BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	R23-18(A)
AMENDMENTS TO 35 ILL. ADM. CODE	)	(Rulemaking—Air)
PARTS 201, 202, AND 212	)	

NOTICE

TO: See attached Service List

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Illinois Pollution Control Board the ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S TESTIMONY OF RORY DAVIS, a copy of which is herewith served upon you.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: /s/ Dana Vetterhoffer
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DATED: April 2, 2024

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S
TESTIMONY OF RORY DAVIS

My name is Rory Davis. I am the manager of the Regulatory Development Unit in the Air Quality Planning Section of the Illinois Environmental Protection Agency's ("Illinois EPA" or "Agency") Bureau of Air. I have been employed by the Agency in the Air Quality Planning Section for 16 years and was an Environmental Protection Engineer in the Section prior to taking my current position as manager. I have a Bachelor of Science degree in Computational Physics as well as a Bachelor of Science degree in Mathematics from Illinois State University. I have a Master's degree in Engineering from the University of Illinois at Chicago. My graduate studies consisted of an interdisciplinary program involving coursework from the Chemical Engineering and Mechanical Engineering fields with a concentration on Environmental Engineering. I am also a Licensed Professional Engineer in the State of Illinois. In my current position with the Agency, my duties include coordinating Illinois' air quality planning activities in the State and region, managing regulatory proposals, and maintaining the Bureau of Air's air emissions inventories. I will be providing testimony regarding the proposed amendments to Title 35 of the Illinois Administrative Code ("35 IAC") Parts 212, 215, 216, and 217 regarding alternative emission limits ("AELs") during startup, shutdown, and malfunction ("SSM"). These amendments were proposed by Rain CII Carbon LLC ("Rain Carbon"), East Dubuque Nitrogen Fertilizers LLC ("EDNF"), the Illinois Environmental Regulatory Group ("IERG"), and the

American Petroleum Institute ("API"), with a joint proposal filed by Dynegy and Midwest Generation ("Dynegy/MWG").

Kyle Sottoriva, an Environmental Protection Engineer in the Bureau of Air's Regulatory Development Unit, contributed greatly to the analysis in this testimony. Mr. Sottoriva and I will both be available at the April 15, 2024, hearing to answer questions.

Summary of Information Responses

The Agency has been in cooperative discussions with the rule proponents to varying degrees. Prior to the second hearing, the Agency commented to the Board that it would be appropriate for the proponents to file technical support that would address the criteria in the SSM SIP Call Guidance for an analysis of potential worst-case emissions and air quality impacts with regard to the applicable National Ambient Air Quality Standards ("NAAQS"). In general, the Agency requested emissions data from previous startups at the affected sources that would indicate what worst-case emissions could be expected during SSM events, and modeling demonstrations or monitoring data that would demonstrate that these events would not interfere with maintenance of the applicable NAAQS. The Agency requested that the startup data be provided in a format that could be easily used in a modeling demonstration (lb/hr of pollutant).

The following is a summary of what the Agency has received from the rule proponents, and what has been filed recently with the Board prior to the third hearing. In instances when my testimony addresses information that has been provided only to the Agency, the Agency defers to the Board as to whether rule proponents should submit such information into the record for all participants' consideration.

The Agency has received modeling files from those rule proponents that conducted modeling. To the Agency's knowledge, such files have not been provided to the Board as they

are voluminous and not likely useful to most participants. The Agency reviewed all of these modeling files underlying the proponents' filings, and in some cases made suggestions regarding methodologies and assumptions that were included in the analyses.

More specifically, IERG did not provide any additional information to the Agency or the Board, consistent with its representative's statements on status calls with the Hearing Officer. EDNF provided CEMS data from startups and modeling files to the Agency, but did not provide the data or a detailed discussion of the modeling in its most recent filing with the Board. Rain Carbon provided startup data from emissions testing, to the extent that it was available, a modeling report, and modeling files to the Agency. Rain Carbon's most recent filing with the Board contains this startup data and there is an additional modeling report in its "Supplemental TSD." Dynegy/MWG provided the Agency startup data, a modeling report, and modeling files. These data and the modeling report were also provided to the Board. Marathon provided the Agency with a monitoring summary that contained startup data in a graphical format, and that was submitted to the Board in the filing by API. CITGO provided the Agency with startup CEMS data and modeling files, and provided the Board these data and a modeling report in its filing. ExxonMobil provided the Agency with modeling files, but did not provide CEMS startup data. ExxonMobil, in the API filing, provided the methodology for how worst-case emissions were calculated, and provided a printout of the modeling outputs based on the inputs that it provides in the filing narrative. No additional information regarding the Conoco Phillips refinery was provided to the Agency or the Board, as Conoco Phillips has indicated to the Agency that no relief is needed by its facility.

IERG

The IERG proposal seeks to amend the carbon monoxide ("CO") standard at 35 Ill. Adm. Code Section 216.121 for fuel combustion emission sources during periods of startup and shutdown and incorporate portions of the National Emission Standards for Hazardous Air Pollutants ("NESHAP") at 40 CFR Part 63, Subpart DDDDD during those periods. This would apply to any furnace, boiler, or similar equipment used for the primary purpose of producing heat or power by indirect heat transfer. IERG proposes to amend 35 IAC 216.121 to allow a source to comply with certain portions of the NESHAP during startups and shutdowns, in lieu of complying with the existing Section 216.121 standard. In conjunction with the proposed amendments to Section 216.121, IERG proposes amendments to Sections 216.103 and 216.104, governing definitions and incorporations by reference respectively. Specifically, IERG proposes to amend Section 216.103 to add the sentence "T[h]e definitions of 'startup' and 'shutdown' in 40 CFR 63.7575 apply to Section 216.121(b) of this Part." Section 216.104 would be amended to incorporate the NESHAP standard by adding the clause "40 CFR 63, Subpart DDDDD (2022)."

In comments submitted by the Agency on October 23, 2023, prior to the second hearing in this rulemaking proceeding ("Agency's 10/23/23 Comments"), the Agency noted deficiencies in the IERG proposal and clarified what changes and technical support would be necessary for the Agency to consider supporting the adoption of its proposal to the Board, and to assess whether the proposed amendments would be appropriate for a revision of the Illinois State Implementation Plan ("SIP"). The various deficiencies identified fall into two main categories. First, IERG's proposal is not sufficiently tailored. It applies to an extremely large universe of sources and units, with no specificity regarding which sources/units have an actual need for

relief. It is therefore likely that relief is being sought unnecessarily. Also, this large number of subject sources and source categories lack specificity, which fails to satisfy Criteria 1 of the SSM SIP Call Guidance that, "The revision must be limited to specific, narrowly-defined source categories using specific control strategies."

Second, IERG's proposal lacks sufficient technical support justifying the proposed AEL. The technical support requested in the Agency's 10/23/23 Comments includes identifying the greatest potential for air quality impacts during startup and shutdown periods for subject sources, quantifying worst-case emissions, and demonstrating that CO emissions during these periods will not threaten the 1-hour and 8-hour CO NAAQS at these higher impact sources via modeling. Without this support, it is not possible for the Board, the Agency, or the public to identify and consider the emissions impacts, including worst-case emissions impact, of the proposed AEL. Also, this lack of technical support fails to satisfy Criteria 4 of the SSM SIP Call Guidance, "As part of its justification of the SIP revision, the state should analyze the potential worst-case emissions that could occur during start-up and shutdown."

Since the submittal of the Agency's 10/23/23 Comments, and despite suggestions from the Agency in subsequent discussions with representatives of IERG, IERG has failed to narrow the universe of affected sources to a specific number of identifiable sources and units, and it has provided no additional technical support or information to the Agency or Board. The Agency, therefore, has insufficient information with which to evaluate IERG's proposal and objects to the adoption of IERG's broad proposed amendments. Even if adopted by the Board, the Agency cannot offer IERG's proposal in a SIP submittal to USEPA.

EDNF

EDNF proposes amending the nitrogen oxides ("NOx") and opacity emission standards in 35 Ill. Adm. Code 217.381 for new weak nitric acid processes. The proposed NOx limitation for such processes would: (a) reduce allowable emissions from 3.0 lbs of NOx per ton of acid produced ("lbs/T") to 1.5 lbs/T, (b) use a 30-day averaging period at half of the current allowable level; and (c) would apply at all times, including during startup and shutdown. An alternative, non-numerical standard would apply for opacity during startup and shutdown, and these processes would no longer be required to comply with the opacity limitations in 35 Ill. Adm. Code 212.123. Lastly, definitions would be added that would limit the duration of startups and shutdowns.

EDNF has been engaged in cooperative discussions with the Agency throughout the rulemaking process in order to support their proposed rule amendments. One request of EDNF from the Agency's 10/23/23 Comments was confirmation via USEPA Method 5 emissions testing that there is not a particulate matter ("PM") element to opacity readings. This was in response to EDNF's proposed language exempting emission units subject to 35 IAC 217.381(a) (including the EDNF nitric acid production processes) from Part 212 opacity standards. After discussion with EDNF, the Agency agreed that Method 5 testing is not a feasible way to provide this support because the intermittent and unpredictable nature of startup and shutdown events prevents EDNF from testing during such periods, and testing during normal operating scenarios would not be representative of emissions during startup and shutdown. EDNF then proposed utilizing a combination of technical and regulatory USEPA publications (included in their 3/15/24 filing to the Board) to conclude that 1) the opacity during startup and shutdown periods is produced entirely by light reacting with the NOx in the emissions stream (i.e., it is "NOx

opacity" rather than opacity caused by PM), and relatedly, PM emissions from startup and shutdown at EDNF's nitric acid production processes are negligible from an air pollution control standpoint, and 2) USEPA itself recognized this fact in removing the NOx opacity standard present in NSPS Subpart G (to which EDNF is subject) from NSPS Subpart Ga, which was promulgated on August 14, 2012. These provide sufficient evidence that opacity readings under 35 IAC Part 212 are not needed for emissions from the nitric acid processes.

The further Agency requests of EDNF were similar to the information requested of all sources that submitted AEL proposals: emissions data (in this case, NOx emissions in lbs/ton of acid produced, calculated using data from Continuous Emissions Monitoring Systems ("CEMS") at the source for the past five years of operation), the date and duration of each startup and shutdown during the timeframe this data was collected, and modeling of the worst-case emissions scenario from these data to demonstrate that the emissions from startup and shutdown periods will not result in a violation of any NAAQS (in this case, the hourly or annual NO_2 NAAQS).

EDNF provided this data and information as requested to the Agency, but for a more limited timeframe. Specifically, after consultation, the Agency indicated that three years, not five, of data was sufficient. The facility submitted startup and shutdown date, time, duration, and emissions data for the years 2021-2023. This data and information adequately supports the AEL language proposal given relatively low maximum emissions potential and the demonstration of a relatively low impact on the NO_2 NAAQS when modeled, as will be further discussed.

EDNF modeled emissions from the absorption towers at both Nitric Acid Plants 1 and 2 ("NAP1" and "NAP2"). NAP1 was modeled at an hourly emission rate of 0.4918 pounds per hour and NAP2 was modeled at an hourly emission rate of 0.9585 pounds per hour. Both

emission points were modeled during every hour of the year (8760 hours). The maximum 1-hour model receptor concentration produced by EDNF in its modeling demonstration was 8.47 µg/m^3, which is only 4.5% of the NAAQS. Further, this maximum modeled concentration was the 1st highest 1-hour value, which value is typically compared against the 8th highest modeled concentration. Thus, EDNF's impacts would actually be less than 4.5% of the NAAQS.

Based on the additional technical support and justification for the amendments that EDNF has provided, the Agency does not object to adoption of the rule proposal as set forth in EDNF's March 15, 2024, filing with the Board, with one caveat. The Agency opposes the proposed deletion of Section 217.381(b), (c), and (d) as reflected in Exhibit 1 of EDNF's filing; these are existing provisions in the current rule that were not deleted in EDNF's original proposal and were not part of discussions with the Agency. Notably, the Agency has confirmed with EDNF that the strikethrough of subsections (b), (c), and (d) was unintentional/scrivener's error.

Rain Carbon

Rain Carbon's original proposal sought to amend Sections 212.124, 212.322, and 215.302 to establish alternative emission standards for opacity, PM, and volatile organic material ("VOM"), respectively, during startup for opacity and VOM and during startup, malfunction, and breakdown ("SMB") for PM. The proposed amendments would be applicable to emission units designated Kiln 1 and Kiln 2 (and the associated pyroscrubber pollution controls). Specifically, Rain Carbon proposed an amendment to 35 IAC Section 212.124 to allow for up to a 3-hour averaging period (using Test Method 9 of Appendix A to 40 C.F.R. Part 60) to demonstrate compliance with the opacity standard in Section 212.123(a) during startup. Rain Carbon also proposed amending Section 212.322 to allow the units to exceed the PM emission standards in

Section 212.322(c) during SMB events, up to 720 hours per year. Finally, Rain Carbon sought an amendment to 35 IAC 215.302(b) to allow the units to demonstrate compliance with the VOM emission standard in Section 215.301 based on an average of hourly emissions during startup, with an averaging period of up to 24 hours.

To provide technical support for its original AEL proposal, Rain Carbon conducted emissions testing during a startup of Kiln 1 (the "startup testing"), and then performed modeling based on the results of this testing. This modeling was discussed in the Agency's 10/23/23 Comments, and the Agency expressed concern on the extent to which the methodology properly represented a worst-case analysis. Specifically, the Agency requested that Rain Carbon conduct modeling based on the total worst-case emissions from the Kilns, rather than considering the excess emissions beyond the applicable standards from this worst-case scenario and evaluating this quantity of excess emissions against a Significant Impact Level ("SIL").

The Agency opined on the use of the modeling to justify the proposed PM alternative standard of 720 hours per kiln per year. The Agency requested that Rain Carbon consider whether fewer allowable annual operating hours in excess of the PM standard were feasible based on past operating data, and further requested that Rain Carbon justify the number of allowable excess hours in the updated modeling.

The Agency expressed concerns with the VOM emission rates reported from the startup emissions testing, as the maximum rate from the original TSD for all test runs performed was 2.41 lbs/hr, which is well below the 35 IAC 215.301 standard of 8 lbs/hr and thus, in the absence of further context, indicated no startup relief was necessary. The Agency also requested a technical justification for the proposed 24-hour averaging period within the VOM AEL request. The only justification Rain Carbon provided was that the duration of any startup event is

authorized to extend up to 24 hours under the facility's CAAPP permit. The Agency requested that Rain Carbon use prior operating data to determine what minimum averaging period would be feasible for the rolling VOM emission rate average to comply with the 8 lb/hr standard.

Rain Carbon engaged the Agency and in the course of those discussions developed an updated modeling methodology to address the Agency's comments. The facility also provided a response to the Agency's request for reconsideration and justification for both the originally proposed 720 allowable hours in excess of the 35 IAC 212.322 PM standard and the 24-hour averaging period for determining compliance with the 35 IAC 215.301 VOM standard. In this response, Rain Carbon reduced the annual allowable excess PM hours in its proposal to 300 hours per kiln and the averaging period within the VOM AEL to 12 hours. Rain Carbon used prior operating records to support developing these voluntary reductions, as recommended by the Agency.

Rain Carbon's updated modeling uses the maximum emissions determined from the startup testing as the SSM worst-case emissions scenario, in conjunction with data estimation procedures that the Agency agrees are appropriate. Specifically, the maximum hourly PM emission rate of 57.1 lbs/hr used in the updated modeling was calculated by fitting the testing data to a correlation curve that provides PM emission rate values up to 1800 ^{O}F. The startup testing measured five PM emission rates for pyroscrubber inlet temperatures ranging from 694 to 1373 ^{O}F, which necessitated this calculation procedure to estimate the maximum hourly PM emission rate, as the maximum rate will occur at a temperature greater than 1373 ^{O}F, at which PM emissions begin to decrease until 1800 ^{O}F is reached. Because the startup testing measured increasing PM emission rates up to the highest temperature point tested, Rain Carbon needed to perform data interpolation to determine this maximum emission rate. The Agency has no

concerns with this estimation procedure and agrees that the calculated maximum emission rate is sufficiently conservative for use as an input for the modeling demonstration. If the startup testing had been performed at temperature up to 1800 ^{O}F, the temperature at which compliance with 35 IAC 212.322 is demonstrated could have been lower than 1800 ^{O}F. The 1800 ^{O}F pyroscrubber inlet temperature value is the minimum temperature at which compliance is guaranteed, meaning compliance could be demonstrated at lower temperature values during any given startup procedure, which could move the inflection point of maximum PM emission rate to a lower value.

For VOM, Rain Carbon similarly used data extrapolation to estimate the maximum VOM emission rate from the startup testing measured data. The lowest temperature point of data collection was 694 ^{O}F, while Rain Carbon is permitted to initiate green coke feed to the kilns at 400 ^{O}F. Because VOM emission rates would be expected to be maximized at the minimum temperature in the kilns, Rain appropriately extrapolated the measured VOM emission rate at 694 F to 400 F, to obtain a maximum rate of 4.82 lbs/hr.

However, this value is expressed on an “as propane” basis (a data quantification procedure based on the calibration gas used in the testing and allowed by USEPA Method 25A). The Agency recommended that Rain Carbon convert this to an “as carbon” basis in order to estimate the maximum potential VOM emission rate from startup. Converting the emission rate to an “as carbon” basis triples the maximum VOM emission rate to 14.47 lbs/hr. Using this value as the maximum emission rate in the modeling is conservative, and it eliminates the Agency’s prior concern that the startup testing data reported to the Agency suggests that no startup VOM relief is necessary.

Because VOM is a precursor to ozone formation, rather than a directly emitted criteria pollutant, the impacts on the potential for ozone NAAQS nonattainment from any VOM emissions scenario cannot be modeled using dispersion modeling, as with PM and other criteria pollutants. To address this difficulty, Rain Carbon has utilized the USEPA-developed concept of Modeled Emission Rates for Precursors ("MERPs"). USEPA has provided VOM "MERP values" (a quantification of the VOM emissions for a selected geographical location that would be expected to significantly contribute to ozone formation) for a variety of hypothetical emission points distinguished by stack height, annual emission rate, and other factors specific to the chosen geographical location. USEPA performed photochemical modeling to calculate MERP values for hundreds of hypothetical emissions points across the United States. Rain Carbon appropriately selected a MERP value published by USEPA for one of the closest geographical locations available (Boone County, Indiana), based on its lower MERP value compared to other nearby MERP-analyzed locations. This MERP value is 2,985 tons of VOM emitted per year, and adding a further layer of conservativeness to the analysis, it was developed based on a stack height of 10 meters, while Rain Carbon's stack emits at a height of 45.72 meters. Rain Carbon calculated a considerably conservative annual VOM emission rate from the Kilns based on assumed operation at startup VOM emission rates for every hour of a calendar year. In comparing this maximum annual VOM emission rate from the Kilns to the Boone County MERP value, Rain Carbon effectively demonstrates that the contribution from the Kilns' startup VOM emissions to the potential for ozone NAAQS exceedance is very small, even given very conservative assumptions.

Rain Carbon performed a dispersion modeling analysis starting from the 57.1 lbs/hr maximum interpolated PM emission rate from the Kilns. Specifically, this emission rate was

speciated into PM_{10} and $PM_{2.5}$ components based on data from USEPA AP-42 Compilation of Air Emissions Factors from Stationary Sources, Appendix B.2. Rain Carbon then utilized USEPA guidance published in 2011 that addresses intermittent operating scenarios (such as SSM periods) in dispersion modeling for NOx emissions with respect to the 1-hour NO_2 NAAQS. This guidance includes a methodology to prorate intermittent emissions over an annual period by dividing the annual number of expected hours of intermittent operation (in this case, easily identified as 300 hours for both Kilns) by 8760. In utilizing this guidance and PM_{10} and $PM_{2.5}$ speciation, Rain Carbon concluded that PM_{10} and $PM_{2.5}$ emission rates of 1.04 and 0.35 lbs/hr, respectively, can be modeled at continuous year-round operation in order to quantify the maximum ambient concentration impacts from the intermittent SSM periods of Kiln operation. Rain Carbon concludes from this methodology that the modeled first high ambient concentrations from the Kilns' SSM events are no higher than 0.1% of the relevant NAAQS ambient concentrations for each of the PM_{10} 24-hour, $PM_{2.5}$ 24-hour, and $PM_{2.5}$ annual NAAQS.

The Agency recognizes that Rain Carbon's PM modeling methodology accurately utilizes the intermittent emissions approximation contained in the 2011 1-hour NO_2 NAAQS guidance, and that this methodology produces results that are a negligible percentage of the relevant NAAQS. The Agency had concerns regarding the application of this guidance to the PM emissions from the Kilns, as the Agency is unaware of any USEPA guidance that specifically references the proper use of this methodology for non-NO_x criteria pollutant emissions, and Rain Carbon does not provide any such reference within its TSD. The Agency considers the NO_2 guidance more appropriate for considering the Kilns' emissions impact on the $PM_{2.5}$ annual standard, as opposed to the $PM_{2.5}$ and PM_{10} 24-hour standards. However, due to the very low modeled impacts Rain Carbon's modeling analysis produced for each NAAQS, it is sufficient to

demonstrate that the impact from these SSM events would not be of concern even had the analysis been conducted using the maximum interpolated emission rate of 57.1 lbs/hr. This is because modeled concentrations of 50 or even 100 times those that their analysis produced would not have raised concerns about interference with the applicable NAAQS.

Lastly, Rain Carbon has addressed the questions from the Agency's 10/23/23 Comments pertaining to the justification for the three-hour averaging period for compliance with the 35 IAC 212.123(a) opacity standard. Rain Carbon states that because the maximum opacity value observed from the startup emissions testing occurred at a Kiln temperature of approximately 600 F, there is potential for higher values closer to the 400 F temperature at which green coke is permitted to be introduced to the Kilns. This potential for opacity values greater than 50% at the beginning of startup periods necessitates an averaging period of greater than one or two hours.

Based on the additional technical support and justification for the amendments that Rain Carbon has provided, the Agency does not object to adoption of the rule proposal as set forth in Rain Carbon's March 15, 2024, filing with the Board.

Petroleum Refineries

API's proposal seeks to amend 35 Ill. Adm. Code Sections 216.103, 216.104, and 216.361 regarding carbon monoxide standards for fluid catalytic cracking units ("FCCUs") during startup and hot standby. Section 216.361 would have a new subsection (d) added which incorporates by reference select provisions of the NESHAP for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units found in the code of at 40 CFR Part 63, Subpart UUU. Under the NESHAP, API would comply with work practice standards during startup and hot standby in lieu of compliance with existing numerical emissions

limitations. API's proposal would also amend definitions and incorporations by reference in Sections 216.103 and 216.104, respectively.

ExxonMobil, CITGO, and Marathon refineries have responded to the Agency's comments, questions, and requests for data from the Agency's 10/23/23 Comments in varying degrees of comprehensiveness since the second hearing in this rulemaking proceeding. CITGO and Marathon provided a description of the FCCU units' operation that resolves the Agency's request for clarification of how the units operate with respect to the definitions of "full burn unit" and "partial burn unit" as provided in API's initial proposal. This clarification assists in these sources' demonstrations that the FCCU units' SMB events will not threaten the CO NAAQS at or near the source, because the FCCU regenerator exhaust gas 1% oxygen concentration requirement from NESHAP Subpart UUU effectively causes each source's FCCU unit to operate at full burn during startup and hot standby events. This has decreased the CO concentrations and emission rates from the FCCU units during such events. Therefore, even in startup and hot standby scenarios in which the sources are unable to vent FCCU emissions to the CO boilers due to uncombusted hydrocarbons in the waste stream, the CO emission rate is low relative to pre-NESHAP Subpart UUU levels such that the worst-case ambient CO concentration from these SMB events has a minimal impact on the potential for CO NAAQS exceedance. This is demonstrated in the modeling performed by ExxonMobil and CITGO and in the monitoring study performed by Marathon.

Based on the additional technical support and justification for the amendments that API has provided, the Agency does not object to adoption of the rule proposal as set forth in API's March 15, 2024, filing with the Board.

ExxonMobil

In its March 15, 2024, filing with the Board, API did not provide a discussion of ExxonMobil's FCCU's operation with respect to the definitions of partial or full burn units, as requested in the Agency's 10/23/23 Comments. However, the CO concentrations and emission rate data used as inputs in the modeling clearly demonstrate the effect of compliance with NESHAP Subpart UUU on the FCCU's impact on CO concentrations. Specifically, the maximum CO concentrations and emission rates for the 2013 startup compared to the more recent startup decrease from 43,800 ppm and 35,200 lb/hr to 2,000 ppm and 4,900 lb/hr. In turn, the modeled ambient impacts, as a percentage of the NAAQS, decrease from 13.51% to 2.77% for the 1-hour NAAQS and from 19.75% to 5.18% for the 8-hour NAAQS. The Agency concurs with ExxonMobil that these low impacts in relation to the CO NAAQS demonstrate that the worst-case SMB events from the FCCU unit will not cause significantly high ambient CO concentrations or interfere with either relevant NAAQS.

Additionally, ExxonMobil provided the Agency with modeling files from its analysis, but not the SMB event data that was requested in the Agency's 10/23/23 Comments. However, the Agency can confirm that the maximum concentrations that were used agree with the information that the Agency has on file, and given the additional information ExxonMobil provided in its analysis description (Exhibit 1, p. 2) regarding stack diameter, temperatures, and flow rates, the maximum emission rates in lb/hr are appropriate for the modeling conducted.

CITGO

CITGO comprehensively and effectively responded to all of the Agency's 10/23/23 Comments. The discussion and analysis regarding the FCCU unit's operation with respect to full and partial burn combustion answer the questions from the Agency's 10/23/23 Comments and

provide further insight into the worst-case startup and hot standby scenario that the FCCU undergoes. Specifically, CITGO provides the most recent SMB events and associated emissions data for the four categories of 1) startup following refractory dry-out, 2) return to normal operations after an unplanned unit shutdown involving periods of hot standby, 3) periods of hot standby not associated with startup or unplanned unit shutdowns, and 4) CO boiler trips. CITGO demonstrates that the worst-case scenario occurs during category 2) above. This shows that the worst-case emissions scenario for the FCCU occurs during the prolonged periods of torch oil injection into the regenerator during hot standby periods caused by SMB events of the FCCU or other upstream or downstream units, rather than periods of torch oil injection during a "cold" startup involving refractory repair, as anticipated by the Agency. Most importantly, CITGO effectively demonstrates the worst-case startup and hot standby event, and then models it using a very conservative emissions scenario in which the CO emission rate and stack flow velocity and temperature are two standard deviations higher and lower, respectively, than measured values from the actual worst-case scenario. This analysis generates CO ambient concentration impacts from this worst-case event that are less than 1% of both the 1-hour and 8-hour CO NAAQS, despite the considerable level of conservativeness in the analysis. CITGO's technical support is comprehensive.

Marathon

Marathon provides a short yet effective description of its FCCU unit's operation. This confirms that Marathon's FCCU unit can operate in partial burn or full burn mode, and that it routes to the CO boiler for CO control during periods of normal partial burn operation. Marathon further provides CO emissions data from ten separate startup events from the years 2019 and 2020. This data shows a maximum CO emission rate of approximately 250 lbs/hr,

which lasts for a relatively short period of several hours, as do all of the CO lb/hr emission rate spikes within the data for all ten of the startups.

Marathon did not provide a modeling analysis, as requested in the Agency's 10/23/23 Comments. However, Marathon provides the results of monitoring the facility was required to conduct near the source. This monitoring demonstrates that 1) the monitors never collected data indicating CO NAAQS exceedance concerns (the maximum monitored concentrations were on the order of 1-2 ppm, whereas the 1-hour and 8-hour CO NAAQS are 35 and 9 ppm, respectively, which is less than 15% of the 8-hour standard 5% of the 1-hour standard) and 2) none of these maximum monitored CO concentrations occurred during any startup event of the FCCU.

Dynegy/MWG

In its Joint Proposal, Dynegy and MWG seek amendments that would create a new a subsection (d) in Section 212.124, which would allow the affected units to demonstrate compliance with the applicable 20% or 30% opacity standards in Sections 212.122(a) or 212.123(a) on a three-hour averaging basis during times of SMB.

Dynegy/MWG have completely and effectively responded to the Agency's 10/23/23 Comments and requests for further information, data, and modeling. Outside of the requested modeling, the Agency's comments and requests can be summarized in two main concerns that required examination by Dynegy/MWG. Data and analysis needed to be submitted to quantitatively confirm that 1) individual six-minute opacity exceedances will not lead to disproportionate short-term increases in PM emissions compared to six-minute operating periods in compliance with the 20% or 30% opacity standard and 2) operation under the AEL will not lead to non-compliance with any applicable PM emission standard or PM NAAQS, taking into

consideration all possible three-hour AEL operating scenarios and quantifying the worst-case PM emissions that could occur for any given three-hour operating period that complies with the AEL. The Agency requested that Dynegy/MWG utilize CEMS data available from some of the represented power plants to perform this analysis.

Dynegy/MWG used PM CEMS data from Kincaid Power Station ("Kincaid") and Powerton Generating Station ("Powerton") in the analysis. The PM CEMS at these two facilities were installed and are operated in accordance with federally enforceable Consent Decree requirements, and both of the CEMS monitors have been certified in accordance with EPA Performance Specification 11. Each CEMS monitor is installed on a common stack shared by two units at each of the facilities (i.e., on Kincaid Units 1 and 2 and on Powerton Units 5 and 6).

In the original TSD prepared by Agora Environmental Consulting ("Agora") and filed with the Board on August 7, 2023, Agora provided opacity correlations for each of Baldwin Energy Complex ("Baldwin"), Newton Power Station ("Newton"), Kincaid, and Powerton. These correlations were based on data collected during prior emissions testing performed at the power plants. Agora considered both USEPA Method 5 performance testing data and data collected from the modified version of Method 5 prescribed by the Mercury and Air Toxics Standards ("MATS") Rule ("MATS Method 5 Testing"), and created separate opacity correlations from data collected from both of these testing methods for each of the power plants. Agora developed these correlations by gathering PM emissions data (in units of lbs of PM emitted per million British Thermal Unit ("mmBtu") of heat input to the boiler) from the Method 5 and MATS Method 5 testing performed separately at each of the power plants between the years 2016 and 2022, and then plotting these PM data against opacity observations made and recorded at the time each PM measurement was taken. Between the Method 5 and MATS

Method 5 correlations developed for each of the power plants, Agora selected the PM correlation that had the higher slope when plotted to estimate the PM emissions in lb/mmBtu at the Part 212 opacity standard, and then compared this estimated emission rate against the applicable Part 212 PM standard for each source.

In response to the Agency's 10/23/23 Comments, Agora collected and plotted all one-minute PM emissions CEMS data points from 2022 for Kincaid and Powerton that are in exceedance of 30% opacity (the applicable 35 IAC 212 standard for both of these sources). The opacity value plotted against each of these CEMS data points was determined by readings from the Continuous Opacity Monitoring System ("COMS") present at each of Kincaid's and Powerton's stacks. Agora developed opacity correlations from these CEMS data for the two facilities, appropriately excluding the one-minute data points with PM emission rate below 0.02 lb/mmBtu as outliers in developing the correlations. Agora then plotted these data points and correlations along with the formerly developed PM testing correlations and compared the results.

The Agency recognizes that the PM CEMS data used in the new correlations is based on one-minute CEMS readings that alone cannot indicate an opacity exceedance (which is determined on a six-minute interval) and that these data points "reflect short-term, transient events and illustrate a large degree of variability due to the variety of conditions that the events represent, drift associated with the measurements, and potential other uncertainties." (p.12, Exhibit 1, Agora). Despite these uncertainties inherent in the CEMS data, the Agency concurs with Agora that the CEMS data correlations are sufficiently similar to the testing method correlations to justify their consideration as evidence of estimated PM emissions under the proposed AEL. The Agency further concurs that the "roughly linear" relationship between the opacity and PM CEMS measurements shown on the CEMS data correlations provides strong

evidence that the PM emissions from short-term six-minute operating periods in excess of the 30% opacity standard do not increase in a non-linear (e.g. exponential) manner. This aids in resolving the Agency's prior expressed concern that the total PM emissions from three-hour averaging periods under the proposed AEL could increase beyond the relevant PM standards if such three-hour periods include one or more six-minute periods far in excess of 30% (up to 100%, as allowed by the proposed AEL language). In other words, the linear relationship demonstrated in the PM CEMS correlations is evidence that no three-hour operating scenario that complies with the proposed AEL limitation will result in excess PM emissions beyond the relevant standard. This is because regardless of the increased PM emissions that can occur during short-term periods of opacity in excess of 30%, the fact that the three-hour average opacity value must be below the opacity standard confirms that the total PM emissions from the three-hour period will not exceed the PM emissions that would have occurred if the opacity (and associated PM emission rate) had remained steadily at 30% through those three hours of operation.

The emissions testing and PM CEMS data correlations for Kincaid and Powerton provide sufficient evidence to demonstrate a low probability of the proposed AEL resulting in an exceedance of the applicable 35 IAC 212 PM standard for both of these sources. Furthermore, the evidence provided by the PM CEMS correlations for Kincaid and Powerton can be used as evidence for Baldwin's and Newton's likelihoods of exceeding their relevant PM standards, as the agreement between the emissions testing and PM CEMS data correlations for Kincaid and Powerton suggests that because the Baldwin and Newton emissions testing correlations demonstrate compliance with the relevant PM standards at the relevant 35 IAC 212 opacity standard (i.e. 20% or 30%), a correlation for these sources that considers measured opacity values up to 100% (not possible due to Baldwin's and Newton's lack of PM CEMS) would also

show a linear relationship that demonstrates compliance with the PM standards at a three-hour average opacity value below the relevant opacity standard.

In addition to the above analysis, Dynegy/MWG performed dispersion modeling that demonstrates a lack of PM_{10} and $PM_{2.5}$ NAAQS exceedances under the worst-case emissions scenario for each of the sources, as requested in the original Agency 10/23/23 Comments. Specifically, for each of the sources, Trinity Consultants, Inc. ("Trinity") performed a modeling analysis that considers two scenarios evaluated as separate "worst-case" emissions profiles – one that models the units operating at full load year-round and continuously emitting at the lowest applicable PM emissions limitation (the "Worst-Case Full Load at PM Limits" scenario"), and one that models the units operating at full load year-round and continuously emitting at the emission rate obtained from the opacity correlations at the value of the relevant opacity standard (the "Worst-Case Full Load at AEL Limits" scenario). As an example, the lowest applicable PM limitation for Baldwin is the consent decree emissions limit of 0.015 lb/mmBtu – for the "Worst-Case Full Load at PM Limits" scenario, this was converted to a gram/second emission rate by assuming continuous full-load operation of the units and then modeling this value at year-round operation. The opacity standard applicable to Baldwin is 30% from 35 IAC 212.123(a). For the "Worst-Case Full Load at AEL Limits" scenario, the PM emission rate at an opacity value of 30% determined from the emissions testing PM correlations was similarly modeled assuming continuous, year-round operation at this rate. The $PM_{2.5}$ and PM_{10} emission rates are speciated using AP-42 estimates and modeled against the relevant statistical parameter for the $PM_{2.5}$ 24-hour standard, the current annual $PM_{2.5}$ standard, the recently adopted annual $PM_{2.5}$ annual standard, and the PM_{10} 24-hour standard.

The two different "worst-case" modeled scenarios appropriately capture the maximum PM emission rate at which compliance with all applicable PM emission standards is determined for each of the sources. For Baldwin and Kincaid, this is the "Worst-Case Full Load at AEL Limits" scenario, as the PM emission rate estimated from these sources' opacity correlations at 30% opacity is larger than their maximum regulatory PM emissions limitation (derived from consent decrees for both). For Newton and Powerton, this is the "Worst-Case Full Load at PM Limits" scenario, as the maximum regulatory PM emissions limitation for both of these sources is larger than the PM emission rate estimated from these sources' opacity correlations at the relevant opacity standard. The two modeled scenarios further include appropriate levels of conservativeness by assuming continuous year-round operation at full load and at the maximum of the two modeled emission limits. The results clearly demonstrate the low potential for an exceedance of any of the applicable $PM_{2.5}$ or PM_{10} NAAQS standards. For each of these standards and for each of the four sources, the maximum modeled impact considering both "worst-case" scenarios is less than 2% of the NAAQS standard.

Finally, after discussion with the Agency, Dynegy/MWG has included in their most recent filing a change in the proposed AEL language that makes the AEL averaging period prospective rather than retrospective, meaning the averaging period considers any given six-minute operating period and averages it with the following 174 minutes of six-minute operating periods, rather than the prior 174 minutes of six-minute operating periods. This change avoids the scenario in which the first three hours of any given SMB scenario are unable to be averaged under the AEL, and further prevents the AEL from allowing the sources to "excuse" one or several six-minute operating periods in excess of the opacity standard by using the preceding timeframe (up to 2.9 hours) of opacity values. In other words, once any measured six-minute

opacity value exceeds the standard, the source must use the following 174 minutes to get the average opacity under the value of the standard, rather than potentially using several hours of compliant six-minute period data not in excess of the opacity standard before any individual six-minute period of excess opacity occurs.

Based on the additional technical support and justification for the amendments that Dynegy/MWG has provided, the Agency does not object to adoption of the rule proposal as set forth in Dynegy/MWG's March 15, 2024, filing with the Board.

CERTIFICATE OF SERVICE

I, the undersigned, an attorney, state the following:

I have electronically served the attached ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S TESTIMONY OF RORY DAVIS upon the following persons:

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Respectfully submitted,

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