EXHIBIT A

Baird, Mandalas, Brockstedt
1413 Savannah Road, Suite 1
Lewes, Delaware
19958

December 23, 2021

Attn: Mr. Chase Brockstedt

Re: Comments on New-Indy's Air Dispersion Model Report as Pertains to Emissions from the WWTP

Dear Mr. Brockstedt,

This letter is my letter report commenting on New-Indy's Air Dispersion Model Report pertaining to sulfide emissions from the New-Indy Catawba wastewater treatment plant (WWTP). This report is my evaluation as an expert in wastewater treatment and residuals (sludge) handling of the wastewater treatment history, operations, and practices at the New-Indy plant and its impact on the local environment. I have formed my opinions, analyses, and conclusions with a reasonable degree of engineering probability after reviewing the references listed in the attachment. My opinions and conclusions are also based on my education, experience, and training in the environmental, engineering, and science of the treatment of pulp and paper mill wastewater, discharge of treated effluent, disposal of residual sludges and floatables, off-gas releases, and my knowledge of related regulations, standards of practice, and public health requirements.

All opinions expressed herein are based on the information received and documents currently available, with the right to supplement and/or modify the opinions as more information is discovered or becomes available.

<u>Background</u>

New-Indy Catawba (NI) completed an air dispersion modeling analysis (the 'dispersion model') in response to paragraph 5 of the Order to Correct Undesirable Level of Air Contaminants issued by the South Carolina Department of Health and Environmental Control (DHEC) on May 7, 2021. The report was submitted to DHEC in October 2021. New-Indy was required to consider all potential sources of sulfide emissions throughout the mill and the wastewater treatment plant (WWTP). The comments in this report focus on the WWTP since it is the most likely source of the malodorous and potentially toxic sulfide emissions reported by local residents throughout 2021.

The New-Indy Catawba pulp and paper mill operation is of a common type known as a "Kraft Mill". The Kraft process uses strong sulfur-containing chemicals and caustic lime to dissolve wood chips as required to make paper products such as linerboard. This generates a very concentrated wastewater full of extremely odorous reduced sulfide compounds, which is referred to as Total Reduced Sulfur (TRS) and includes hydrogen sulfide (H2S), methyl mercaptan and other reduced sulfur compounds. Kraft mills must remove these potentially toxic TRS compounds so as not to poison local inhabitants and the environment. Most Kraft mills remove the TRS from the wastewater stream and concentrate them in a Foul Condensate Steam Stripper, or "Steam Stripper," to then be destroyed inside the mill. Although it is not the industry standard, some mills attempt to cut costs by discharging the wastewater without removing the TRS in hopes that the aerobic wastewater treatment process will adequately oxidize and destroy the TRS compounds outside of the mill.

New-Indy has concluded in its October 2021 Air Dispersion Model Analysis that its the WWTP emits negligible levels of H2S and TRS. It is the conclusion of my review that the New-Indy dispersion model report is meaningless since the NI WWTP utterly fails to meet the assumptions and requirements built into the model by its creators. Further, some of the assumptions applied and some of the critical input data to the model are severely flawed and/or understated. Even if the model was valid for the NI WWTP, an air dispersion model, which uses dozens of theoretical inputs, guesstimates, and approximations, is pointless if there is the option for directly measuring the TRS, H2S and methyl mercaptan emissions from the wastewater units – and at NI WWTP that option is not only feasible but vastly more accurate.

Discussion

At NI Catawba, the critical task of removing pollutants, including H2S, TRS and methyl mercaptan from the wastewater falls to the critical aerobic process in the WWTP which is called the Aerated Stabilization Basin (ASB), (see Figure 1 in the appendix). New-Indy initially decided to shut down the operating Steam Stripper and send all Foul Condensate containing some 40,000 pounds per day of TRS through a "hard pipe" to the ASB. Subsequent severe reactions from downwind local residents reacting to fugitive TRS emissions caused DHEC to order NI to put the Steam Stripper back into operation. NI refurbished the steam stripper unit, and it now treats up to 70% of the Foul Condensate, while still sending about 300,000 gallons of Foul Condensate with 12,000 pounds of TRS per day outside the mill to the entrance of the ASB. Unfortunately, the startup of the reconfigured Kraft process on February 1, 2021, went very poorly and a series of related decisions and incidents, described in my September 26 letter, caused the total failure of the ASB and almost every process in the WWTP. Although New-Indy has attempted to improve its WWTP operation in recent months, the residual effects of New-Indy's badly flawed start-up continue to plague operation of the WWTP.

One result of the seriously flawed and prolonged startup was the discharge of millions of cubic feet of biological sludge, mineral waste, fibrous waste, and other solids to the ASB. Much of the ASB was literally filled with sludge and became inoperable. A New-Indy engineering document lists the original surface area of the ASB as 64 acres; in the calculations supplementing the NI emissions model report the free-water surface area of the ASB was measured at 46 acres – thus when the data was collected for the dispersion model in July 2021, there were 18 acres, 28% of the ASB, filled with sludge all the way to the surface of the basin that was originally 18-feet deep. Even the areas that show free-water during the test are only 4.5 ft deep in the north end of the ASB, 3-feet-deep in most places, and just inches in others.

NI recently addressed the issue of excessive sludge accumulation in the ASB, stating in their 10/27/2021 response to a DHEC question about the huge area of the ASB ignored by NI in its air dispersion model:

> *"The area of the ASB used for the emissions calculations and the air dispersion modeling encompasses the free liquid surface area of the ASB based on drone images captured on July 8, 2021, one day prior to the ASB testing conducted July 9–11, 2021. The western side of the upper section (ASB Zone 1) was filled in with material, so it was excluded from both the emissions calculations and the air dispersion modeling. Attachment 1 of this response shows the free water surface of the ASB on July 8, 2021."*

The aerial view of the ASB referred to as "Attachment 1" is attached in the appendix to this letter as Figure 2. (Note 'north' is at the top of the photograph.) Please note NI's choice of words when referring to the vast sludge-filled area of the ASB: "The western side…was filled in with *material, so it was excluded"* from the dispersion model calculations (emphasis added). This is a significantly flawed statement and a flawed decision. This mountain of sludge in the ASB is not an inert mass of dry "material" – it contains a large percentage of biologically degradable organic matter that has time, liquid, nutrients, and warm temperature – the ideal ingredients for anaerobic decomposition to occur. These are the same conditions and the same process that occurs in every septic tank, and it generates the same malodorous and potentially toxic TRS off gases. It is simply invalid to assume that TRS compounds are not released from these 18 acres of mounded, anaerobic wet sludge. These are all zones of anaerobic activity – producing and releasing bubbles with TRS compounds. New-Indy's air dispersion model fails, among other reasons discussed below, because it does not account for this major source of fugitive TRS emissions.

New-Indy's theoretical wastewater emission model for the ASB was originally developed and tested by the National Council for Air and Stream Improvement – NCASI. The NCASI Technical Bulletin 956 ("EMISSIONS OF REDUCED SULFUR COMPOUNDS AND METHANE FROM KRAFT MILL WASTEWATER TREATMENT PLANTS ") describes the wastewater model ("H2SSIM") and the myriad coefficients, assumptions, and estimated values necessary to run the model to estimate the TRS emissions from a Kraft Mill WWTP. (New-Indy's report shows they had to use the EPA Water9 emissions model to calculate some of the variables for the NCASI H2SSIM in order to work the model.) The NCASI bulletin describes the onsite testing used to check the accuracy of the model against actual measured releases of TRS at other operating Kraft mill WWTP's. The Bulletin clearly states the limitations of the wastewater model, and it becomes clear that the NI WWTP simply does not meet these requirements:

1. *"The NCASI model is based on actually measured emissions from well-aerated basins operated using state of the art management."*

    - As we have seen, this is not a case of "*emissions from well-aerated basins*" - the New-Indy ASB was so poorly aerated that 18 acres of sludge accumulated and idled 28% of an ASB that was already failing to meet performance requirements. For perspective, that amounts to about 3.5 million cubic feet of sludge just in the dead zone that was apparently 4.5 ft deep before being inundated. The multiple islands of sludge scattered throughout the ASB show that there are many areas in the ASB that were and remain poorly aerated, particularly at depths where anaerobically decomposing sludge remains.

    - The NI dispersion model concludes that the ASB could not have generated excessive TRS because a measurable residual Dissolved Oxygen concentration was measured in the free-liquid areas on the few days of data collection. (Anaerobic decomposition required to generate TRS does not typically occur in the presence of dissolved oxygen.) But this is a specious claim because bubbles composed of gas laden with TRS, methane, and CO_2 form continuously in the millions of cubic feet of the active sludge layer – *throughout* the entire 64-acre basin not just in the 18-acre island at the inlet - and these bubbles constantly rise to the surface. In the 3 ft of liquid in most of the ASB - a rising bubble takes less than 6 seconds to break the surface and release to the atmosphere. In that time less than 12% of the TRS in the bubble would be destroyed.

    - Further, it is not just anaerobic decomposition in the sludge layer that generates TRS, there is some 400 mg/l of sulfate (SO_4) in the wastewater. Under the right conditions (no oxygen, appropriate pH, etc.) some sulfate will be reduced to form hydrogen sulfide gas, which can then release to atmosphere. As shown in Table 1, the chemical characteristics of the wastewater in the NI WWTP have varied over a wide range and many days presented conditions ripe for sulfate to be converted to hydrogen sulfide at various locations in the system.

        - NI also claims that only a negligible amount of any hydrogen sulfide gas formed in the ASB would be released from the ASB because the acidity was at pH levels near 9.1-9.2. While this is true for hydrogen sulfide while still present in the liquid, in the ASB. However, as Table 1 shows, the pH levels in the ASB were much lower than 9.2 (as low as 7.05) just two weeks prior to the samples collected for this dispersion model, and the calculated H2S release to atmosphere would have been many times greater than what the New-Indy model indicates. Also, as noted above, the TRS compounds are not formed in the free liquid when there is oxygen present, but rather from anaerobic decomposition of organics or sulfates – down in the sludge layers where oxygen is absent, and the pH is lower.

Further, a NI consultant took weekly measurements of various pertinent operating parameters in the WWTP. Several of these data summaries were included in the Appendix of the Corrective Action Plan, Revision 2. Some of that data is summarized in Table 1.

- It is self-evident that a WWTP that suffered multiple failures at every unit process and went for months operating in a complete failure mode while generating thousands of citizen complaints, and still hundreds of complaints every month as of late 2021, could not possibly be "*operated using state of the art management"* as the NCASI model requires.

2. The NCASI technical bulletin goes on to state: "*Aerated stabilization basins where foul condensates were directly introduced via a submerged enclosed pipe were found to be the most significant source of emissions of the three organic reduced sulfur compounds. Emission rates for the same unit often varied considerably over time, and similar units at different plants generally did not have equivalent emission rates*."
    - Clearly, this applies directly to the NI ASB:
        - New-Indy direct pipes approximately 300,000 gallons per day of foul condensate every day containing some 12,000 pounds of TRS compounds through a "*submerged enclosed pipe*" which discharges below the water surface at the inlet to the ASB. That will increase to about 21,000 pounds per day at full mill output.
        - It is known from various air sampling efforts that New-Indy is the source of "*emissions of the three organic reduced sulfur compounds".*
        - It is known from the variability in the number of odor complaints filed with DHEC that the rate of TRS emissions "*varied considerably over time".*
        - The NCASI H2SSIM model itself makes it clear that it is not a valid application for the New-Indy WWTP ASB.
3. The NCASI technical bulletin also states: "*biological activity in the sediment results in release of gases such as methane, carbon dioxide and hydrogen sulfide. These gases form bubbles which rise through the water column and are released to the atmosphere, thus contributing to reduced sulfur compound emissions from the treatment system. This mechanism is particularly important when high levels of anaerobic activity are present."* This was discussed above, and this quote from NCASI applies directly to the NI ASB, and yet the NI dispersion model ignores it.
4. Finally, the NCASI technical bulletin states: "*The largest sources* (of TRS emissions) *were multi-acre anaerobic pre-aeration basins such as primary settling ponds".* The 18 acres of settled sludge at the inlet end of the ASB is similar to a primary settling pond – it is clearly invalid to ignore the TRS emissions from that massive area.

Conclusions

New-Indy has employed two different wastewater models to estimate fugitive H2S emissions from its WWTP for use in its Air Dispersion Model Analysis: 1) the NCASI H2SSIM theoretical wastewater model for hydrogen sulfide releases from pulp and paper mills like that at New-Indy Catawba, and 2) EPA's Water9 model for more general application. These are credible models *if* the specific assumptions that ground each model are satisfied by the conditions at the New-Indy WWTP. Based on my review outlined above, this is not the case, and the models underestimate the emissions of H2S and other TRS compounds by a substantial amount. There are two primary reasons to not rely on these model results:

1. The NCASI H2SSIM model requirements are repeatedly violated by the conditions at the New-Indy WWTP, as noted above. The model is therefore not applicable.
2. Eighteen acres of anaerobic sludge settling zone at the influent end of the ASB was not accounted for in the input to NI's Air Dispersion Model Analysis. The model's developers, NCASI, state clearly that the model is inaccurate in this situation.
3. The NCASI Technical bulleting (#956) that describes the H2SSIM model includes a detailed description of different techniques to directly measure TRS emissions rather than to rely on a model calculation based on dozens of assumptions and measurements and estimates and inputs from yet another model.

Please let me know if you have any questions concerning the above.

Kenneth L. Norcross

President, Wastewater Experts

Attachment

Table 1. Sulfide, pH, and H2S values	**5/11/21** measured	**5/25/21** measured	**6/9/21** measured	**Dispersion Model Value**
Sulfide – Clarifier Effluent	n/a	0.35	0.3	<0.02 mg/l
Sulfide – ASB Zone 2	n/a	0.14	0.11	<0.02 mg/l
Sulfide – ASB Effluent	n/a	0.13	0.1	<0.02 mg/l
pH – ASB Zone 2	8.11	7.05	8.62	9.2
% of Free H2S	7.5%	47%	2%	negligible
pH – ASB Effluent	7.66	7.28	8.17	9.2
% of Free H2S	15%	32%	5%	negligible

Figure 1. General Layout of the New-Indy WWTP.

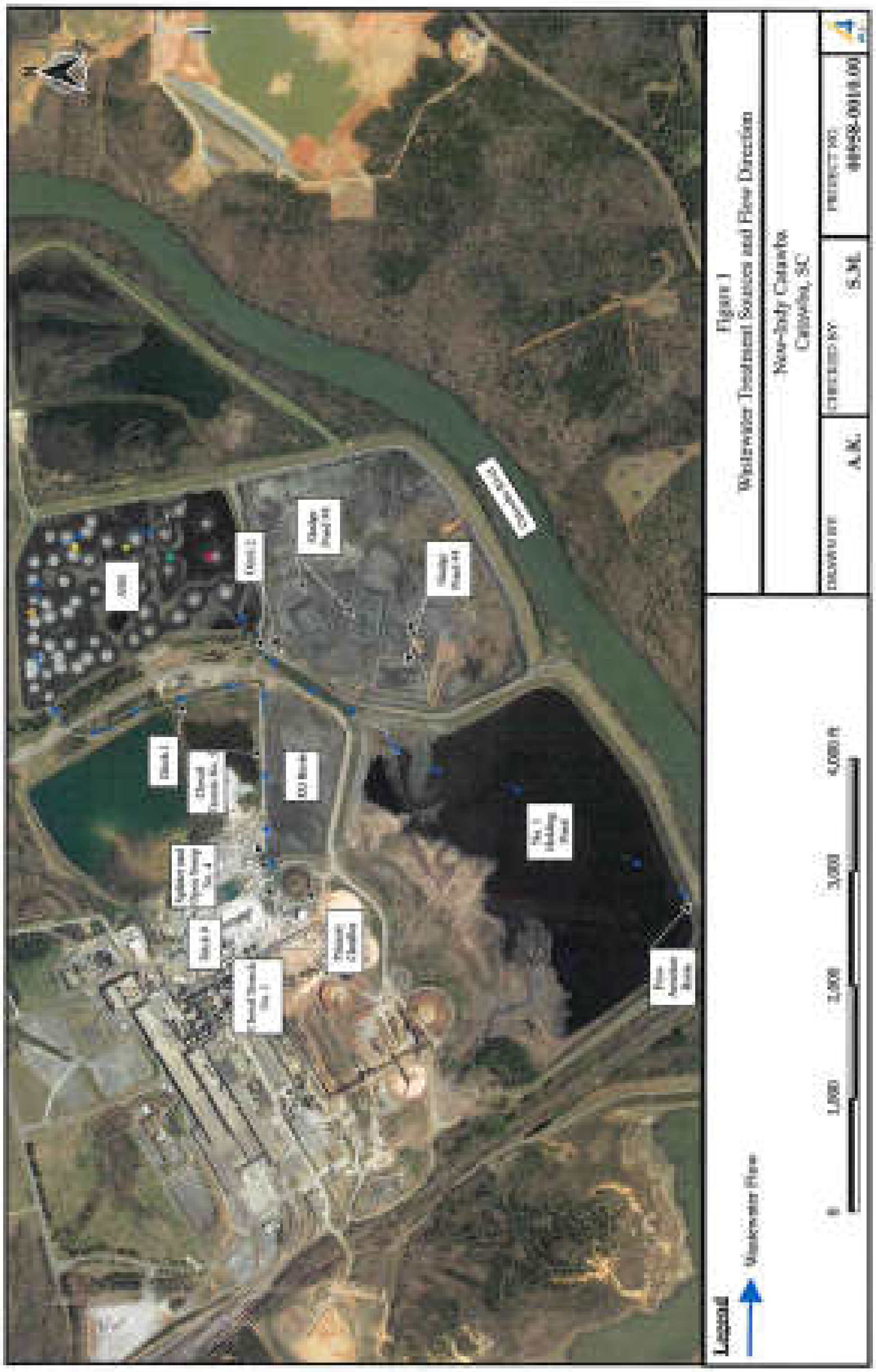

Figure 2. Note the Large (18-acre) dead zone where Ditch 1 empties influent and foul condensate into the ASB.

Figure 3. Showing the Many Sludge Islands in the ASB

Legend

- Zone 1 Free Water
- Zone 2 Free Water
- Zone 3 Free Water
- Non-operational during IPT
- Aerators Running at Night (5:30 pm - 7:00 am)
- Operational but not included in the model

0 75 150 225 300 m

New-Indy Catawba
Catawba, SC

Attachment 1
Aerator Status during 7/9-11/2021 IPT

Figure 4.

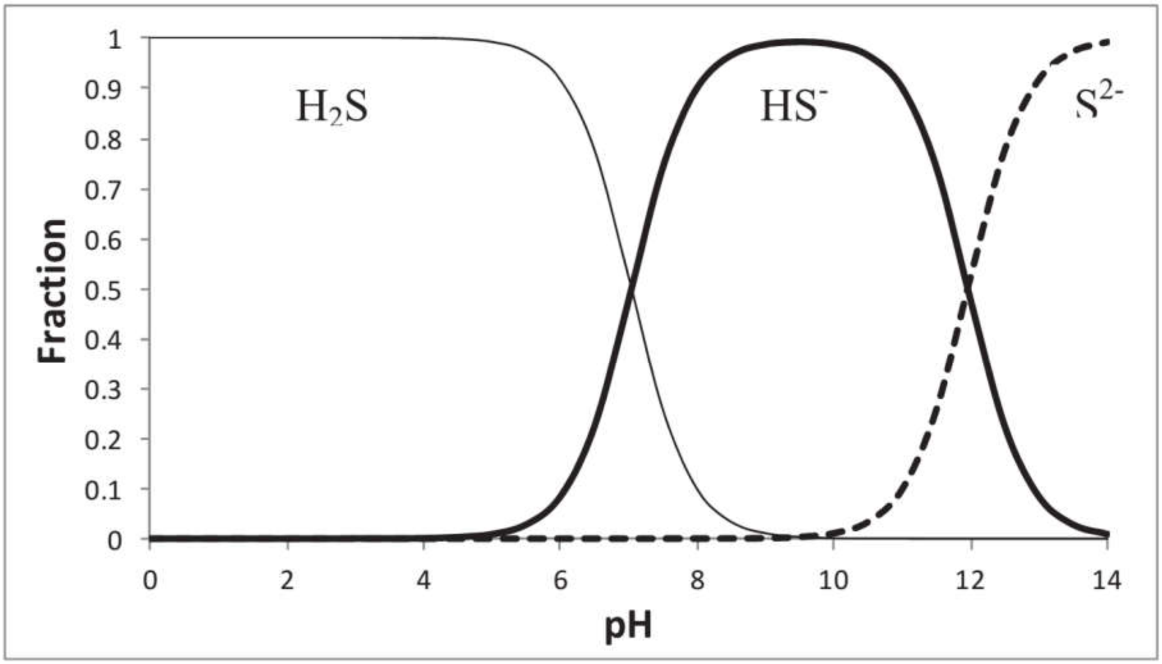

Figure 3.2 Fraction of Sulfide Species as a Function of Wastewater pH