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20 March 2023

Mr Khemraj Parsram
Executive Director
Environmental Protection Agency
Ganges St., Sophia, Georgetown, Guyana

Dear Mr Parsram,

Review of exemption from the requirement to conduct an EIA for construction and operation of 300 MW natural-gas-fired power plant

I, Peter Vine, am a physicist, BSc (Lond.)(Chemistry & Physics), MAgrSc (Reading)(Soil Science), PhD (UWI)(Agriculture), with specialization in Soil Physics. I write to present evidence of the need to cancel the Exemption captioned above. In so doing, I concentrate particularly on airborne emissions and Air Dispersion Modelling.

1. Exxon Mobil obtained an EIA of the pipeline-plus-NGL-plant. The consulting firm that produced the EIA came up with many 'Minor' impacts and one or two 'Major' impacts. But there was not a complete tally of impacts because full attention was not paid to the power plant.

2. An EIA for the proposed gas pipeline and Natural Gas Liquids (NGL) plant serves little purpose without including the power plant. The reasons for an assessment of the pipeline and the NGL plant are equally applicable to the power plant. The classification of the power plant as a Third Party project is scientifically invalid.

3. The current EIA may be amended and extended to be an integral pipeline-plus-NGL-plus-power-plant EIA.

4. Regardless of the inclusion or exclusion of the power plant from the EIA, one very serious caution is mentioned in the existing EIA – the unlikely but possible Unplanned Loss of Integrity of the onshore pipeline. For this reason it appears

necessary that the pipeline route be adjusted where it comes near to residences. There are examples such as from Venezuela of natural gas pipeline rupture and fire next to populated zones, and of anxiety in south Trinidad caused by proximity of habitations to a major natural gas pipeline. I also cite:

Explosion and fire reported at Venezuela's natural gas pipeline (hydrocarbons-technology.com) [2021]

'Ocean on Fire' – Gas Leak From Underwater Pipeline Sparks Blaze West of Mexico's Yucatan Pensinsula (VIDEO) By Cristina Laila Jul. 2, 2021 7:27 pm

5. With regard to air dispersion of emissions, model-predicted wind roses in the current EIA (Vol 2) do not agree satisfactorily with the wind roses made from actual observations. (Wind roses show the proportions of wind that occur in different classes of speed and direction). There is evidence that the 'reasonable agreement' claimed in the EIA is not adequate for meaningful use of models for predicting dispersion of emissions.

6. For example, emissions do not disperse well in periods of calm but such periods were grossly under-predicted by the models. Please see the wind roses in the EIA Vol 2: for Carifesta, the relevant values are barely legible but calm periods appear to be <1% by model, >2% by observation (Figure 2-7); for New Amsterdam the values are 0.13% by model, 1.59% by observation (Figure 2-8).

7. This poor agreement tallies with the poor agreement between models and actual observations that is shown in 'A critique of industrial air dispersion modelling in Trinidad and Tobago' (http://hdl.handle.net/2139/4226).

   There is an anomaly in the Cheddi Jagan Airport wind roses due to the method of tabulation of wind speeds there – an anomaly discussed in the EIA – which hides this problem as far as Cheddi Jagan Airport wind roses are concerned.

8. Another presentation of wind speeds in the current EIA – Figure 2-10: Time Series of Wind Speeds at New Amsterdam and Cheddi Jagan Airport Monitoring Sites – indicates that whereas wind speeds at New Amsterdam, for example, were recorded at their actual values, wind speeds at Cheddi Jagan were recorded to the nearest whole number in m/s such as 0 m/s, 1 m/s, 2 m/s, etcetera. Figure 2-10 then shows that for Cheddi Jagan Airport, there were many-fold more cases of actual speed <0.5 m/s (plotted as 0 m/s) than of modelled speeds plotted in the same range <0.5 m/s. This indicates that at Cheddi Jagan Airport, like at Carifesta and New Amsterdam, modelled amounts of calms were significantly less than actual amounts.

9. Figure 2-11 shows that wind direction at New Amsterdam, and moreso at Cheddi Jagan Airport, changes often to all points of the compass, both in modelled data and in actual data. Thus there is a significant probability of pollution in any direction, but the current EIA has a serious omission in that it does not give maps of geographical distribution of predicted pollution. Thus the location of relatively high pollution is not revealed.

10. When maps of modelled geographical distribution of pollution are published, they frequently expose further significant limitations of the air dispersion modelling used (see the Trinidad and Tobago article cited above) and so omission of such maps in the current EIA invites lack of trust.

11. A difference between the current EIA's presentation of air dispersion and the presentation in other reports in the literature -- such as EIAs critiqued in Trinidad -- is that this EIA does not appear to show maps of iso-concentration. Thus it is not possible for the reader to see whether predicted concentrations did, or did not, have a credible distribution around the emission source. Some reports using models similar to those used in the current EIA show distributions that are not rational, such as maximum concentrations arranged like bicycle spokes around the origin (see the Trinidad article cited above). It appears that iso-concentration maps are needed if the dispersion modelling results are to be credible.

12. Reading of the EIA (Vol 2) indicates that the consultants estimated, using (in the onshore case) the AERMOD dispersion model, maximum 15-minute, 1-hr, 8-hr, and 24-hr concentrations of NO2, SO2, PM10, PM2.5, and CO based on quantities of emissions and using wind roses predicted by the weather model called WRD. The estimation was reported as being done both with and without inclusion of power plant emissions. The concentrations were apparently calculated for all points on a grid of 'receptors' and presumably the highest 15-minute concentration amongst all the points was reported as the maximum 15-minute concentration, and similarly for the maximum 1-hr concentration, etc. The whereabouts of each such hardest-hit point does not seem to be reported, which is important.

13. There seems to be an unstated assumption in the text on page 40 of the EIA Vol 2 that maximum air pollution considered from onshore pipeline + NGL + Power Plant (PP) will be at the fenceline of NGL-PP. But pollution caused elsewhere by offshore operations is sometimes also high. Pollution from offshore operations is even sometimes high at NGL, far from the offshore source (page 42). Then the maximum combination of offshore + onshore pollution would not be at the NGL

fenceline and we need to know where it is. For this, again, maps of pollution distribution are called for.

14. The assumption that maximum cumulative pollution (offshore sources + onshore sources including PP) will be at the NGL-PP fenceline is the basis for the consequently unjustifiable Table 4-5 in which maximum predicted concentration from NGL-plus- Power Plant is added to maximum predicted concentration from Offshore to give 'total maximum predicted concentration'.

15. In the current EIA the impact of CO2 emissions on global heating was downplayed along with consideration of what Exxon Mobil should be encouraged to do to diminish global heating by adjusting its Earth-wide plans.

16. For sincerity in fighting global heating it is suggested that Exxon Mobil undertake to place a second pipe in the trenches to carry emitted CO2 from the power plant for injection in the marine gas field.

17. A return pipeline in the same trench should be seriously considered by the EIA authors for injection of the CO2 back into the gasfield offshore.

18. Consideration should be given to useful processes reported elsewhere, e.g. companies re-injecting CO2:

    https://www.aljazeera.com/news/2023/3/8/carbon-capture-projects-tackling-climate-change

19. Potential impacts apparently not considered in the current EIA, which necessitate further EIA, include:

    a. The impact of uncertain differences between modelled and real pollutant concentrations.
    b. The unreported different impacts of pollutants at different distances and directions from source.
    c. Impacts from transformers and transmission lines at the Power Plant including upsets and the presence of >500,000 litres of transformer oil.
    d. Impacts from the large system of storage batteries at the Power Plant.
    e. Power Plant upsets.
    f. Upsets at the large propane, butane, and pentane storage tanks at the NGL.
    g. Impacts of variably toxic PAHs/VOCs (polyaromatic hydrocarbons/ volatile organic compounds) for which copious data were collected to measure background levels. On page 29 of the Air chapter it is stated that dispersion modelling of non-methane VOCs was not done despite the 52.3 t/yr emission,

giving as reason the absence of ambient air quality criteria for these chemicals.

h. Unconsidered also was the socio-economic impact of monetizing or discounting Power-Plant CO2 emissions in terms of carbon credits (market credit in $ per ton of CO2 buried).

The scientific evidence calls for review and cancellation of the exemption from the requirement to conduct an EIA for construction and operation of the 300 MW natural-gas-fired power plant. It is argued that the current EIA is not adequate.

Thank you for your kind attention.

Yours sincerely,

(Signed)

P.N.Vine