

Solution Mining Model



Step by Step Instructions



○ Mining... GREAT for Saskatchewan!

DAY ONE

Teacher Preparation:

Prepare cups with layer of plasticine at base, middle layer of coarse salt and upper layer of plasticine. Make sure each plasticine layer has a good seal with the cup (this is to stop the water from moving up or down the sides of the cup).

Step One:

Give students one cup with layers of plasticine and salt representative of the potash layer (salt) confined by harder rock.



Step Two:

Drill through the rock to reach the potash (salt) layer. Straws represent drills and drill casing.

Make sure that the hole is not on the edge of the cup but towards the edge (not in the middle)

The straws can be cleaned out by using a wooden skewer (remove the points).



Students will know they have reached the potash (salt) layer when they see salt crystals in the plasticine at the end of their straw. **Do not drill through the salt layer.**



Step Three:

Have students drill a second hole into the potash layer.



Step Four:

Take out one of the straws and Insert rubber tubing into the drill hole.



Step Five:

Insert tubing
in other drill
hole.

Tubing
represents
the water
pipelines to
and from
the potash
mill.



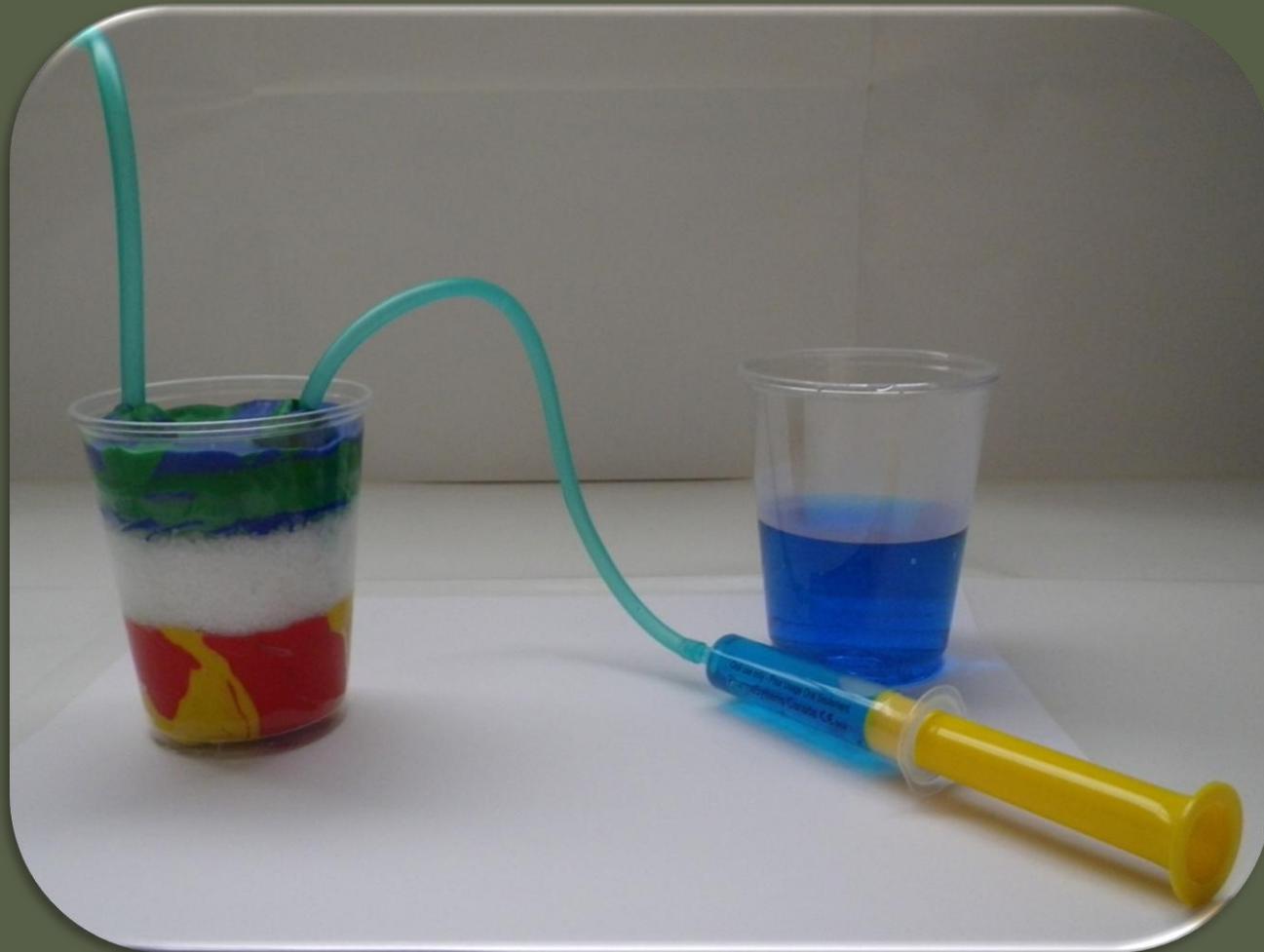
Step Six:

Use extra plasticine to make a **tight seal** around the tubes. Also ensure that there is a tight seal between the top layer of the plasticine and the cup.



Step Seven:

Half fill a second glass with warm water, use a few drops of blue food colouring to give it colour. Fill the syringe with the warm water and attach to one of the tubes.



Step Eight:

Slowly inject the water into the salt until you can start to see water coming up the second tube. It may take a couple of syringes of water.

After injecting the water take the syringe off the tube and place the tube end into the water.

This step represents the injection of brine into the potash bearing Prairie Evaporite Unit by the mining company.



The water fills in any void space around the salt crystals.



Look at the side where the warm water was injected. You should see a dissolution cavity forming.



DAY TWO

Step Nine:

Label the tubes in the direction of flow. Pen has been used here but removable tape would be better if this is a student model. Attach the syringe to the other tube and draw water out of the salt layer. The syringe will draw some air as well so the syringe may only fill halfway. Remove the syringe and deposit the water into a clean cup. Draw out twice, depositing the water from the salt bed into a clean receiving cup. While you are drawing water out of the salt bed, fresh water is being drawn in from the clean reservoir. Leave the syringe attached to the outflow tube.



DAY THREE

Step Ten:

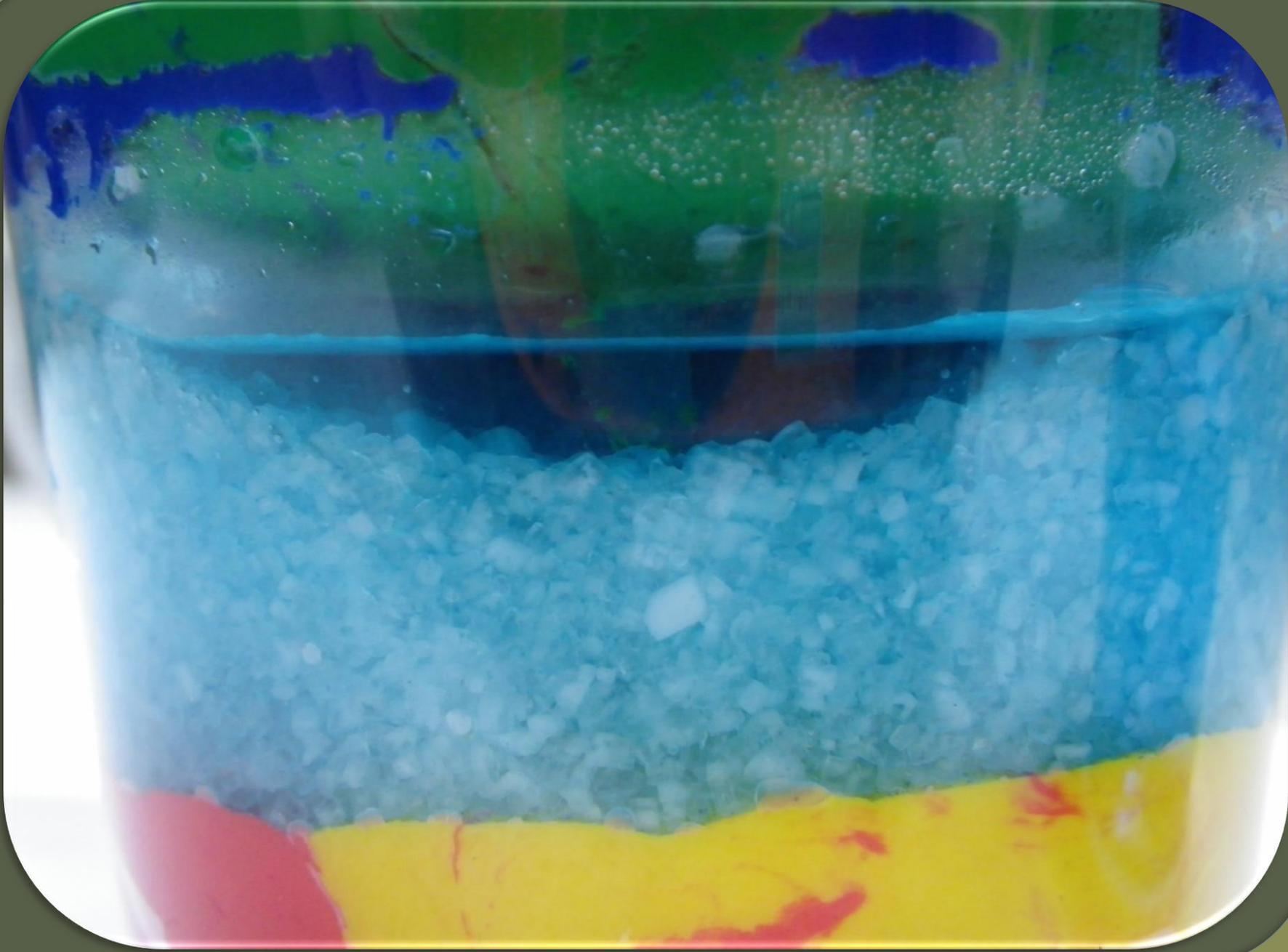
Draw down twice, depositing the water from the salt bed into the receiving cup. If the level of the clean water reservoir gets low replenish.

Notice that the water in the receiving cup has started to evaporate and salt crystals are forming along the walls. Also notice that the clean water reservoir remains clear and clean. The water being sucked up the well and deposited into the receiving cup, has dissolved some of the salt in the salt bed.





The cavity in the salt layer is increasing in size.



**Salt continues to grow
on the walls of the salt
water reservoir.**



Salt crystals start to form on the bottom of the salt water reservoir.



DAY 4:

Step Eleven:

Remove two more syringes of water from the salt bed and deposit in the salt water reservoir. Note how the salt crystals are now growing up the sides of the reservoir and over the lip. The fresh water reservoir remains clear.



The cavity in the salt bed continues to get bigger.



Salt crystals have almost completely covered the inside of the salt water reservoir.



DAY 5

Two more syringes of water have been extracted. The salt water reservoir is now completely coated in salt crystals and the cavity is much larger.



Approximately 1/3 of the salt bed has been dissolved.



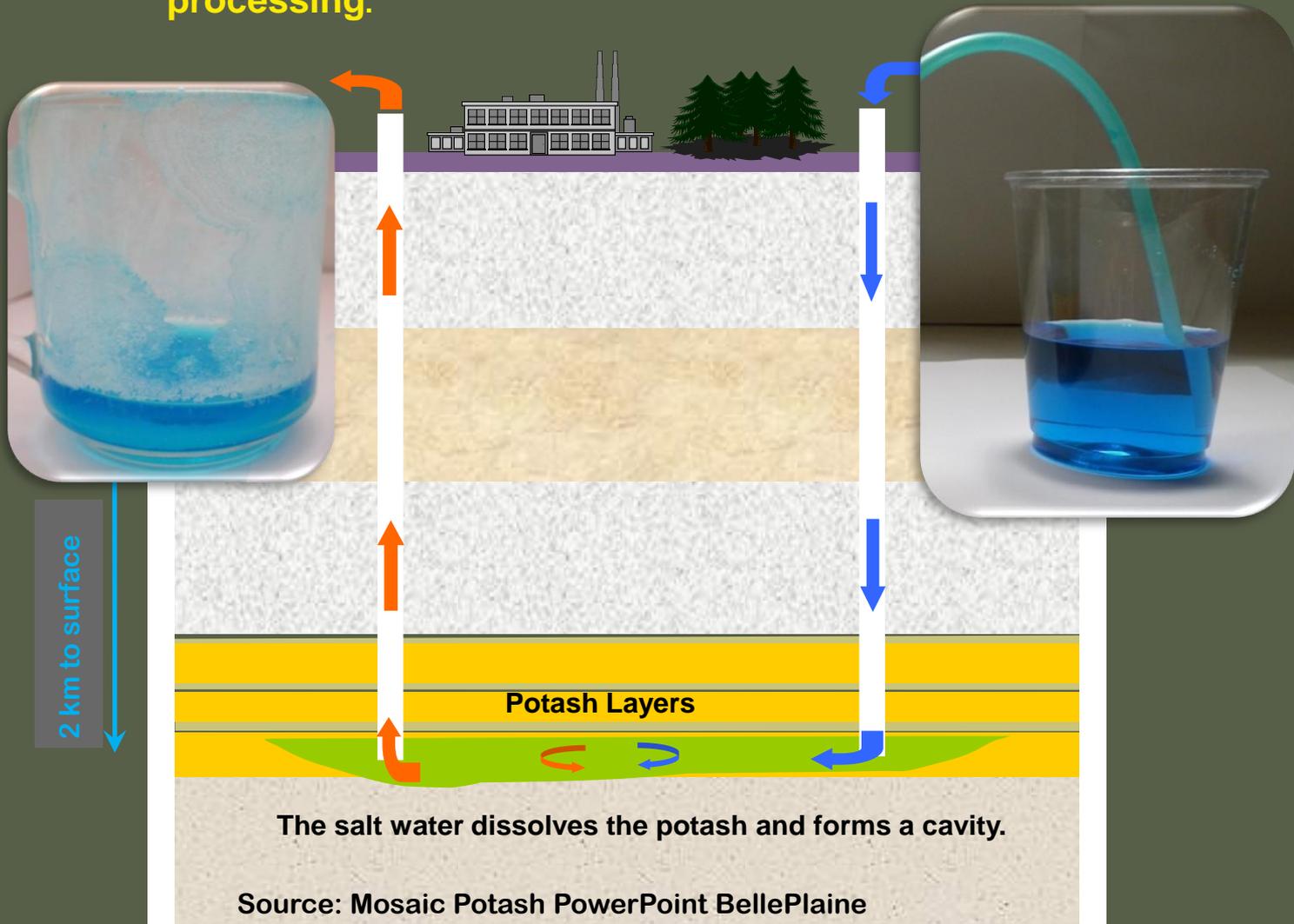
Development of salt
crystals both inside
and out.



Solution mining at Mosaic Potash's Belle Plaine Mine

2. The salt & potash rich water is then pumped to the plant for processing.

1. Hot salt water is injected into the potash layer.





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