

## MEMORANDUM

**TO:** Lowell Spackman, District 1 Supervisor .   
**FROM:** Pam Rothwell, Permit Coordinator  
**DATE:** May 12, 2011  
**SUBJECT:** **Chronology of Events and Recommendations for Excursion Well CM-32  
Cameco Resources, Permit #603, Highland Uranium Project**

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### INTRODUCTION

Cameco Resources operates two in-situ leach (ISL) uranium mines in the Southern Powder River Basin; the Highland Uranium Project (HUP) and the Smith Ranch Mine (SR). The mines are located adjacent to each other including over 37,500 acres in Converse County. The combined production for the mines during the 2009-2010 report period was 1,902,403 pounds of uranium yellow cake.

In-situ mining utilizes the injection of a leaching solution (lixiviant) to remove the in-place uranium ore. The lixiviant is injected through injection wells which surround a production well where the lixiviant and uranium are recovered in solution. Several injection/production well patterns comprise a wellfield. A ring of monitor wells is located around the perimeter of each wellfield to detect lixiviant and/or production fluid migration outside the production pattern. In addition, wells are constructed to monitor the aquifers immediately above and below the production zone to identify contaminants moving vertically. If water sampling of a monitor ring well detects the presence of production fluid, the well is considered *on excursion* if two of three parameters (chloride, alkalinity, conductivity) exceeds an upper control limit (UCL) for the parameter. An excursion can also occur during the groundwater restoration where the fluids are monitored for chloride, conductivity and uranium.

### CHRONOLOGY

#### 2007

July 3, 2007	Scheduled sample for Well CM-32 exceeded upper control limits (UCLs).
July 5 & 6, 2007	CR collected excursion confirmation samples
July 10, 2007	Confirmation sampling results confirmed the excursion
July 11, 2007	CR verbally notified LQD
July 11, 2007	LQD received written notification of the excursion. Chloride and Conductivity exceeded the UCLs. CR indicated they were going to begin pumping seven adjacent wells to control the excursion in "adjacent Header House C-22". The wells were being retrofitted for restoration.
July-Dec 2007	<u>Quarterly Excursion Monitoring Reports (3<sup>rd</sup> and 4<sup>th</sup> Quarter):</u> All UCL parameters increased through the end of the Fourth Quarter, water level

also increased. Uranium values reported as high as 0.8 mg/l during this period. (EPA's maximum contaminant level (MCL) for uranium is 0.03 mg/l.

October 23, 2007 Quarterly Mechanical Integrity Test Report states the operator attributes the excursion to the abandoned underground mine workings.

## **2008**

Jan-Dec 2008 Quarterly Excursion Monitoring Reports: All UCL parameters remained elevated and uranium values rose as high as 5.5 mg/l.

Jan 18, 2008 Quarterly Mechanical Integrity Test Report states the operator attributes the excursion to the abandoned underground mine workings.

April 22, 2008 Quarterly Mechanical Integrity Test Report states the operator attributes the excursion to the abandoned underground mine workings.

## **2009**

Jan-Dec. 2009 Quarterly Excursion Monitoring Reports: All UCL parameters remained elevated with a uranium level reported at 4.0 mg/l.

## **2010**

Jan-Dec. 2010 Quarterly Excursion Monitoring Reports: All UCL parameters remained elevated and uranium values rose as high as 4.0 mg/l.

August 17, 2010 LQD Inspector voiced concerns about adding reductant to the restoration fluid due to unanswered questions regarding calcium carbonate precipitation at the wells and/or in the formation. LQD told CR they could continue reverse osmosis (RO) and target areas to get CM-32 off excursion.

November 17, 2010 Quarterly Excursion Monitoring Report, (3<sup>rd</sup> Quarter): LQD review of the report notes the lack of water quality change in Well CM-32.

## **2011**

January 25, 2011 LQD sent a letter to CR requiring a remediation plan for the CM-32 excursion within 45 days. LQD also requested a Guideline 8 parameter suite sample of CM-32.

February 1, 2011 A Mine Unit C potentiometric surface map constructed by LQD hydrogeologist, Steve Ingle, identified the minimal effect of pumping CMP-25 on remediation of the excursion. LQD suggested CR reassess the pumping well.

April 13, 2011 Meeting with LQD and Cameco to discuss groundwater restoration. LQD expressed concerns with the proposed method of combining RO and GWS and how to recover the lixiviant from the pattern area. LQD stated that CR should address the excursion well before working on wellfield restoration. If the wellfield is restored prior to remediation of an excursion, the treatment of the excursion potentially can re-contaminate the restored groundwater in the wellfield. Well CM-32 needs to be at baseline and CR should address this in an urgent manner, i.e., find a better way to get off excursion. CR agreed to rework the model.

April 19, 2011 CR responded to Third Quarter Monitoring Report comments. CR proposed a one year period to remove the well from excursion.

April 20, 2011 LQD Inspector requested the excursion Guideline 8 sample results and they were provided by CR confirming the sample was taken as requested.

	The inspector inquired whether Cameco has taken any action to determine the extent of the excursion beyond the monitor well as it was on excursion for so long a time period. CR reported no actions have been taken.
April 27, 2011	Meeting with LQD and Cameco to discuss MU-C restoration. CR stated they are working on areas of the excursion. LQD emphasized that the proposed plan to remove the well from excursion in one year was not acceptable.
April 28, 2011	CR notified LQD by telephone message that CM-32 has dropped below the UCLs and the well is off excursion.
May 2, 2011	LQD received the monthly Excursion Status Report for Permit 603 confirming the chloride and conductivity levels have trended below the UCLs.

### RECOMMENDATIONS

The LQD recommends CR construct additional monitor wells to investigate the extent of the excursion beyond the monitor well. The location of CM-32 is within several hundred feet of the aquifer exemption boundary and the permit boundary. With the injection of restoration fluid into the wellfield subsequent to the beginning of the excursion, there is concern that the lack of control of the excursion for almost four years could have caused fluid migration outside the exemption boundary.

CR should consult with LQD's hydrogeologist on the location of the proposed additional monitor wells prior to installation and ensure they are covered under the permit surety. The LQD is amenable to cooperative action by CR to try to identify the extent of the excursion without issuing a violation. It is recommended that the additional monitor wells be required through a Letter of Conference and Conciliation.