Stantec Consulting Ltd.
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February 3, 2020
File: 133348634

**Attention: Mr. Corrie Davis**
Director of Planning and Development
Town of Conception Bay South
11 Remembrance Square,
CBS, NL
A1W 3J1

Dear Mr. Davis,

**Reference: Proposed Drilling Mud Processing & Storage Facility**

On October 21st, 2019 a request for proposal was received by Stantec from the Town of Conception Bay South (CBS) to review background information and concerns on a proposed drill mud processing plant to be developed by Envirosoil (the proponent) on Hops Street in Conception Bay South. The scope of work requested was a professional engineering review of resident questions raised at a public information session held on October 16th, 2019. Stantec was subsequently issued approval to proceed with the work on October 31, 2019 and issued an initial response to the town on November 29, 2019. Stantec has subsequently meet with representatives from Envirosoil to gather additional information about their proposed operation. Please see our updated commentary on the proposed development below.

1. Are there issues with hydrocarbon products and these types of processes in relation to proximity to nearby residential, commercial and light industrial uses?

The handling and processing of hydrocarbon products as outlined by Envirosoil may have three main concerns to surrounding areas. The first is the release of hydrocarbon vapour to the atmosphere. The vents on storage tanks, and non-condensable air discharge described in the presentation will have a minor amount of hydrocarbon product and volatile organic compounds (VOC's) such as benzene or toluene found in common diesel or kerosene (used as a base product for some types of drilling mud). The issue is how much of these compounds will be released, and how will they disperse from the site to the atmosphere. The company can determine what effect this will have by commissioning what is called a fugitive emission air dispersion study. This would model the release of exhaust and contaminants and advise what concentrations are likely to reach surrounding occupancies. This would give an idea of what odor for example may be detectable in the vicinity of the site. The largest emitter on the site will be a 900 KW diesel fired thermo-fluid boiler, which is no larger than those found in many office buildings and not even large enough to be a registered heating boiler by NL regulation 119/96. The overall potential for significant emissions appears to be low.

The second concern is the storage and handling of combustible products in a process facility. The risk of a fire or explosion at the site should be reviewed to ensure there are no adverse effects to nearby residents. In most oil and gas process facilities, a blast screening study is completed to determine the maximum likely release event and subsequent pressure wave from an explosion. This study would show if there are any likely severe effects (fatalities outside the property boundary for example) to nearby residents in a worst-

case event. The output of these studies is used to determine emergency response plans, and what mitigation measures such as offset from property lines is required to ensure public safety. It should be noted that there are sites with much larger flammable and combustible fuel storage volumes in the town, such as retail gas stations, these facilities can be managed safely with proper design to modern codes and adequate operating practices. The risk and likely hood of any kind of explosion on site is likely very low given the type and quantity of hydrocarbons stored onsite.

The third concern with hydrocarbon products is the release of liquid product from the site. In process upset events, operating errors, equipment failure, or even severe weather, it is possible to have a spill from the site to the environment. The planned use of proper tanks and secondary containment liners mentioned is consistent with government regulation and helps to limit risk. Unloading and loading operations for trucks at the site are planned to take place in dedicated product transfer areas connected to oil water separators for added safety. The company will also have an emergency response plan in place to address a spill event should it occur. If there were any sensitive environmental areas downstream of the site, or at-risk water sheds, this would be worth further investigation as part of the environmental assessment process. However, the risk of a significant spill from the site appears to be low.

2. How likely is it that this process would produce no waste as suggested by the applicant?

It is unlikely that there would be 0% waste generated by the site based on normal process facility operations, start-ups, upsets, and potential equipment failure. Maintenance, upgrades, and ongoing operations will generate some amount of waste. It is likely that the amount of waste from this process would be very low based on the data provided by the proponent. The main waste product from the process is shown as water that is planned to be discharge into storm sewer.

The company plans to install a full testing laboratory at the site to address this concern. Batch water release will be tested to exceed provincial standards prior to any release from the site. Samples will be saved and available for regular government audits as required by the department of environment.

3. What are the spill probabilities associated with transfer of untreated drill mud from trucks to the on-site storage and processing systems?

The loading/offloading strategy for the site involves sealed tanker trucks delivering the product in contained areas to sealed piping headers. Leaks from a transfer would be collected in the transfer area or the attached oil water separator. The process and storage areas are also slated to have secondary containment and oil/water interceptors for run-off. This is a common industrial solution that provides excellent protection to the surrounding environment.

4. How would weather patterns (wind/rain) in the area impact an operation of this nature?

Generally, a process facility would not be significantly impacted by weather patterns such as wind and rain. The structures would all need to be designed and built to withstand extreme weather events to meet building code requirements. The operations at site may be suspended in poor weather, the proponent also mentioned reduced operations are expected in the winter months, but these impacts would likely not be significant.

The impact of extreme weather would be most noticeable in the runoff water from the site. In deluge events there is the possibility of site contaminants being released to the environment when oil interceptors are

overwhelmed for example. This can be managed by sizing containment systems appropriately for extreme events.

5. Is it possible that any material could be washed or blown off the trucks coming to/from the facility site?

It is unlikely that sealed tanker trucks would release hydrocarbon material due to wind or rain during normal operations. There is always a risk with trucking of an accident that could cause an overturn or release of material, this is no different from regular trucking of diesel of gasoline fuels though. Except that the mud has significantly less volatility and danger compared to gasoline transportation.

The stockpile of raw material at the site is for rock aggregate only and does not represent a significant risk of release.

6. The bulk storage tanks are to be built to a XXXX Standard (I am waiting on confirmation of the design standard for the tanks); is this an appropriate standard to the type of material that would be stored at the facility?

The proponent indicated that the storage tanks for the site would be ULC certified for hydrocarbon storage. The NL provincial gasoline and associated product regulations (NLR 58/03) mandate that hydrocarbons shall be stored in tanks meeting the ULC-S601 standard - Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids or the API 650 standard - Welded Tanks for Oil Storage. These are both acceptable standards for carbon steel material tanks that are widely used for the storage of hydrocarbons in sites around the province. The proponent would need to confirm the products stored and what type of tank would be used for that specific product. One item to note is that ULC tanks are restricted to a specific gravity of 1.0 or less, some drilling mud products have a high specific gravity and may need to be stored in the API type tanks.

7. Does any of the drill mud or by-products from the processing include hydrogen sulfide?

The proponent has indicated that the site will not be receiving any Hydrogen Sulfide (H2S) materials for processing. The raw product shipped to site is required to be screened prior to transport for H2S, the operators will also have testing equipment on site to ensure no H2S is present. Should H2S be discovered on the site, the operators will have training and a set emergency procedure in place to remove the material safely.

8. Is there testing of the drill muds for presence of hydrogen sulfide before it arrives at the treatment facility?

The proponent has indicated that the raw feed stock will be screened for H2S prior to delivery to site. No H2S material is intended to be processed by this facility.

9. Does the system or process include or need hydrogen sulfide scavengers or scrubbers?

No, the proponent has indicated that the process facility will not receive any H2S containing materials for processing. The facility will have monitoring / testing equipment to ensure there is no H2S onsite.

10. What is the noise output of the mechanical components of the system?

The proponent would need to provide specific equipment types and models to determine the noise pollution from the site. It is common for vacuum pumps for example to generate significant sound levels that require hearing protection in close vicinity. It is possible to house equipment in sound attenuating enclosures to substantially reduce the noise. The proponent has indicated that a noise study has been conducted for the proposed development and that noise levels can be made available. It is recommended that the town review these sound levels compared to civic regulations.

Another important concern is the light pollution from a 24-hour operated site in proximity to a residential area. Where the proposed development is high in elevation compared to surrounding areas, it would be important to know the light intensity that would spill beyond the facilities land boundary. The proponent has indicated that a lighting study has been completed for the development. It is recommended that the town review the light levels in surrounding occupancies compared to civic regulations.

11. Is the proposed containment system containment system adequate and reflective of industry best practices? (Primary – Tanks; Secondary, non-permeable lined & dyked 110% tank volume area'; and Tertiary – +/-1m high gravel clay site perimeter).

The proposed use of ULC/API certified storage tanks, secondary containment liners, and drainage interceptors is a generally accepted best practice for the storage of hydrocarbon material. With proper operation and maintenance, this can be a robust solution to limit the risk of environmental release. This also meets the requirements of provincial regulations for hydrocarbon storage.

12. Would loss of vacuum in the system result in catastrophic failure?

It is highly unlikely that loss of vacuum would result in a failure at the facility. The design of the vessels, piping, and tanks needs to meet national code requirement that require equipment to be able to handle process upsets. Safety relief valves are required equipment that would lift in pressure upsets beyond allowable limits to maintain safety. Loss of vacuum may create off-spec materials and could potentially cause a release of excess vapour to the atmosphere, but the risks are low. The proponent has indicated that the system is designed to release a nitrogen purge to the system upon loss of vacuum to inert the vessels and provide for safe emergency shutdown.

13. How effective is a nitrogen dump into the processing system at mitigating hazards if vacuum is lost in the processing system?

We would need specific process data from the proponent to determine the effect of a nitrogen purge on this operation. However, the use of nitrogen to inert atmospheres in reactor vessels is a common practice in process engineering that is quite effective. The nitrogen displaces any air and stops the oxidation reaction from increasing and generating a heat / fire risk.

14. Does this seem to be a more effective and safe method to treat drill muds from the NL offshore?

The process outlined by the proponent does appear to offer a net environmental advantage to traditional drilling mud disposal. To determine the actual net carbon/waste offset we would need detailed process information from the proponent that is likely proprietary. The safety of the process will depend on specifics of how the process is setup, operated, and maintained. Based on the proposed testing program for this operation, and the intended design of the site, this appears to be an effective and safe means of processing

drilling mud. The successful operation of their pilot plant in NS is an excellent indictor of success for this development.

15. How would a power interruption affect the processes inside the system?

Process systems are generally designed to safely handle power interruptions with design elements such as fail-safe valves, uninterrupted power supplies, relief valves, and safety interlocks. The loss of power would likely cause the product in process to go off spec and require reprocessing or disposal, but it is unlikely that loss of power would have any catastrophic affect.

16. Would this system produce any odors or fumes?

As mentioned above, it is difficult to determine the exact amount of fumes or odor that would be around the site without the completion of an air dispersion study. Hydrocarbons contain organic compounds for example that can produce odors in the parts per billion concentration as noted above. However, given the size of process equipment, type and volume of hydrocarbon stored, it is quite possible that this site could have no detectable odor beyond its land boundary. Given the proximity to residential areas, the dispersion study would be the best method to quantify potential issues. This could easily be included as part of an environmental assessment.

We hope the material provided above is to your satisfaction, should you have any questions or comments please contact the undersigned.

Regards,

**Stantec Consulting Ltd.**