

### Overview

Students will discover what potash is, what it is used for, and interesting facts while reading a potash poster in search for answers. Students will consider the impact of potash on their lives.

**Duration:** One Class

#### Materials:

- [Student Question Sheets](#)
- [Teacher Answer Sheets](#)
- [Potash , What is It Poster PDF](#)
- [Potash Poster On-line](#)

**Notes to Teacher:** This is an introductory lesson on potash.

#### Prior Knowledge:

Before attempting these activities students should have some understanding of the following:

- The difference between rocks and minerals.

#### Instructional Methods:

- Brainstorming
- Individual learning, research



### Learning Outcomes and Indicators

**EC7.2 Identify locations and processes used to extract Earth's geological resources and examine the impacts of those locations and processes on society and the environment.**

- Identify locations of Saskatchewan's primary mineral resources (e.g., potash, gold, diamond, salt, uranium, copper, and graphite) and their primary uses. (EC7.2d)
- Provide examples of technologies used to further scientific research related to extracting geological resources (e.g., satellite imaging, magnetometer, and core sample drilling).(EC7.2f)
- Provide examples of Canadian contributions to the scientific understanding and technological developments related to surface and sub-surface geology and mining, and identify societal and economic factors that drive such exploration and research. (EC7.2h)

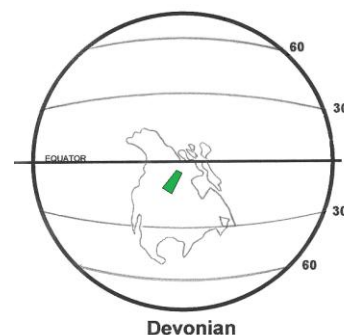
Source: [Saskatchewan Evergreen Curriculum](#)

### Big Picture Questions

1. What is Potash?
2. Why is it so important?

### Background Information

Around 380 million years ago Saskatchewan was located south of the equator.

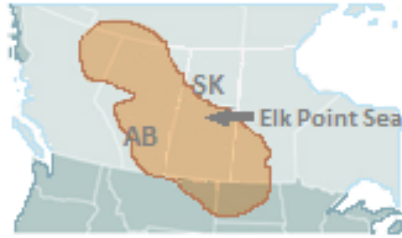


(Modified from Storer, J., 1989)

## Grade 7 Earth's Crust and Resources: Potash, What is it? continued

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A large salt water sea covered most of Saskatchewan and Alberta stretching from the Arctic to the Gulf of Mexico. It was a tropical time with coral reefs forming.



Modified from Globe and Mail, Friday, Nov. 05, 2010

Over time the coral reefs occurring to the west and north of the Elk Point Sea grew and blocked the flow of water from the open ocean to the north. The sea became restricted with little to no influx of fresh sea water into the deeper parts of the sea basin (the southern part of Saskatchewan). The warm, dry climate at the time evaporated the water. Concentrations of mineral salts increased until crystal layers began to form on the sea floor, similar to how salt or sugar crystals form in a glass when a saturated solution evaporates (Storer, J., 1989). The evaporites, which include Saskatchewan's potash deposits, formed for over 2 million years until normal circulation of the sea water returned as did sea life. No fossils are found in the Prairie Evaporite unit. It is thought that animals and plants could not live in the sea at that time due to the high salinity (Storer, J., 1989).

The potash deposits occur diagonally across the southern plains of Saskatchewan. They gently slope to the south from a 1,000 metre depth along a north-west line through Rocanville, Esterhazy and Saskatoon to more than a 1,600 metre depth at Belle Plaine and up to 3,000 metres depth in North-eastern Montana and North Dakota (see Mineral Resource Map of Saskatchewan).

In Saskatchewan, potash is extracted from the deep underground deposits (generally 1000 m or 1 km deep) using either conventional (underground tunnels and mining machines) or solution mining (brine is pumped down wells into the potash unit, dissolved and pumped back up to the surface) methods.

A band 40-48 km wide at the shallow northern edge of the deposit can be mined by conventional underground methods. At depths greater than 1,500 m in the south, solution mining is more economical and safer.

Potash is an important mineral to Saskatchewan and the world. The mineral's name refers to several forms of potassium salt, the most important being potassium chloride or KCl. It is one of the world's three important

fertilizers. Used in combination with nitrogen and phosphate, potash increases the yields of such important crops as corn, soybeans, coffee, and rice.

Potash plays a central role in helping feed the world's growing population. Approximately 95% of world potash production is used as fertilizer, the rest being used in a variety of chemical and manufactured products.

Potash was first discovered in Saskatchewan during the early 1940s while drilling for oil. Exploration during the remainder of the decade helped geologists define the magnitude and richness of Saskatchewan's deposits.

It was not until 1962 that potash was being successfully mined in Saskatchewan. The province had the world's first solution mine in 1964 and by 1971 all of Saskatchewan's ten world class potash mines were in production. Today, Saskatchewan is the 2nd largest potash producer.

The important role played by potash in meeting agriculture's needs has helped make it an increasingly important mineral to Saskatchewan's economy. Revenue from the sale of potash benefits the province in many ways. It supports potash workers and their families through the payment of wages and benefits. It provides an ongoing stimulus to local businesses from the industry's purchases of goods and services. Finally, it helps to support important government social and economic programs through the payment of taxes and royalties.

Sylvite (potash) was proclaimed Saskatchewan's Mineral Emblem in 1996.

### Vocabulary

potash    sylvite  
sylvinite

### **THE ACTIVITY**

#### **Potash, What is it?**

(Brainstorming web, Independent research )

#### **Motivational Set (10 minutes)**

1. Develop a concept web with the word potash in the center. Have students add their knowledge to the web.

### The Activity: Information Scavenger Hunt

1. Hand out the question sheets.
2. Post the SMA poster on a bulletin board, have the students go on-line to the Saskatchewan Mining Association website to look at the [Potash Poster](#).
3. Have students search the poster for the answers to the questions.
4. Revisit the potash concept web, have students create their own concept web adding what they have learned.

### Assessment Method and Evidence

#### ✓ Discussion Questions

- Students will be able to list objects made with potash (eg. Fertilizer for plants/crops, computer screens, medicine, rocket fuel).
- Students will list information, gained from the potash poster, about the potash industry such as mine location, technology (Marrietta Continuous Borer, underground explosions and sound waves) as well as the importance of potash as a fertilizer.
- Students will be able to identify the location of Saskatchewan's potash mines and its primary uses (fertilizer, computer screens, rocket fuel)
- Students will learn how the mining companies explore for/map the potash beds on the surface as well as subsurface.
- Students will gain some insight as to how large an underground mining operation is, as they learn about the Marietta Continuous Borer the main potash cutting tool.
- Students will look at their family's use of fertilizers on plants and lawn, or the use of fertilizers on green spaces in their environment, if it is necessary in their lives, what impact the use of potash has to the mining industry and be able to discuss societal and economic factors that drive the potash exploration.

### Summary

By reading the SMA Potash poster and answering the discussion questions, students have learned many interesting facts about the mineral, what it is, where it is mined, what it is used for, and have considered what the effect of using potash as a fertilizer has on themselves, the community, the mining company and the resource.

### Resources

Saskatchewan Potash Interpretive Centre:  
<http://www.potashinterpretivecentre.com/index2.htm>

SMA Potash Poster. Available free from: Saskatchewan Mining Association Website:  
[http://www.saskmining.ca/uploads/news\\_files/70/sma-potash-poster-v14.pdf](http://www.saskmining.ca/uploads/news_files/70/sma-potash-poster-v14.pdf)

Potash Corporation of Saskatchewan Website:  
<http://www.potashcorp.com/>

International Fertilizer Association Website:  
<http://www.fertilizer.org/ifa/default.asp>

Agrium Website: <http://www.agrium.com>

The Mosaic Company Website:  
<http://www.mosaicco.com>

Fuzesy, A. (1981): Potash in Saskatchewan; Saskatchewan Energy and Mines Report No.181, 44p.

Holter, M.E. (1969): The Middle Devonian Prairie Evaporite of Saskatchewan; Department of Mineral Resources-Geological Sciences Branch-Industrial Minerals Division-Province of Saskatchewan; Report No.123, 134p.

Storer, J., (1989): Geological History of Saskatchewan. Saskatchewan Museum of Natural History,. Regina: Government of Saskatchewan

### Vocabulary

**Potash:** Is Saskatchewan's provincial mineral. Potash is the common name for the potassium rich ore mined in Saskatchewan. It is made up of the minerals sylvite, halite, sometimes carnallite, clay and iron oxides.

**Sylvinite:** is the most important ore for the production of potash in North America. It is a mechanical mixture of sylvite (KCl, or potassium chloride) and halite (NaCl, or sodium chloride).

**Sylvite:** is potassium chloride (KCl) in natural mineral form. It forms very similar to normal rock salt, halite (NaCl). Sylvite is colorless to white with shades of yellow and red due to inclusions. It has a Mohs

hardness of 2.5. Sylvite has a salty taste with a distinct bitterness. Sylvite is one of the last evaporite minerals to precipitate out of solution. Its principal use is as a potassium fertilizer.

## Potash Poster Questions – Teacher’s Answer Sheet

1. How did potash get its name?

*In the past people would evaporate salts out of a pot with water and ashes of burned trees. Pot + ash. The ash from burned trees still had the potassium in them that they took out of the ground when they grew.*

2. What is the chemical name for potash? *Potassium chloride*

3. What is another name for it? *Sylvite*

4. Why do plants need potash?

*It is necessary for photosynthesis, and it makes plants strong.*

5. What else is potash used for?

*Computer screens, medicine and rocket fuel!*

6. How much of the world's potash is mined here in Saskatchewan?

*More than 1/3<sup>rd</sup> of the world's potash is mined here.*

7. Name three mining companies who have potash mines in Saskatchewan.

*PotashCorp, Mosaic Canada and Agrium Inc.*

8. How do the mine geologists map the potash layers?

*1) Drilling from the earth's surface*

*2) Setting off explosives underground. A computer analyzes the sound waves created by detonating the explosives to build maps that show where the potash beds are.*

9. What is the Marietta Continuous Borer used for?

*The borer is used to cut tunnels in the potash.*

How far could it tunnel in an 8 hour shift if it went continuously?

*If it travels at 30 cm per minute, it would travel 1800 cm in 60 minutes (1 hour) x 8 hours = 14400 cm = 144 metres or 0.144 km.*

If a Canadian football field is 100m long how many football fields long would the tunnel be?

*It would be 1.44 football fields or almost 1 and a half football fields in a day.*

10. What are some other interesting facts about potash mines?

*1. It is warm in the underground mines, about 27°C year round.*

*2. Some of the mines are 1,000m below the surface of the earth.*

*3. Potash mines are like underground cities, there are roads and trucks.*

11. Check at home. Is fertilizer put on your lawn or your plants to make them grow better? Take a look at the fertilizer package, it will have three numbers. The first is nitrogen, the second is phosphorus and the third is potassium. Check and see how much potassium (K) is in your fertilizer.

*Miracle grow: 15-30-15 15% of the fertilizer is potassium (potash)*

*Lawn fertilizer: winter – 30-0-10; summer – 31-3-8*

If you don't use fertilizer do a web search for lawn fertilizer to find the amounts of NPK. Some familiar products are Scott's Turfbuilder and Miracle Grow.

12. How important is it to you to have nice looking lawns and green spaces?

*Students answers will vary.*

Why is it important that farmers produce the most crop they can on their acreage?

*Farmers crops are their livelihood it pays their costs for living. Students answers will vary.*

If everyone wants nice looking lawns or the best crops and buys fertilizer, what does this mean for:

*Some may think it is important to have nice looking lawns. Most farmers are trying to get the best yield from their land. If everyone wants nice looking lawns and bountiful crops, they will be buying fertilizer. This will increase demand for the product*

- a) The potash mining company. *The potash companies will mine for more potash. The company will make money. The company will provide jobs for the local community.*
- b) The community. *Many people in the community will be employed by the potash company or by other service industries supporting the potash company. Money will flow back into the community. Mining companies train many health and safety first responders, who are a benefit to their community.*
- c) The potash resource? *The potash resource will eventually become depleted.*

## Potash Poster Questions

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2. What is the chemical name for potash?
3. What is another name for it?
4. Why do plants need potash?
5. What else is potash used for?
6. How much of the worlds potash is mined here in Saskatchewan?
7. Name three mining companies who have potash mines in Saskatchewan.
8. *How do the mine geologists map the potash layers?*
9. What is the Marietta Continuous Borer used for?

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a) The potash mining company.

b) The community.

c) The potash resource?