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**SASKATCHEWAN ENVIRONMENTAL SOCIETY SUBMISSION TO THE
SASKATCHEWAN MINISTRY OF ENVIRONMENT REGARDING THE
ENVIRONMENTAL ASSESSMENT OF THE PROPOSED FORTUNE MINERALS
METAL PROCESSING FACILITY**

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Dear Mr. Yuen,

Thank you for providing the public with a 60 day period in which to review the Environmental Impact Assessment for Fortune Minerals' proposed Saskatchewan Metal Processing Plant near Langham, Saskatchewan.

The Saskatchewan Environmental Society has carefully reviewed the Environmental Impact Study and urges the Saskatchewan Ministry of Environment to turn down this application from Fortune Minerals. In our judgment, the costs and risks associated with this project clearly outweigh the benefits. There are several serious deficiencies in the EIS. Moreover, the project is not at all well suited to development in an area of our province that will be steadily urbanizing over the next 40 years.

Our organization has numerous concerns about this project, on which we elaborate in this submission.

The following issues are discussed:

1. Use of Toxic Sodium Cyanide
2. Process Residue Wastes
3. Failure to Adequately Plan for Future Intense Precipitation Events
4. Deep Well Injection Plans
5. Water Consumption
6. Inadequate Plant Decommissioning Plan
7. Hazardous Materials and the Risk of Accidents



8. Solvent Extraction Fire Hazard
9. Inadequate Level of Confidence Expressed by Fortune Minerals Consultants
10. Subsidized Electrical Rates
11. Minimal Employment Benefit for the Risks to be Taken and the Projected Costs
12. Record of Fortune Minerals Elsewhere in Canada
13. Conclusion
14. Acknowledgements

1. Use of Toxic Sodium Cyanide on Site

The metal recovery process proposed by Fortune Minerals involves using highly toxic sodium cyanide to extract gold. Because of the extremely hazardous nature of this material, the use of cyanide in mining and metal processing is banned in some countries (e.g. Hungary, Czech Republic) and in some US states, including Montana and Wisconsin. Its use in the Saskatoon – Dalmeny - Langham area would be very ill advised.

2. Process Residue Wastes

158,000 tonnes of hazardous residue from the facility are expected to be generated on site each year. At least 2,800,000 tonnes will be generated in the first 18 years of the project, and the disposal area will occupy at least 43 hectares of land. While the metal processing plant is planned to operate for only 18 years, the wastes will remain on site forever.

These wastes would be stored permanently in lined pits, or cells, in a Process Residue Storage Facility (PRSF) that would be filled with toxic residue to a depth of over 4 metres.

The major contaminant of concern in the solid waste destined for the PRSF is arsenic in the form of an iron arsenate complex (scorodite).

Recently published, peer-reviewed medical research (citations available upon request) shows that low doses of inorganic arsenic (as low as 10 to 50 parts per billion) contained in drinking water, foods or air emissions may constitute serious health risks to humans. In a recent article (Discover Oct, 2013) Dartmouth College molecular toxicologist Joshua Hamilton described how chronic exposure to trace arsenic inflicts damage at the cellular level, increasing the body's vulnerability to a wide array of sicknesses, including lung and bladder cancers, cardiovascular disease and diabetes. He states that, "Each passing year, we've discovered health effects at lower and lower doses. There isn't any other toxicant that we know of that even comes close to arsenic in terms of the number of health effects at the doses we're seeing and the number of people worldwide who are potentially exposed." Allan Smith, an epidemiologist from the University of California at Berkeley, states: "I believe arsenic poses the highest cancer and mortality risks we know of compared to any other environmental exposure."



We therefore would need to be assured that the contents of the PRSF would be permanently and securely confined. The EIS is not encouraging. Fortune's own consultants acknowledge (Addendum to EIS, Section 2.4) that the cell liners will be vulnerable to damage during installation and throughout their service life. Description of the modelling of rates of release of contaminants from the PRSF is accompanied by the consultant's warning, "The model is a simplification and can only provide a general indication of what might happen" (Addendum to EIS, Section 6.0). The consultant goes on to say "The concern is that for a functional and practical design, inherent variability of hydraulic conductivity of natural materials, along with variability in transport properties, might result in deviations between the simulated results and observed performance" (Addendum to EIS, p. 28). They acknowledge that insufficient studies have been conducted to provide confidence in prediction of long-term confinement of contaminants.

In addition to the risk of ground water contamination, we note that each storage cell of the PRSF will be open to the air for a period of 2.0 to 2.5 years. During the entire 18 years that the processing plant is forecast to be in operation, at least one storage cell will be open to the air. Normal and strong winds, characteristic of the prairies, may spread dust containing arsenic throughout the region, perhaps as far away as the City of Saskatoon. To our knowledge, the potential distances over which this contaminated dust could be spread has not been determined. Empirical data addressing this health risk is missing.

In summary, SES suggests that arsenic-laden wastes are: (a) incompatible with neighboring agricultural land uses, (b) incompatible with the Dalmeny Aquifer below the site, and (c) incompatible with an area that, by the time operations have ceased, is very likely to be more heavily urbanized than it is today.

3. Failure to Adequately Plan for Future Intense Precipitation Events

While it is recognized in the EIS that climate change could impact the hydrology (flooding, wetlands, change in evaporation rate, etc), the proponent assumes that this will not be an issue during the project's lifetime. In practice, we know that climate change impacts are already happening.

Fortune Minerals based its planning around a 1 in 50 year precipitation event, and uses precipitation data that is outdated. Given the changing nature of our climate on the Prairies such analysis is clearly insufficient.

In the 2011 to 2013 period alone, much heavier rainfall events have occurred in several locations across the Prairies than Fortune Minerals takes account of in its EIS. At the very least, Fortune Minerals should have outlined how it would respond to circumstances on site in which at least 200 mm of rain falls in a 2 day period. How would this affect the Process Residue Storage Facility and the numerous storage ponds on site?

4. Deep Well Injection Plans

Under the Fortune Minerals proposal, briny liquid waste would be injected down lined wells that go through the Dalmeny Aquifer into deep saline formations. The original plan to use the Manville Formation (approximately 475 metres below ground) as the waste receptor was turned down by the Province. The intention is now to go considerably deeper, into the Souris River Formation. However, as the detailed nature of this formation is unknown, it is still



questionable whether this will be feasible. Fortune suggests that studies to evaluate the acceptability of using this formation for disposal will not take place until after the project has been approved. We find this approach intolerable. This is one of several areas in which studies should have been completed, but have not been. This constitutes a notable deficiency in the EIS.

Moreover, the proposed brine injection wells penetrate the Dalmeny Aquifer. Thus, while the risk of well failure is low, in the event that a well failure were to occur and to result in leakage through the well casing, the region's drinking water source could be contaminated.

5. Water Consumption

The project requires a lot of water. The intention is to draw roughly one million litres a day from the Dalmeny Aquifer, which is the source of drinking water for the region. The EIS estimates that the water level in the aquifer and nearby wells would be permanently lowered. This is at a time when the population of the Langham region and local water demand are expected to grow significantly.

6. An Inadequate Plant Decommissioning Plan

Planning for after-care of the site (decommissioning) following the expected 18 year operation of the plant is still very sketchy. No cost estimates have been provided, and the company is proposing to submit a more detailed decommissioning plan only after it obtains Ministerial approval for the project. Yet knowing the details of that decommissioning plan is crucial to assessing whether the project should be allowed to proceed in the first place, especially in an area that is likely to see significant residential development over the next 40 years.

7. Hazardous Materials on Site and the Risk of Accidents

The proposed plant would house a wide variety of hazardous chemicals on site. This increases risks to workers and to the public, particularly in the event of a fire or a serious accident at the facility.

The Environmental Impact Study has not adequately addressed how Fortune Minerals would respond to a fire or a serious accident on site. Nor has it adequately addressed what the impacts of such an event might be. This is another significant deficiency in the EIS.

8. Solvent extraction fire hazard

One example of the lack of attention the EIS has given to fire risk is the failure to adequately examine the risks associated with the solvent extraction process used for recovery of copper. It would be important to know the intended lay-out of the piping and solvent storage facilities, as well as the composition of the piping materials which may be exposed to both chemical and heat degradation. Risks vary with the specific nature of the solvent involved. Fortune Minerals in the EIS describes its solvent simply as "a chemical extractant transported by kerosene". Adequate review of the proposal is impossible with such vague information and lack of technical detail. See L.J. Moore, "Using Principles of



Inherent Safety for Design of Hydrometallurgical Solvent Extraction Plants" in Chemical Engineering Transactions Vol. 31, 2013 for reference to solvent extraction plant fire incidents (including one involving the use of kerosene in copper extraction) resulting from poor design.

9. Inadequate Level of Confidence Expressed by Fortune Minerals Consultants

Consultants who contributed to the EIS emphasize that the modeling on which the estimates of environmental impact are based can only provide preliminary insight. They clearly deny responsibility for damage suffered by any third party as a result of decisions based on their reports (e.g. Addendum to the EIS Section 6.0). And yet it is these reports that we are asked to accept as assurance of the project's safety and sustainability. We believe that the consultants' lack of confidence in the results of the modeling needs to be taken very seriously.

10. Subsidized Electrical Rates

Fortune Minerals indicates in its EIS that it was facing electricity costs of 20 cents per kilowatt hour in the NWT versus the prospect of electricity costs as low as 4 cents per kilowatt hour in southern Canada. Without saying precisely what it will be paying for electricity in Saskatchewan, the Fortune Minerals EIS states: "Electrical power in Saskatchewan is relatively inexpensive".

It appears from these comments that Fortune Minerals is being offered a bulk rate on electricity from SaskPower, and would likely be paying somewhere in the 4 to 7 cents per kilowatt hour range. If that is accurate, this will constitute a subsidy by residential and farm electricity customers in Saskatchewan, who will soon be paying about 12 cents per kilowatt hour. Shortly put, Fortune Minerals will not be paying the real cost of the additional 13.2 megawatts of electrical capacity that SaskPower will need to build in order to accommodate Fortune Minerals operations on the grid. Nor will Fortune Minerals be paying any of the cost associated with the environmental damage from the fossil fuels that are burned to supply this electricity. We cannot support this approach to industrial development and power planning.

11. Minimal Employment Benefit for the Risks to be Taken and the Projected Costs

The proposed Fortune Minerals plant, once operational, would only employ 85 people over an 18 year period, with the possibility that this period could extend a few more years. This is a relatively small employment benefit for the subsidized electricity rate that will be provided, the greenhouse gas emissions that will be released, the drawdown of the Dalmeny Aquifer that will take place, and the large amount of hazardous waste residue that will be left behind for thousands of years into the future. There are also risks that must be considered such as a potential fire or other type of accident at the chemical plant in the short term, or the potential contamination of the Dalmeny Aquifer several centuries from now as contaminants leach through the deteriorating liner and the fill barrier below. We do not find the cost-benefit ratio to be attractive.



12. Record of Fortune Minerals Elsewhere in Canada

One component in any decision to approve a proposed development involves having sufficient confidence that the proponent will conduct its business activities in a manner that demonstrates concern for community wellbeing, and a willingness to be responsive to community concerns.

Just as a bank pays close attention to an applicant's credit rating when approving a loan, the Saskatchewan Ministry of Environment should be carefully examining the environmental record of each project applicant as part of the process of assessing how well they are likely to perform in protecting the environment, in the event that they were to receive approval for their proposed development in Saskatchewan.

In the case of Fortune Minerals, we have watched with concern as the company displayed inappropriate intransigence in moving forward with its application to develop an open pit coal mine in an area of British Columbia known as the Klappan (or 'Sacred Headwaters'), a region that supports three major salmon-bearing rivers (the Skeena, Nass and Stikine), and whose preservation is fundamental to hunting, fishing and cultural practices of the Tahltan people. For years the Tahltan, who have co-operated with companies on several industrial projects, have asked Fortune Minerals to withdraw their coal mining proposal, because of the sacred nature of the area to them, and for years Fortune Minerals has refused.

Only in the face of active occupation of its camp site this fall, did Fortune Minerals finally pause, while negotiations occur between the BC government and representatives of the Tahltan First Nation.

The record of performance by Fortune Minerals in BC raises serious questions about the attitude of the company, and what Fortune Minerals will really be like to deal with. Given the nature of the proposed Saskatchewan Metal Processing Plant, which would house a large concentration of hazardous chemicals and hazardous wastes, the lack of responsiveness that Fortune Minerals has displayed in British Columbia is of concern.

13. Conclusion

The Saskatchewan Environmental Society has carefully analyzed the Fortune Minerals EIS and finds it to be deficient on too many fronts to merit approval. Moreover, the costs and risks associated with the project over the short and long term outweigh the short term economic benefits.

We urge the Ministry of Environment to refuse approval of this proposed project.

14. Acknowledgements

The Saskatchewan Environmental Society gratefully acknowledges the valuable contribution to the preparation of this document made by SES Water Committee member Nargiz Rahimova, who holds a Master of Environment and Sustainability degree, and by SES Board Member David Henry, who holds a Masters degree in Forest Ecology and a PhD in Behavioural Ecology.



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Submitted on behalf of the Saskatchewan Environmental Society by

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