) website at <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/oil-and-gas/oil-and-gas-licensing-operations-and-requirements/application-to-repair-a-well>;
- Directive PNG014 does not apply to licensed wells associated with a potash mine site that has been permitted by the Ministry of Environment (ENV). Incidents relating to the wells outside of active mine sites must be reported to ER as per Directive PNG014;
- All potash wells are subject to inspections conducted by ER; and
- The licensee must submit specific well data and related documentation outlined in Directive PNG013, with the exception of the requirements as per MRO 291/21.

##### 4.1 Grout Well

Grout wells require a licence and are subject to logging requirements set forth in Directive PNG010.

##### 4.2 Potash Exploration Well

Potash exploration wells require a licence and are subject to logging requirements set forth in Directive PNG010. Pursuant to the SMCR, potash exploration wells are given a 5-year confidentiality period with respect to information related to the Prairie Evaporite.

##### 4.3 Potash Freeze Hole

Potash freeze holes require a licence. In emergency situations, they may be drilled prior to the issuance of a well licence, but the appropriate ER Field Office must be contacted prior to drilling and the wells must be licensed after the drilling operations have occurred. A freeze hole is not required to run open or cased hole logs and is exempted from the requirements outlined within Directive PNG010. Pursuant to the OGCR, these well types are only subject to a 1-year confidentiality period due to the nature of the well.

#### 4.4 Potash Solutioning Well

Logging requirements for wells classified as potash solution mining wells are set forth in MRO 291/21 and are outlined as follows:

- Vertical/Direction Wells: one open hole log must be run per Section and must be run on the first well drilled within the Section (unless otherwise approved). Subsequent wells with a surface location within the same Section are not required to submit logging to ER but must keep the record/details of the log and provide it upon request.

Vertical/Directional Wells: cased hole logging obligations are automatically set on wells in IRIS when a waiver of open hole logging is disclosed at the time of licensing. An application can be made for the cased hole logging waiver after the licence is issued by applying for a logging amendment in IRIS if there is adequate log coverage provided by an aforementioned open hole log in that Section.

- Horizontal Wells: one cased hole log must be run per Section unless log coverage is provided by an aforementioned open hole log in the Section, the log is to be run on the first well drilled within the Section (unless otherwise approved). Subsequent wells with a surface location within the same Section are not required to submit logging to ER but must keep the record/details of the log and provide it upon request.

After the required logs have been submitted, potash solution mining wells are not required to submit subsequent logs that are run at the operator's discretion. At the time of well abandonment, the last set of logs run on the well must be submitted. Companies are still required to retain all information related to logging and must be able to provide this information upon request to ER.

Potash solutioning wells are not required to submit injection or production volumes into Petrinex as per MRO 291/21.

A potash production-injection solution well set is described and subject to the confidentiality period set forth in MRO 23-21.

#### 4.5 Potash Waste Disposal Well

Potash waste disposal wells require a licence and must be fully compliant with the applicable requirements, including annual annulus test and pressure fall-off test requirements as outlined in Directive PNG008, Appendix 4: Potash Waste Disposal Well.

Potash waste disposal wells are also subject to Directive PNG032. Several things need to be set up and maintained in Petrinex, including the Business Associate Identifier (BA ID), creation of reporting facilities, and monthly volumetric reporting of active facilities along with linkages to associated wells. In the case of potash mining activities, the typical facility created is a disposal injection facility (subtype 518) in which facilities report the injection of brine instead of water. In order to conduct these various activities, the relevant Directive PNG032 sections are as follows:

- Set up a BAID – Directive PNG032, section 3;
- Create a reporting facility in Petrinex – Directive PNG032, section 5;
- Set up and maintain facility information in Petrinex – Directive PNG032, section 5; and
- Report monthly facility volumes in Petrinex as per Directive PNG032, section 6.

The well IDs with a status of “completed” will be fed into Petrinex from IRIS automatically.

Potash waste disposal wells and disposal injection facilities (subtype 518) are subject to Directive PNG017, section 1.8: Measurement Schematics and section 15.2.9: Brine Measurement and Reporting. This section outlines all the requirements for measuring brine water being injected into potash waste disposal wells.

Directive PNG076 requires facility operators to show that they have effective controls in place to provide a reasonable level of assurance that measurement and reporting requirements (as per Directive PNG017 and Directive PNG032) are being met. Any Petrinex facility with an active status will trigger the need for a declaration-based self-assessment as described in the Enhanced Production Audit Program (EPAP). More information on EPAP can be found on the EPAP website on [www.saskatchewan.ca](http://www.saskatchewan.ca).

#### **4.6 Whipstocks**

A whipstock is added after the licence issuance and can be added by the licensee within the “Drilling Activity” screen for the subject well in IRIS. Whipstocks can be added and reported on as they are drilled with no additional authorization required.

Reporting of an additional whipstock must be completed in IRIS within 1 day of the whipstock action commencing on the well, and rig release must be reported within 7 days of the actual release. A whipstock must have the drilling activity fully reported against it, a drill waste disposal form submitted, and a tour report submitted.

#### **5. Well Abandonments**

Abandonment of all potash well types is to be done in accordance with Directive PNG015 and Appendix 2 in this Guideline for Potash Solutioning Wells. Applications should be made containing all supporting information for well location and condition. Abandonments associated to a licensed well should be applied for in IRIS. Abandonments that cannot be associated to a licensed well in IRIS should be submitted to ER Service Desk. When the authorization is approved, the licensee is contacted in IRIS or by email.



## 6. Potash Restricted Drilling Areas (PRDAs)

PRDAs are identified in Appendix 1. In these areas any well drilling must receive the consent from the potash disposition holder and the approval of the minister in writing prior to receiving a licence as per section 26 of the OGCR. The consent of the potash disposition holder is not to be unreasonably withheld.

Spatial records showing potash dispositions are available within the Saskatchewan Mining and Petroleum GeoAtlas: <https://gisappl.saskatchewan.ca/Html5Ext/index.html?viewer=GeoAtlas>.

## 7. Liability and Site Reclamation

Directive PNG016 and Directive PNG018 do not apply to licensed wells associated with a potash mine site that has been permitted by ENV. These wells include the following:

- Grout Well;
- Observation Well;
- Potash Freeze Hole;
- Potash Shaft Hole;
- Potash Solutioning Well; and
- Potash Waste Disposal Well.

Any potash wells outside of active mine sites must be reclaimed to the standard set forth in Directive PNG016 and Directive PNG018. These will include but are not limited to:

- Potash Exploratory Well (unlikely to be on mine site).

## 8. Orphan Potash Well or Facility

An orphan well or facility is one where the company that owns the well or facility has either gone out of business or cannot be located. Currently, the Orphan Fund Procurement Program managed by ER is responsible for identifying orphaned well and facility sites licensed by the OGCR in Saskatchewan.

## 9. Pipelines

Pipelines and flow lines used in the potash industry do not transport any of the listed substances within *The Pipelines Administration and Licensing Regulations*. Therefore, they are not subject to the requirements set forth in *Directive PNG034: Saskatchewan Pipelines Code*. The liability associated to the flowlines are managed by ENV.

**Appendix 1: Potash Restricted Drilling Areas**

Current PRDAs in Saskatchewan

<b>PRDA</b>	<b>Established</b>	<b>Area (Sections)</b>
Belle Plaine Area	MRO 370/95	72
Patience Lake Area	MRO 374/95	71
Allan Area	MRO 671/95	291
Lanigan Area	MRO 672/95	275
Vanscoy Area	MRO 673/95	149
Cory Area	MRO 674/95	261
Colonsay Area	MRO 933/95	232
Esterhazy Area	MRO 171/96	256.25
Rocanville Area	MRO 1115/96	281.5

## Appendix 2: Abandonment Requirements for Wells Classified as Potash Solutioning Wells

This Appendix outlines minimum guidance for applications submitted for abandonment of cased potash solutioning wells. Directive PNG015 prescribes application criteria to be submitted when applying for abandonment of wells licensed under the OGCR. All non-oil-and-gas producing wells are required to have a non-routine application submitted for review and approval prior to any work being conducted. This guideline will assist potash solution mining companies with minimum requirements to be submitted for review.

Recommended reference materials in support of this Appendix includes the following:

- Directive PNG015;
- Guideline PNG044;
- *CSA Group - CSA Z341 Series, Storage of hydrocarbons in underground formations (CSA Z341).*

### 1. Application

A Well Abandonment Application form must be submitted through IRIS along with any accompanying supporting information and must be reviewed and approved by ER before any abandonment operation may begin. Once ER has reviewed the application, a decision will be communicated to the applicant. Prior notification of at least one business day must be provided to the appropriate Field Office before commencing abandonment operations.

The form can be found at the following link on the Saskatchewan.ca website at <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/oil-and-gas/oil-and-gas-licensing-operations-and-requirements/well-abandonment>.

Supporting information should typically include any or all of the following:

- program of operations;
- bridge plug setting depth;
- cementing plan;
- wellbore cementing details – if not recorded in IRIS;
- casing details – if not recorded in IRIS;
- wellbore history;
- plans to address wellbore integrity issues;
- plans to address inadequate base of ground water coverage.

### 2. Surface Casing Vent Flow/Gas Migration

A surface casing vent flow (SCVF)/gas migration (GM) survey must be completed prior to abandonment and the results submitted into IRIS. If a well has inadequate stratigraphic isolation, SCVF and/or GM, the SCVF and/or GM must be identified at point of origin prior to any other remedial work commencing.

If the well is located on a pad, a final GM survey may be delayed until after final pad decommissioning has been conducted however a SCVF must always be conducted.

If there is a positive SCVF test the operator must contact the appropriate field office to discuss remedial program requirements prior to abandonment operations continuing.

### **3. Wellbore Integrity Issues**

Any of the following are considered to be wellbore integrity issues:

- wells with a fish-in-the-hole, production casing leaks, production casing patch, collapsed casing, hole in the casing;
- wells drilled without a surface casing string;
- wells with known inadequate stratigraphic isolation;
- wells known to have primary casing cementing issues;
- wells with a prior commitment to address a temporary stratigraphic abandonment method previously approved by ER.

Any wellbore integrity issues must be disclosed and addressed in the proposed abandonment application.

### **4. Base of Ground Water**

The base of ground water must be determined and compared with the surface casing depth for the proposed well. If surface casing does not adequately cover the base of ground water, a proposed remedial plan must be included with the application for abandonment. The remedial plan should be developed by following requirements outlined in Guideline PNG044.

For assistance in determining the base of groundwater protection for a particular area of Saskatchewan, visit the following page of the Saskatchewan Water Security Agency website (<https://www.wsask.ca/Water-Info/Ground-Water/Mapping/>) for information on available groundwater mapping resources.

### **5. Downhole Abandonment**

Downhole abandonments should be conducted with a bridge plug and cement as follows:

1. The permanent mechanical bridge plug must be set within 5 meters measured depth of the casing seat or no shallower than the cap rock immediately above the salt zone.
2. Test the bridge plug by pressure-testing the plug and production casing to 7 MPa for at least 10 minutes.
3. Circulating a series of cement plugs to create a continuous column of cement from the bridge plug to the surface casing.

If the test in step 2 above fails, contact the appropriate ER Field Office.

## 6. Surface Abandonment

Cut and cap operations must be finalized within one year of the completion of the downhole abandonment operation unless otherwise approved by ER. Upon completion of cut and cap operations, the operator must submit the cut and cap form outlining the cut and cap details and any supporting attachments through IRIS immediately at the time they report cut and cap.

Surface abandonment must meet one of the following requirements:

### 6.1 Wedding Cake Cut and Capping Requirements

Wedding cake cut and cap operations are to be carried out by:

1. Cutting off the surface casing a minimum of one metre below ground level and cutting off the production string one metre below ground level;
2. Welding a steel plate in order to completely close off the annulus between the surface casing and the production casing; and
3. Welding a steel plate in order to completely close off the end of the production casing and attaching at a minimum, the well licence number to the plate.

### 6.2 Vented Cap Requirements

The vented cap method of cutting and capping in place of the wedding cake method may also be used. Vented caps must show the well licence number.

## 7. Records and IRIS Reporting Abandonments

Daily Tour Reports must be maintained for all well abandonment operations and must comply with the requirements specified in Directive PNG013. Tour Reports must be compiled into a single PDF file and submitted into IRIS following abandonment operations. The Tour Reports must contain detailed records of:

- the setting depth of any bridge plugs, retainers, packers, patches or other subsurface tools;
- the cement squeeze reports and charted squeeze pressures obtained for any retainer cement squeeze conducted as part of the abandonment including cement type, class and any additives used;
- the volume and linear depth of cement used in the abandonment including cement type, class and any additives used;
- the initial and final pressure and duration of any pressure tests conducted;
- the type of fluid used during the pressure testing and end-resulting fluid used to fill the wellbore;
- casing issues encountered while abandoning the well;
- defined data on SCVF and/or GM, including identification of sources and other information relating to non-routine abandonment (if applicable); and
- the depth the well casings were cut and the method used to cap the casing string(s).

At any point in time prior to, during or following a well abandonment, ER may conduct an audit of the well file to ensure the well abandonment was performed in accordance with Directive PNG015. Failure to wait for approval to conduct the abandonment, failure to conduct the well abandonment as applied for, or failure to properly report the well abandonment activities could result in re-entry of the well and performing the necessary work to bring the abandonment activities into compliance.