



Air Quality Assessment

Bruderheim Sulphur Forming
and Shipping Facility



Operations at Facility

- Liquid sulphur to be delivered to proposed terminal by truck, rail tank car, and potentially by pipeline
- Liquid sulphur will be transferred via pumping station to heated tanks with a maximum capacity of up to 18,000 tonnes
- Liquid sulphur will be processed into pastilles with typical diameters of about 3 mm.



Operations at Facility (Cont'd)

- Pastilles will be deposited on an asphalt bulk storage pad with a capacity of 90,000 tonnes.
- Pastilles will be periodically loaded onto rail cars for shipment



Air Emissions

- Air emissions associated with pastille forming, storage and shipping operations contain a variety of components relating to criteria pollutants:
 - Fine dust ($PM_{2.5}$)
 - Sulphur dioxide (SO_2)
 - Oxides of nitrogen (NO_x)
 - Hydrogen sulphide (H_2S)
 - Carbon monoxide (CO)



Air Quality Issues

Four air quality issues addressed in the Environmental Impact Assessment, include:

- air emissions of criteria air contaminants – industrial emissions of criteria air contaminants associated with Project operations and from operations at surrounding industries
- acid deposition – emissions of potential acid forming substances such as SO₂ and NO_x



Air Quality Issues (Cont'd)

- Particulate deposition – emissions of sulphur particles and subsequent deposition
- Ozone formation – potential for O₃ creation as a result of photochemical reactions with NO_x and VOC




Remedial Measures to Reduce Air Emissions

- Installation of low NO_x burners
- Only degassed liquid sulphur with a maximum H₂S content of 10 ppm will be accepted at the facility
- Exhausts from the storage tanks will be subject to the Sulfa Treat process to ensure that H₂S concentrations will not exceed 1 ppm .



Remedial Measures to Reduce Air Emissions (Cont'd)

- The ground in the area of front end loader activity will be swept and washed on a daily basis.
- The storage pad will be shielded from the wind by a 6.1 m screen
- Dust suppression in the rail-out area will be achieved with the use of a proprietary dust suppression agent as well as with water



Remedial Measures to Reduce Air Emissions (Cont'd)

- Dust suppression agents will be applied to all transfer points behind the hopper and at rail out
- Conveyer belts will be covered



Government Regulations

- Maximum ground-level concentrations of air emissions such as fine $PM_{2.5}$, SO_2 , NO_x , CO, H_2S and potential acid deposition loads are governed by Provincial and/or Federal Objectives
- The objectives provide adequate protection against adverse effects on soil, water, vegetables, materials, animals, personal comfort and well being.



Observed Air Quality

- Regional ground-level concentrations $PM_{2.5}$, CO, NO_2 , SO_2 , as observed at Elk Island, Lamont and Fort Saskatchewan monitoring stations are less than Alberta's Ambient Air Quality Objectives (AAAQO) and thus have no adverse effects on the environment
- Observations show that regional emissions of NO_x tend to result in the destruction rather than the formation of ozone pollution.



Predicted Air Quality

- Plume dispersion model calculation demonstrate that:
 - Impacts of Project emissions on ground-level air quality will be of a minor nature
 - Ground-level concentrations of PM_{2.5}, SO₂, NO₂, CO, and H₂S resulting from a combination of Project and regional emissions from existing, approved and planned industries will remain within regulatory limits.



Potential Acid Input (PAI)

- Estimates of PAI indicate that soils and water bodies within the area of the proposed Project are adequately protected against adverse effects associated with acid deposition
- Project emissions of SO₂ and NO₂ are predicted to have a only a minor impact on acid deposition
- The impact is predicted to be greatest adjacent to the Project boundary



Sulphur Deposition

- Project operations will result in local deposition of elemental sulphur
- Maximum estimated sulphur deposition beyond the Project boundary is about $1 \text{ kg ha}^{-1}\text{y}^{-1}$
- There are no regulations relating to acceptable levels of sulphur deposition.



Upset Conditions

- Small sulphur fires may occasionally occur within the sulphur pastille storage area
- Any fire should be small, slow in progressing and short-lived
- Maximum ground-level sulphur dioxide concentrations resulting from the fires beyond Project boundaries should remain within acceptable limits



Conclusions

- Observational evidence and plume dispersion calculations demonstrate that regional air quality will remain well within acceptable limits following Project initiation
- Ozone will not be created as a result of Project emissions



Conclusions (Cont'd)

- Soil and water bodies within the region of the Project will remain adequately protected against adverse effects of acidic deposition attributable to industrial air emissions.
- Air quality impacts associated with small sulphur fires associated with upset conditions will not have any adverse environmental effects
- Maximum deposition of elemental sulphur beyond the Project boundary will be about 1 kg ha⁻¹y⁻¹.