

Investigation Report

Worker fatally injured after being buried in phosphate rock

June 2, 2016

## The contents of this report

This document reports Occupational Health and Safety's (OHS) investigation of a fatal accident in June 2016. It begins with a short summary of what happened. The rest of the report covers this same information in much greater detail.

## Incident summary

Three workers were either partially or completely covered in ground phosphate rock while trying to dislodge phosphate lumps over a grate that fed a chute onto an underground conveyor. One worker was fully buried. The second worker attempted to rescue the first worker and became trapped up to their waist. The supervisor was pulled into the draining phosphate rock by their feet when attempting to help but was able to get free. The supervisor called for help on the radio, and a rescue operation was initiated by using a front end loader. The rescue efforts continued, and vacuum (VAC) trucks were used to remove the phosphate product which freed worker 2. To assist in removing the phosphate rock product from the structure, the conveyor system became operational and joined with VAC trucks to recover the buried worker's body.

## Background information

### Nutrien Ltd. (Agrium)

The Agrium Redwater plant was one of the largest global distributors of fertilizer worldwide. Nutrien merged with Agrium and Potash Corp in 2018.

Agrium employed 450 people on average with around 100 contractors on site every day. Agrium hired Carey Industrial services Ltd. to provide labourers in the rock processing facility which had been in operation for approximately 50 years.

### Carey Industrial Services Ltd. (Carey)

Carey was a small family run business based out of Fort Saskatchewan, Alberta. Carey was hired by Agrium to provide labourers throughout the fertilizer plant and employed the deceased worker.

Worker 1, the fatality injured worker, had been employed by Carey as a labourer since October 2005.

Worker 2 was a labourer inside the teepee (Figure 1) above ground at the time of the incident and was buried up to their waist in phosphate rock requiring rescue.

The supervisor in charge of the Carey workers was inside the teepee above ground at the time of the incident.

Worker 3 was below ground at the time of the incident and operated the front end loader during the rescue efforts.

Worker 4 was below ground at the time of the incident.

## Equipment and materials



*Figure 1. Incident location was inside the teepee structure.*

### **Teepee**

The phosphate rock was reclaimed, drawn from the storage buildings by underground conveyor systems to a surge bin prior to being metered into the phosphoric acid production unit. The phosphate rock flowed through gates in the floor “live” until the pile had coned out at its natural drawdown angle, after which mobile equipment (bulldozer or front-end loader) was used to move the phosphate rock to the reclaim gates. The reclaim of phosphate rock operated on a batch basis whereby the surge bin was normally filled at a rate of 200-250 tonnes per hour (tph). The phosphoric acid production unit consumed the phosphate rock at rates of up to 175 tph at peak capacity. The mass of rock in the R2420 storage building on June 2, 2016, at 23:25 hours, was estimated to be 17,600 tonnes.

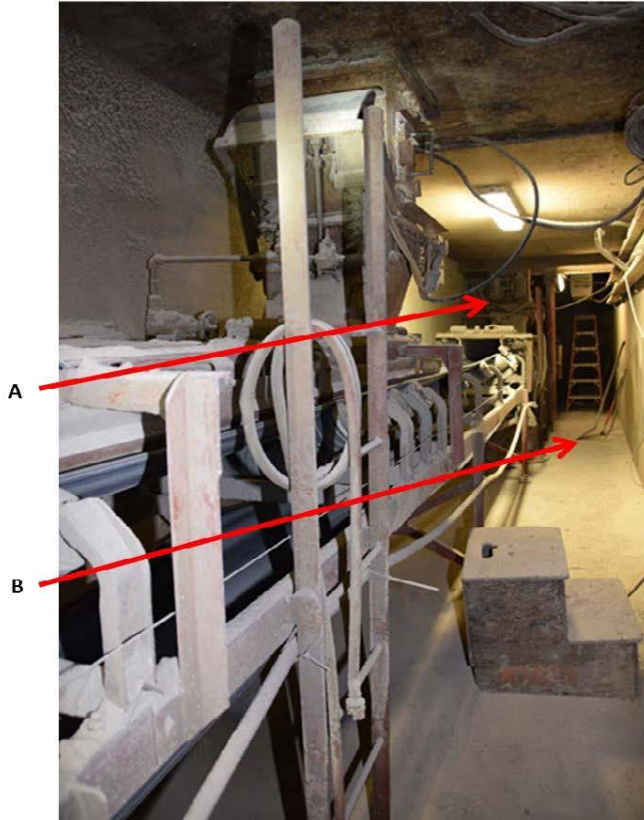
Phosphate pile



Figure 2.

A. Location where worker 1 was found. The height of the overhead beam in the photo is 5 metres (m). Each section of colour on the survey stick represents 1 m.

## Conveyor



*Figure 3. Conveyor system located below the teepee structure.*

- A. Gate 24 feeder for the conveyor system located below the teepee.*
- B. Tools that workers were using underground to dislodge lumps in the feeder. This process was also called “rodding the gates”. Rodding the gates was a process where a worker used a metal bar and inserted it into the gate opening to clear the feeder gate of lumps.*

**Gate 24 opening**



*Figure 4.*

- A. Opening on the side of gate 24 feeder access hatch from below the teepee in the conveyor area. The opening was approximately the size of a letter sized piece of paper.*





# Material Safety Data Sheet

NFPA Classification	DOT / TDG Pictograms	WHMIS Classification	HMIS	PROTECTIVE CLOTHING
 Health: 1, Flammability: 0, Reactivity: 0, Specific Hazard: 0			Health: 1 Flammability: 0 Reactivity: 0 PPE: E	
<b>Section I. Chemical Product and Company Identification</b>				
<b>PRODUCT NAME/ TRADE NAME</b>		Morocco phosphate rock - PB1 and K2O - Phos Acid Unit Feedstock		
<b>SYNONYM</b>	Moroccan rock	<b>MSDS NUMBER:</b>	13017	
<b>CHEMICAL NAME</b>	Fluoroapatite	<b>REVISION NUMBER</b>	1.2	
<b>CHEMICAL FAMILY</b>	Mineral ore containing oxides of phosphorous, iron, aluminum, calcium, sodium, magnesium, silicon and small amounts of fluorides. Originates in Morocco, Africa.	<b>MSDS prepared by the Environment, Health and Safety Department on:</b>	August 31, 2013	
<b>CHEMICAL FORMULA</b>	Ca <sub>10</sub> F <sub>2</sub> (PO <sub>4</sub> ) <sub>6</sub>	<b>24 HR EMERGENCY TELEPHONE NUMBER:</b>		
<b>MATERIAL USES</b>	Agricultural use.: Raw material in the production of fertilizer.			
<b>MANUFACTURER</b>	OCP S.A.	<b>SUPPLIER</b>	Agrium	

Figure 5. Material Safety Data Sheet of the phosphate rock product used in the teepee.

## Sequence of events

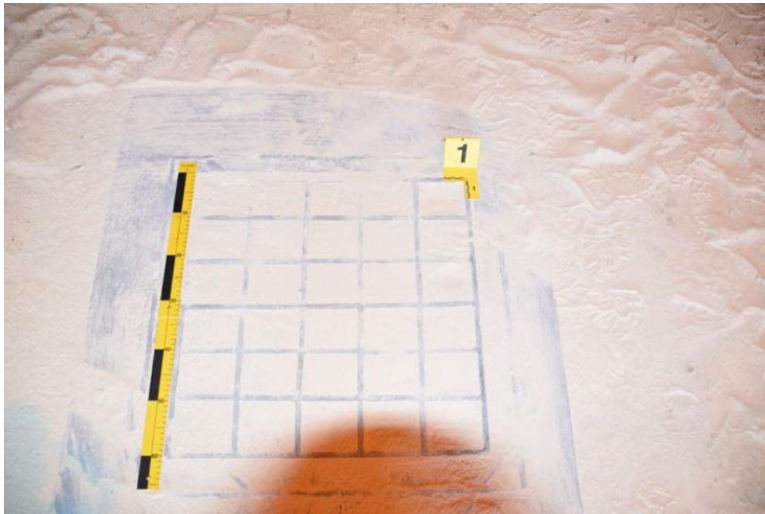
On June 2, 2016, at 6:00 p.m., Carey workers arrived at the Agrium Redwater Plant to begin their last night shift of their set. When the workers arrived, they completed a tool box meeting and then the work crew split up. Some workers went to the teepee, and the others went to the offloading area. The Carey workers were tasked with working with the phosphate rock product inside the teepee and unloading the product from rail cars.

The workers in the teepee encountered difficulties while working in the underground conveyor area as the feeder grate continually clogged with lumps of phosphate which slowed the production. When the lumps occurred, the workers would use long metal bars and tools to bang the feeder and loosen the lumps to continue the flow of phosphate rock; this process was also called “rodding the gates” by workers. The workers used this method, on the date of the incident, but were unable to clear the gate from below.

The workers in the teepee then called for their co-workers from the phosphate loading area to come and assist them with the process. When the assistance arrived, the two workers and their supervisor (that had been working below in the teepee) went above ground and entered the teepee on foot. The other workers who had joined them to help remained below ground under the gates to manage the conveyor. The supervisor and workers did not de-energize the conveyor or shut the gates prior to entering the structure; furthermore, they did not utilize any other method of protection from contact with the pile of phosphate rock.

When one worker and one supervisor entered the teepee, they began picking up the lumps of the phosphate rock above the 24 gate in an attempt to prevent the lumps from clogging the feeder. As they were conducting this process, the phosphate rock continued to pour through the gate as sand does through an hour glass (Figure 6).

#### Gate 24



*Figure 6. Gate 24, ground level inside the teepee. Worker 1 was located above gate 24 within the phosphate pile. This gate fed into the feeder and conveyor. The gate measured 58 centimetres (cm) x 58 cm.*

While the workers below ground were “rodding out the gates”, they began to “get a good flow,” according to one worker. Worker 2 below ground decided to attend above ground in the teepee to assist worker 1 and the supervisor by throwing lumps to the side before they clogged the gate again.



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The two workers and the supervisor took a short break in the teepee and after a couple of minutes worker 1 went to gate 24 area to pick up a lump. At that time, worker 1's hard hat fell off, and they went to reach for the hard hat to pick it up. As worker 1 was reaching, their feet started to get pulled down into the gate with the product that was flowing into the feeder.

Worker 2 came to worker 1's aid and began attempting to free worker 1 from the product. The supervisor also came to assist in the efforts as worker 1 was not coming free. The supervisor was pulled into the draining phosphate rock by their feet but was able to get free. At approximately 11:30 p.m., the supervisor ran to the radio and called below ground to shut down the gate. The supervisor continued to call on the radio; they then switched radio channels and called "60-60" which was the distress signal for the plant. The occupational health nurse called 911 at 11:36 p.m. to report the incident.

During this time, worker 1 continued to be pulled down into the phosphate rock product and became buried over their head as the product was flowing through the feeder. While trying to hold up worker 1's head, worker 2 was pulled deeper into the product and became buried up to their waist.

At approximately 12:00 a.m., the control room called out asking for all available personnel to attend the teepee to assist in rescue efforts.

Meanwhile, two workers from below ground in the conveyor and other Agrium staff arrived at the incident site and began using the front end loader, shovels and VAC trucks to back blade the phosphate rock away from the trapped workers. After approximately 25 minutes, worker 2 was freed and rescue efforts continued for worker 1.

The Agrium emergency responders arrived on site and assumed incident command for the rescue/recovery operations and called 911 for additional assistance.

Emergency medical services arrived on site followed by the Royal Canadian Mounted Police (RCMP) at 12:12 a.m. who stated they found "15-30 people were furiously digging in the phosphorous rock tee-pee". The Agrium emergency response team continued with rescue efforts.

On June 3, 2016, at 3:25 a.m., OHS officers arrived at the incident scene and observed the rescue/recovery operations in progress. The Agrium emergency response personnel were using a U shaped sheet of metal to create a barrier between the buried worker and phosphate in order to dig the worker out without the phosphate re-filling the space. The three emergency response personnel were also using a VAC truck to aid in the removal of the phosphate along with hand digging.

At 2:55 p.m., on June 3, 2016, worker 1 was recovered from the phosphate pile, having succumbed to injuries received in the incident.

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## Completion

A review for enforcement action was completed on December 21, 2016, and it was determined that the file would be referred to Alberta Justice for review. The entire file was sent to Alberta Justice on February 28, 2017. Charges were laid on May 25, 2018. On July 19, 2019, Carey pled guilty to Section 189 of the OHS Code for failing to ensure, where a worker may be injured if equipment or material was dislodged, moved or spilled, that the material or equipment was contained, restrained or protected to eliminate the potential danger. They were fined \$1000 inclusive of the 15% Victim Fine Surcharge. They were also ordered, under the *OHS Act* Section 75, to pay \$334,000 in favour of Alberta Construction Safety Association and Safety in Schools for the development and delivery of an incident-based course focused on the internal responsibility system. All other charges were withdrawn against Carey Industrial Services Ltd. All charges were withdrawn against Agrium Inc. et al.

This investigation was closed on July 24, 2019.

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**Signatures**

ORIGINAL REPORT SIGNED

September 23, 2019

Lead Investigator

Date

ORIGINAL REPORT SIGNED

October 30, 2019

Manager

Date

ORIGINAL REPORT SIGNED

September 29, 2019

Director

Date