Mailing Address
PO Box 1372
Saskatoon, SK S7K 3N9

Office
204-220 20th Street West
Saskatoon, SK

p 306.665.1915
f 306.955.5852
info@environmentalsociety.ca

YANCOAL SOUTHEY PROJECT

Comments to the Saskatchewan Ministry of Environment on the Environmental Impact Statement for the Yancoal Southey Project

Submitted by Dominique Richard, M.Sc. and Ann Coxworth, M.Sc. on behalf of the Saskatchewan Environmental Society, 2 June 2016

The Saskatchewan Environmental Society wishes to take advantage of the public review process to express its concerns and recommendations following the publication of the Yancoal Southey Project EIS.

The five issues addressed in the present review are:

1. Energy consumption and greenhouse gas emissions
2. Fresh water supply and demand
3. Protection of surface and underground water quality
4. Decommissioning and reclamation
5. Conservation of grassland and wetland ecosystems

1. Energy Consumption and Greenhouse Gas Emissions

It is in the interest of Saskatchewan's economic growth and its population's health to demand that the Yancoal Southey Project rely mostly on renewable energy sources with a goal of becoming carbon neutral. In the long term this project cannot rely on fossil fuels to power its operations. Greenhouse gas (GHG) emissions emanating from the Yancoal Southey Project are expected to be as high as 1.09 million tonnes of carbon dioxide equivalents per year. It is unrealistic to aim to significantly reduce our provincial GHG emissions if the fossil-fuel-dependent Yancoal Southey Project, as it stands, is given approval. A 1.4 % increase in provincial GHG emissions, as stated in the Technical Review Comments, would steer Canada further away from its commitment to reduce GHG emissions and is not acceptable.

The proponent has written off the option of using combined heat and power. While acknowledging that the natural gas used for heating could also generate 70 MW of power, they have

discarded this option without presenting the rationale for doing so. The total amount of GHG emissions associated with each of the three cases briefly described in Sec 3.5.3 (p. 3-7) must be quantified. This should include the emissions produced by SaskPower in the generation of electricity, as well as the emissions released in the exhaust stream.

The proponent has also written off the option of using renewable energy electricity sources, ostensibly because they cannot be base load supplies. SaskPower's grid already has the potential to incorporate intermittent renewable supply when it is available, without disrupting the steady supply of power. The proponent should be asked to provide an analysis of a scenario in which both the solar and wind potential on the site is developed to meet part of the electricity needs of the project. The Yancoal Southey EIS states (Table 2.4-7) that the favored mine site is characterized by > 2000 sunny hours per year and that prevalent wind speeds average 18.4 km/hr. These two conditions are sufficient to implement very efficient and productive on-site solar panel and wind turbine energy systems.

We need to bear in mind that this project is being considered at a time when Canada is facing a very challenging task in planning to meet its commitment to cut its GHG emissions to 30 % below 2005 levels by 2030. This is not a time to launch new industrial projects without taking advantage of every opportunity to minimize fossil fuel use.

2. Fresh water supply and demand

The Yancoal Southey EIS provides very limited information about water availability and sources for this heavily water-demanding project. They note (Sec 4.3.1, p.4-5) that "at peak stages of construction, water will be provided on an as-needed basis … and will potentially require multiple short-term sources". They comment that "water availability, source, supply and requirements…will be addressed in the feasibility study and early detail design stage". Sourcing water from multiple local sources could have significant environmental and local social impacts, so this needs to be dealt with before environmental approval of the project is considered.

For long-term water supply, the plan is to draw water by pipeline from Buffalo Pound Lake, which is dependent on the South Saskatchewan River for re-supply. The EIS states that "SaskWater will be the proponent of the water pipeline and will be responsible for all regulatory approvals including an EIS if required." It does not appear that there has yet been a study of the cumulative impact of withdrawing 1,450 cubic metres/hr from Buffalo Pound Lake for the anticipated 100-year life of the mine during a period of shrinking flow in the South Saskatchewan River.

We must consider this project in the present context of climate change, in which the number of days with temperatures >30°C in southern Saskatchewan is expected to at least double if not triple by 2080, as reported on 7 May 2016 by the Prairie Climate Centre at the University of Winnipeg. Water flow in the South Saskatchewan River is expected to be seriously impacted by reduced snowfall in the mountains, and water resources available in southern Saskatchewan will become scarcer.

The project cannot be approved with the level of uncertainty that exists about future river flow and the impact that such withdrawal could have on other water users. The reader is referred in the EIS to Appendix 4-B, but this deals only with how the pipeline route would be determined. In order to feel comfortable with this project, we need to see a thorough study of anticipated water demands and supply in the whole region served by the South Saskatchewan River as the climate changes. This should be part of the current EIS.

We note that, during the operational period, 20,000 cu.m./day of brine from the reclaim pond will be deep injected. This represents an equivalent volume of fresh surface water that will be permanently lost from the hydrologic cycle every day for 100 years. The ecological implications of this loss in a dry-land region need to be examined before project approval is considered.

3. Protection of Surface and Underground Water Quality

Based on the information provided in the Yancoal Southey EIS, we find that the proponent has not yet provided sufficient evidence that the potable water resources will not be contaminated by migrating brines.

Risks of water contamination and remedial measures need to be addressed in more detail to take account of the possibility of: (1) leaks from pipelines, casing and tubing, (2) rock fracturing due to induced pressure differentials and structural instability, (3) lateral and vertical brine seepage to underlying aquifers.

(1) The procedure in case of detection of leakage should be detailed, and the size of spills should be predicted, given a detection time lapse and brine flow rates. The pipelines will only be single-walled unless judged to be located at risky locations (section 8 p. 32). However, it is much safer to use double-walled pipelines to avoid any leak into the surrounding geological formations and glacial till.

(2) Geological structures need to be identified to evaluate possible land surface and underground disturbances through slippage along pre-existent fractures or faults, and subsidence caused by the presence of caverns. The EIS states that the maximum expected ground subsidence is 6.7 m (section 8 p. 34), which is significant in the context of underground fluid circulation. It is very likely that structural instability caused by solution mining generates fractures in the bedrock adjacent to the mine, but also at shallower

depths above the mine. In addition, the lubrication of fault surfaces increases the risk of slip on faults. As stated on page E-8 of the EIS, the "cavern spacing may be adjusted to reduce surface strains and limit the potential effect of subsidence on surface development". The proponent should specify the criteria that will be used to identify the need to readjust the cavern spacing. If rock fracturing were to occur directly above the mined formation, it would affect the rather thin Red Beds Formation of 46 m thickness that lies below the permeable Dawson Bay Formation, which contains in part bituminous limestone. Water contamination could result. The method used to contain the lateral extent of cavern formation should include the containment of the oil to avoid oil circulation in the existing porous and permeable network underground. The amount of pressure on the injected water should be disclosed and the risk of earthquake generation should be investigated. A recent study (Atkinson et al., 2016) shows that hydraulic fracturing induces 90 % of earthquakes greater than magnitude 3.0 in the western Canada sedimentary basin.

(3) Based on the EIS, it seems to be a difficult task to predict the extent and timing of brine seepage that will occur from the TMA, in part due to inhomogeneities in the geological stratigraphy. "The results of the solute transport analysis predict first arrival of the brine plume could range from less than 1 year to more than 1,600 years after the start of waste salt deposition depending on the depth to aquifers present at a given location, taking into account uncertainty in soil properties (section 8 p. 43)." This amount of uncertainty is not acceptable. Leak-proof measures and a selection of threshold criteria for which additional mitigation will be implemented to contain brines within the TMA footprint should be part of the strategy developed to manage the mine tailings and as such be described in the EIS.

4. Decommissioning and Reclamation

In Appendix 4-D, the EIS says that the core facilities area will eventually be reclaimed, with the exception of the Tailings Management Area (708 ha) and the brine reclaim pond, where important and irreversible effects will prevail. The apparent absence of any provision for the long-term fate of the TMA is worrisome. In other types of modern mining and milling operations, it would be regarded as unacceptable to not plan for permanent removal of hazardous wastes from the active environment. If the salt piles are left exposed indefinitely to rain and weather erosion, we would expect large surrounding areas to become permanently sterile. The fact that previously licensed potash mines have been allowed to operate without any provision for removal of salt piles is not a good reason for continuing this practice. The proponent should be asked to describe how they will keep the tailings permanently isolated from surrounding lands during an indefinite period following closure of the mine, or innovate for the recovery of co-products in the "waste". Financial provisions for the mine closure should also be demanded from the proponent.

The United Nations Environment Programme (UNEP) and the International Fertilizer Industry

Association (IFA) recommend continuous rehabilitation throughout the life cycle of a mine in a report on the Environmental Aspects of Phosphate and Potash Mining (2001). Because decommissioning and reclamation is a critical aspect of any mining project, it is imperative that the proponent submits a decommissioning and reclamation plan that will be evaluated before the project is to be given approval.

5. Conservation of Grassland and Wetland Ecosystems

If approved, the Yancoal Southey Project would be located in the Moist Mixed Grassland Ecoregion, within the Prairies Ecozone. Parks Canada writes "In less than one century the native grasslands have become one of the most endangered biomes in the world." (http://www.pc.gc.ca/eng/pn-np/sk/grasslands/natcul/natcul3.aspx).

It is our understanding that the project will in part cause the fragmentation and disturbance of primitive and undisturbed Grasslands and Wetlands, as well as modified prairie. We strongly suggest that fragmentation and disturbance be minimized as it is imperative to spare the remaining undisturbed primitive land to preserve the biodiversity of the region. It is worth noting that wetlands act as carbon sinks that are much more efficient than is farmed land at reducing greenhouse gases. The proponent should indicate which areas will be affected by the Yancoal Southey Project. Efforts should be deployed to minimize the flooding of native Grasslands and modified prairie due to ground subsidence and restrict the facilities, MTA, ponds and pipelines to areas exempt of undisturbed native land and modified prairie, with caution to maintain connection between these undisturbed land areas.

Gail M. Atkinson, David W. Eaton, Hadi Ghofrani, Dan Walker, Burns Cheadle, Ryan Schultz, Robert Shcherbakov, Kristy Tiampo, Jeff Gu, Rebecca M. Harrington, Yajing Liu, Mirko van der Baan, Honn Kao (2016) Hydraulic Fracturing and Seismicity in the Western Canada Sedimentary Basin, Seismological Research Letters, DOI: 10.1785/0220150263