

September 24, 2013

8115-4100-59240-16

Aaron White, EIT  
Exploitation Engineer  
Murphy Oil Company Ltd.  
4000, 520 – 3<sup>rd</sup> Avenue SW  
Calgary, AB T2P 0R3

Dear Mr. White:

**RE: ACID GAS DISPOSAL APPROVAL ORDER 10-16-004  
MURPHY HERITAGE b-69-E/93-P-09; WELL PERMIT # 24480  
BALDONNEL FORMATION**

Commission staff have reviewed the pressure transient analysis report dated August 28, 2013 for the subject acid gas disposal well.

This well, rig released December 3, 2008, commenced disposal in March 2011 and has consistently been operated within the approval conditions. Initially intended as a back-up injection well, this wellbore now operates as a primary disposal location. Because of concerns with the viability of the Baldonnel formation as a disposal formation, the Order specified a limit on injection rate along with reservoir pressure testing and observation well requirements.

In October of 2012 the Commission expressed concern with a 2,000 kPa increase in injection pressure and a 3,200 kPa increase in average reservoir pressure. Since then Murphy has made significant efforts to better characterize the Baldonnel pressure migration through an extended fall-off test and comprehensive modeling scenarios.

The 47 day fall-off test conducted from May to July 2013, indicated a current sandface pressure of 23,375 kPa (at datum of 2113.8 mCF, 2,119.5mKB) which is less than the maximum limit value of 23,786 kPa (120% of initial pressure). At the end of the test, the pressure was still decreasing approximately 14 kPa/day indicating continued dissipation into the reservoir. Continued disposal into the Baldonnel at this sandface pressure is currently acceptable. As indicated in the presentation by Murphy Oil staff to the OGC on September 17, 2013, injection rates below 8 e3m3/d will likely allow dissipation of disposal fluids at constant sandface pressure and limited increase in formation pressure. The use of bottom-hole pressure gauges in this well has been highly beneficial for reservoir and operational data interpretation.

Since the stratified Baldonnel aquifer is considered a poor long-term acid gas disposal zone, the Commission requests that Murphy identify an alternate method of acid gas disposal for the Tupper West plant and commit to that method prior to September 1, 2014. Further, Murphy Oil is expected to achieve, on a best-efforts basis, an operational date for the alternative disposal method prior to December 31, 2015.

Should you have any questions, please contact Michelle Gaucher at (250) 419-4482 or the undersigned at (250) 419-4430.

Sincerely,



Ron Stefik, Eng.L.  
Supervisor, Reservoir Engineering  
Oil and Gas Commission