ATTACHMENT 2

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. **Docket No. ER14-500-000**

SUPPLEMENTAL AFFIDAVIT OF
ANTHONY LICATA

Mr. Anthony Licata declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Supplemental Affidavit

2. The purpose of my Supplemental Affidavit is to respond to certain protests responding to the New York Independent System Operator, Inc.'s ("NYISO's") November 2013 proposal to implement revised Installed Capacity ("ICAP") Demand Curves[1] for the three year period beginning on May 1, 2014 (the "November Filing"). I previously prepared an affidavit that supported the November Filing and that introduced and briefly described the report prepared by The Brattle Group and me that described various analyses underlying the selection of the proxy peaking technology for New York City ("NYC"), Long Island ("LI"), and the "G-J Locality" (the "Brattle Report").

3. Various parties including the New York Transmission Owners , the New York State Public Service Commission , Multiple Interveners and New York City , the Independent Power Producers of New York ("IPPNY"), the Electric Power Supply Association,

[1] Capitalized terms that are not otherwise defined herein shall have the meaning specified in the pleading to which this Supplemental Affidavit is attached or the meaning set forth in the NYISO's Market Administration Services Tariff and if not defined in the Services Tariff, have the meaning set forth in the NYISO's Open Access Transmission Tariff.

Entergy Nuclear Power Marketing, LLC ("Entergy"), the "Indicated Suppliers," TC Ravenswood, LLC ("Ravenswood"), and the New York Supplier and Environmental Advocate Group submitted comments supporting and protesting the analyses and conclusions contained in the Brattle Report regarding the technical and economic viability of operating an F class frame combustion turbine in simple cycle mode with selective catalytic reduction ("SCR") post combustion emission control technology (hereafter "F class frame with SCR") in NYC, LI, and the G-J Locality.

4. In this supplemental affidavit, I: (i) respond to protests made regarding the objectivity and comprehensiveness of the work conducted in preparing the Brattle Report; (ii) answer protests regarding the reasonableness of the analyses and conclusions in the Brattle Report;[2] (iii) provide a discussion of additional information that I have obtained about the operation of Marsh Landing since the Brattle Report was issued; and (iv) respond to Protests regarding the reasonableness of S&L's cost estimates for the F class frame with SCR.

II. Qualifications

5. I am Vice President and Co-Owner of Licata Energy and Environmental Consultants, Inc. ("Licata Energy"), which has been in the energy and environmental consulting business since 1990. Licata Energy advises clients on emissions compliance strategies, business development as related to Environmental Protection Agency ("EPA") regulations and licensing of new technologies. I have been actively engaged in the air pollution control

[2] This includes an explanation of the importance of the four units at the Marsh Landing Generating Station in California ("Marsh Landing") and the other high temperature SCR applications that were referenced in the Brattle Report to the selection of the proxy unit; and respond to the specific protests that claim the Brattle Report does not provide enough evidence to fully support the economic viability of the F class frame with SCR in southeastern New York in light of the requirement to have dual-fuel capability, *i.e.* the capability to burn Ultra-low Sulfur Diesel ("ULSD") as a backup fuel.

systems and the power generation business since 1966 and have been working with SCR technology since the mid-1980s. I have authored or co-authored over 100 technical papers, of which 22 relate to SCR and NOx emissions controls. My Curriculum Vitae is attached to and my qualifications are discussed in more detail in the affidavit that I prepared in support of the November Filing.

III. The Objectivity and Comprehensiveness of Analysis that I Conducted for the Brattle Report

7. In their protests of the November Filing, certain parties wrongly suggest that the review that Brattle and I conducted was "not unbiased,"[3] "ill-advised and incomplete"[4] or "not comprehensive."[5] These are inaccurate characterizations of our work, which was thorough, impartial, and in-depth.

8. In October 2013, I was contacted by Marc Chupka of The Brattle Group to do some work for them related to the application of SCR emission control technology to F class frame combustion turbines operated in simple cycle mode. In my interviews with Brattle prior to starting the project, I was only asked about my background in SCR emissions controls and their application to gas turbines. In agreeing to undertake this work for the Brattle Group, I was never directed by NYISO or Brattle to give an opinion that the F class frame with SCR was a technically feasible or economically viable technology.

9. Based on my prior work at Babcock Power, I had experience with the application of high temperature SCR applications with frame units, but it was only after I completed an in-depth review of the technical data and design criteria available from past and present high temperature SCR applications that I concluded that the F class frame with SCR was an

[3] IPPNY at 27.

[4] Indicated Suppliers at 19.

[5] Ravenswood at 5.

economically viable and proven technology. My review included a thorough examination of Marsh Landing's design, which consisted, in part, of several conversations and a daylong in-depth technical meeting with Mitsubishi Power Systems Americas, Inc. (MPSA), and a thorough review of all available EPA emissions data for Marsh Landing.

10. I reached this conclusion independently. I believe that my conclusion was and continues to be supported by the construction and commercial operation of Marsh Landing, which as an $800 million, 800 MW facility comprised of four simple cycle F class frame turbines operating in California with SCR emissions control technology. Marsh Landing represents a very significant investment that cannot be ignored. These conclusions are also supported by my detailed discussions with several SCR manufacturers, including ATCO Emission Management (ATCO) and MPSA, catalyst vendors and turbine manufacturers.

11. I worked closely with Marc Chupka and his staff at the Brattle Group in order to complete the analysis set forth in the Brattle Report. Our analysis commenced with a review of the work conducted by Sargent & Lundy (S&L), which was reported on in the NERA/S&L Report as well as in a presentation to NYISO stakeholders on July 9, 2013. In addition to publically available data from industry conferences, such as PowerGen and the National Energy Technology Laboratory (Conferences on Selective Catalytic Reduction and Selective Non-Catalytic Reduction for NOx Control 1997 – 2003), I drew upon my prior experience with Babcock Power and my extensive collection of data and documents regarding SCR applications to perform the engineering evaluation of the viability of the F class frame with SCR. Unlike the work performed by S&L earlier in

the Demand Curve Reset, Brattle and I focused exclusively on the single task of evaluating the technical and economic viability of the F class frame with SCR. Furthermore, we had seven months (March - September, 2013) of Marsh Landing's operating data to review, three months (July-September) of which had not been available on the EPA's Clean Air Markets database at the time NERA/S&L released their report.

12. Because we were solely focused on one issue, we had sufficient time to conduct several detailed and lengthy discussions with several catalyst and SCR vendors, including MPSA, the SCR vendor for Marsh Landing. My understanding is that NERA and S&L did not engage in similar discussions prior to completing their report and their evaluation of the question of viability of the F class frame with SCR presented by Marsh Landing that was raised by certain stakeholders in the NYISO process.

13. I was also able to look into and determine the relevance of the failure modes associated with the Cambalache Facility in Puerto Rico ("Cambalache") and the Riverside Facility in Kentucky ("Riverside") that were the sole examples of SCR failure referenced by NERA/S&L in their analysis. I had a detailed discussion with a former employee of mine that had worked for Research Cottrell, who had firsthand knowledge of the SCR application at Riverside. Research Cottrell provided the SCRs for the Riverside project in Kentucky.

A. The Differences Between the NERA/S&L Report and the Brattle Report with Respect to the Evaluation of the F Class Frame with SCR

14. In reviewing the NERA/S&L Report's discussion on the question of the viability of the F class frame with SCR, it appears to me that that S&L conducted a limited survey of past industry experience with SCR on frame units as well as a performing a limited inquiry into the current development of industry interest in this configuration. It

appeared to me that they obtained some information from the proposed Bridgeport Peaking Station air permit application[6] that cursorily discussed the SCR failures at Cambalache and Riverside. I did not find, either in the NERA/S&L Report, or in the stakeholder presentations an investigation into the root causes of the failures at these two installations. Instead, the NERA/S&L Report and stakeholder presentations focused largely on the occurrence of these two failures and the higher temperatures of an F class combustion turbine when compared to a LMS100. S&L did not reference any of the SCR applications in Japan and in the US that were operating on simple cycle frame units with high exhaust temperatures (*i.e.*, 900 °F and above) despite the fact that, and as was brought to light in the Brattle Report, there are frame units in the United States, such as the McClure and McClellan turbines, which were retrofitted with SCRs designed for temperatures over 900 °F.[7]

15. The NERA/S&L Report also did not include any discussion on SCR failures on aeroderivative machines, which are far more numerous than the two SCR failures on F class frame machines. For example, *POWER* Magazine in June 2010 published an article about an SCR failure on 4 LM 6000s in Austin, Texas where the catalyst had to be changed twice in five years.[8] Mr. Daniel Ott's affidavit for IPPNY stated: "I have been involved in over 100 simple cycle SCR systems with non-performance issues, some of which led to formal warranty claims against the SCR vendors. Some of these nonperformance issues involved systems that include tempering air (also referred to as

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[6] *Available at*: http://www.ct.gov/csc/lib/csc/pendingproceeds/petition_841/attachment_f_bulk_exhibit_air_permit_app_june07.pdf. This was a proposal to construct a simple cycle gas facility using the F class frame with SCR technology.

[7] *See*, for example, the discussion below of high temperature SCR applications on frame units.

[8] Exhibit 1.

"dilution" or "cooling" air) applications. In those systems, problems I identified involved catalyst failure, ammonia maldistribution, tempering air maldistribution, seals issues/bypass, high ammonia slip, high inlet NOx and many others issues…."[9] Importantly, Mr. Ott's statement that he has been involved in more than 100 SCR nonperformance issues must largely relate to failures on aeroderivative applications. Because the NERA/S&L Report neither investigated or discussed possible root causes of the SCR systems at Riverside and Cambalache, nor discussed SCR failures on aeroderivative machines, it was not recognized that aeroderivative failures such as those identified by Mr. Ott are typically the result of faulty engineering design or improper installation, which I concluded was also the case at Riverside and Cambalache. Finally, I have had numerous discussions with catalyst vendors, SCR manufacturers and turbine vendors regarding the state of this technology and sought to understand what technological advancements have occurred in the SCR and catalyst design field since the failures at Cambalache and Riverside, neither of which appears to have been performed in the development NERA/S&L Report.

16. The Brattle Report built upon the S&L analysis and addressed several items that were mentioned by S&L in its original evaluation of the F class frame with SCR. Our work went beyond S&L's primary focus on the temperature of exhaust gases and focused on gaining a better understanding of the operational data and technological achievement associated with Marsh Landing. We also looked at the performance and operating data of other high temperature SCR applications with catalysts that experienced temperatures above the 850 °F temperature (the threshold temperature cited by S&L in their July 9,

[9] IPPNY, Ott Affidavit at P 8.

2013 presentation to stakeholders). This included high temperature SCR applications both with and without tempering air. The NERA/S&L Report contained no discussion of the several high temperature SCR applications that had long been in service.

17. Mr. Chupka, his staff and I were able to look at substantially more operating data from the Marsh Landing plant than had previously been examined. MPSA was very helpful in providing us with additional detail regarding the various functional design requirements required for the fast ramping Marsh Landing units and provided us a review of the costs developed by S&L for the SCR with tempering air. I have attached a white paper prepared by Rand Drake, General Manager, SCR Systems that presents a concise discussion of the design considerations that MPSA addressed for Marsh Landing.[10] (Marsh Landing is designed to and operates at or below 850 °F while S&L cost estimate conservatively assumes tempering air reduces the temperature down to 750 °F.)

IV. The Reasonableness of the Brattle Report's Analysis and Conclusions

A. The Relevance of Successful High Temperature SCR Applications

18. Both IPPNY[11] and the Indicated Suppliers[12] question the relevance of SCR operating data from the McClellan and McClure facilities on the ground that they were not F class frame units manufactured by Siemens. This is incorrect. The effectiveness of an SCR system is not dependent on what the make or model of the turbine is, but rather that (i) the design specifications and performance objectives provided to the SCR vendor are complete and accurately describe the nature of the facility, and (ii) the engineering design and installation of the SCR are appropriately conducted.

[10] Exhibit 2.

[11] IPPNY at 17.

[12] Indicated Suppliers at 22-23.

19. Mr. Ott's statements that SCRs are not viable with exhaust gas temperatures of greater than 850 °F and above[13] are inaccurate as indicated by the SCR applications with similar design criteria cited in the Brattle Report. There are many types of catalyst available for use in the SCR design, with each type manufactured to operate over a specified temperature range, including several catalysts that are designed to operate at temperatures above 1,000 °F. As stated before, there are SCRs on simple cycle frame units that have been operating above 900 °F for many years in both Japan and the United States, and Marsh Landing's SCRs are designed and have demonstrated successful operation using tempering air to temperatures of around 850 °F.[14]

20. The McClellan Plant has a gas-only GE, PG 7931 Frame 7E gas turbine with SCR that has demonstrated compliant environmental performance over its ten plus year service life. Despite having exhaust gas temperatures of 1020 °F, having no tempering air system, and that it continues to operate with the original Cormetech Catalyst.[15] The McClellan Plant is primarily operated as a black start unit, thus it has experienced a large number of starts during the past 10 years of its operation. This is important because frequent starts stress the high temperature catalyst in a number of ways: 1) the physical strength of catalyst can degrade over time, 2) thermal stress can cause cracking in the catalyst which affects the ceramic fiber structure, and 3) sintering can occur if there is a maldistribution of temperature or flow. Based on the Official Emissions Compliance Report conducted on September 19, 2013 the unit is still in compliance with their permits. This clearly indicates that there has not been any significant deterioration of the

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[13] *See, e.g.* IPPNY, Ott Affidavit at PP 23-24, 32-34.

[14] *See e.g.* Exhibit 3.

[15] *See, e.g*. Slide 13 of Exhibit 4.

catalyst over the past ten years, and is a testament to the durability of the catalyst, despite operating at temperatures of 1020 °F. The sustained environmental compliance performance over its 10 plus year service life at a temperature that is approximately 10% lower than the F class frame clearly makes the McClellan plant relevant to the frame with SCR proxy unit technical and economic viability discussion.

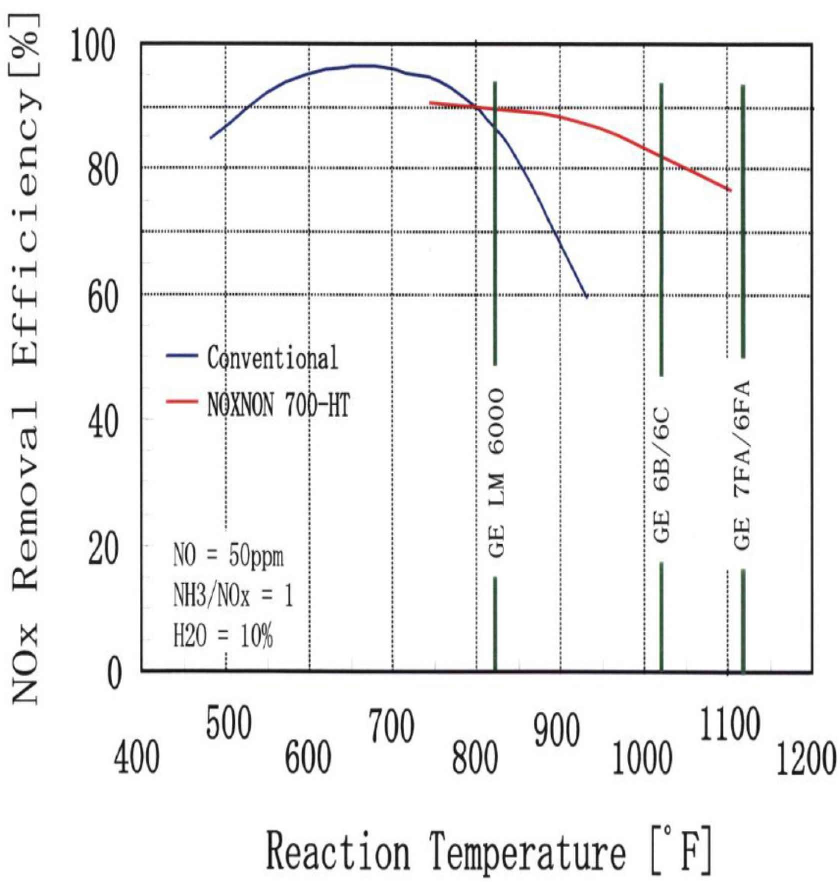
21. The McClure plant, which still has the original Haldor Topsoe catalyst and that utilizes tempering air to reduce flue gas temperature from 975 °F to 790 °F at the catalyst face, clearly demonstrates the Frame with SCR technology is viable on plants capable of burning both oil and gas.[16] Because it also operates at exhaust gas temperatures proximate to an F class turbine, it is therefore clearly relevant to the questions of technical and economic viability. McClure and McClellan's sustained performance also highlights the feasibility not only of the high-temperature SCR in a configuration with tempering air, which the proxy unit uses for economic reasons, but also the technical feasibility of high-temperature SCR applications without tempering air systems in which the catalyst is exposed to much higher temperatures. Scaling of these smaller frame units to the F class turbine can readily be accommodated, as demonstrated by MPSA with Marsh Landing, with the modeling tools (CFD and Cold Flow Modeling) and SCR design methodology described in the Brattle report.

22. The availability of high-temperature SCR designs both with and without tempering air is important when considering economic viability. In fact, the choice to use tempering air or to use a catalyst that operates at a higher temperature is largely an economic one. A developer has several economic choices to make when selecting a high temperature SCR

[16] *See* Exhibit 3.

design for either a frame or aeroderivative machine. The current industry trend is to use tempering air, but the developer then needs to select how much tempering air to use, as more air will result in a lower temperature at the catalyst face. In general, a lower temperature will allow for a less expensive type of catalyst to be used and will require less catalyst volume. For example, an SCR system for an LMS100 without tempering air uses about 35 cubic meters of catalyst per reactor; however, a system with tempering air may require only 25 cubic meters of catalyst. The economic advantage associated with a lower temperature must be balanced with the cost associated with a larger tempering air system in order to arrive at a developer's optimal configuration. For example, in the S&L design for the proxy unit high-temperature SCR, the tempering system had the capacity to reduce the flue gas temperature to 750 °F, which required 2300 horsepower fans. MPSA's SCR design at Marsh Landing reduced the temperature to only 850 °F, which required approximately 2000 horsepower fans. ATCO has advised that they typically design their tempering air systems to quench to a bulk temperature of 900 °F at the catalyst face, which would allow for even smaller fans. These different temperature specifications impact the choice of catalyst for the SCR, but would not necessarily impact the SCR system's NOx removal efficiency. The Hitachi Zosen graph below shows the NOx removal efficiency for both their conventional and high-temperature catalysts with respect to temperature, and identifies the temperatures of un-tempered exhaust from various frame machines. It is easy to see that by moving the vertical lines to the left – the effect of using a tempering air system to lower temperature –the efficiency of each catalyst improves.

NOxNON 700-HT Performance



23. IPPNY claims that catalyst effectiveness and life will erode when used in SCR on an F class frame turbine that is operated in simple cycle mode.[17] I could not find any references to erosion of catalyst in a simple cycle application, so it is not apparent what IPPNY extrapolated from in order to arrive at its conclusion. But all catalyst lose its activity over time, but this is true for all SCR applications. In addition, a catalyst operating at higher temperatures may have a shorter life expectancy, but that does not make the SCR design that incorporates it uneconomic. Further, catalyst can be damaged or lose functionality if it is operated outside its designed operating temperature range, and catalyst will not function if it is operated below its design range. While F class frame machines, like any other technology, face engineering challenges we learned from our discussions with both MPSA and ATCO that this risk can be mitigated by providing 100 percent redundant tempering fans to ensure that the tempering air system works correctly to prevent damage to the catalyst.

24. The following table is a summary of operating High Temperature SCRs that were provided by MPSA. This table clearly shows that SCR applications on combustion turbines with exhaust gases above 900 °F, with or without tempering air, can be engineered to work successfully on gas turbines. In addition, a paper published by Babcock Hitachi in 2002, referenced five Simple cycle machines with SCRs operating in Japan between 990 °F and 1067 °F.[18] Hitachi Zosen in 2003 at a DOE conference also reported on two frame units in Japan with SCRs.[19]

[17] *See, e.g.* IPPNY, Ott Affidavit at PP 23-24, 32-34.

[18] Exhibit 5.

[19] Exhibit 6.

Project	K Point Japan	SMUD McClellan	TEPCO Japan	Carson IceGen	NRG Marsh Landing	MID McClure
GT	M701F	Frame 7AE	M701DA	LM 6000	SGT 6-5000 F	Frame MS 7001B
Gas Temp	1112 °F	1020 °F	986 °F	875 °F	1146 °F	969 °F
DeNOx Eff.	86%	90%	60%	90%	87%	90%
Start of Operation	7/1992	4/2004	8/1992	6/1995	3/2013	12/2005
Hours of operation 10/13	3,000	450	4,081	17,000	1,200	3600 844 on oil
Tempering air fans	Yes	No	No	No	Yes	Yes

25. As the Brattle Report noted, injecting ambient air into the flue gas of a simple cycle machine is a well-established technology. Many of the LMS100 and the LM 6000 machines currently in operation with SCR inject cooling air to reduce the volume of catalyst needed. Mr. Ott in his affidavit confirms that this is the technology that is used. To calculate the amount of ambient air required to reduce the flue gas temperature from 1,100 °F to 850 °F-900 °F for a frame machine or 900 °F to 750 °F for an LM 6000 is a routine calculation. The engineering challenge is how to best inject the tempering air and mix it uniformly with the flue gas. Designs for inlet plenums are also not new technology. The inlet plenums on a high-temperature SCR such as one designed for an F class frame unit are equipped with mixers, vanes and perforated plates/distribution grids that mechanically distribute and mix the tempering air uniformly to prevent "hot spots" on catalyst. These are all known and proven design techniques that have been

demonstrated to work successfully when the necessary engineering design work has been performed.

26. It is true that if tempering air is not properly injected in either a frame or aeroderivative machine serious operating problems will develop. In aeroderivative machines tempering air may quench the flue gas by 50 °F to 200 °F. In an F class frame unit, tempering air is typically introduced in order to reduce the flue gas temperature by 250 °F to 300 °F. The tempering air used in a frame machine verses the LM 6000 is not significantly different, the F class frame machine simply requires more of it. The technology must also ensure that the reduced bulk temperature is uniform across the face of the catalyst. When Riverside and Cambalache were built in the early to late 1990's some of the air flow modeling techniques that are now commonly employed were not available or were not used. I have been informed by both MPSA and ATCO that in order to ensure good mixing both modeling with Computational Fluid Dynamics (CFD) and scaled cold flow modeling must be employed. This was clearly pointed out in the Brattle Report and is an engineering design feature that MPSA and ATCO insist on using when designing SCR for these types of applications. Data provided by MPSA shows that they have achieved the required mixing and a uniform temperature profile.[20]

B. Understanding the Cambalache and Riverside Facilities

27. Indicated Suppliers argue that the failure at Riverside "cannot be dismissed as irrelevant."[21] But they are wrong to suggest that the Riverside failure means that F class frame with SCR units constructed today would not be economically viable or technically feasible. As I have stated above in paragraph 13, I learned this information from a

[20] *See* Exhibit 2.

[21] IPPNY, Ott Affidavit at PP 27-28.

former employee at Babcock Power who had worked for Research Cottrell – the company that built the SCR at Riverside. I had his evaluation of the Riverside project in my files prior to undertaking this project. In addition, I received information from both MPSA and ATCO about Riverside. Both of these SCR vendors spent time at Riverside prior to submitting their bids for the Marsh Landing project.

28. From these sources, I learned that one of the problems that led to the SCR failure at Riverside was that, even though the air volume for tempering air might have been calculated correctly, the fans that were installed were too small (400 horsepower versus the 2000 horsepower fans used at Marsh Landing and the 2300 horsepower fans used for the S&L proxy plant design) and did not provided sufficient energy to facilitate the mixing of the tempering air with the flue gas. This should not be an issue at Marsh Landing because the horsepower of the tempering air fans at Marsh Landing is four times greater than at Riverside. In addition, MPSA has designed the SCR to have turning vanes and other mechanical mixing devices to ensure the temperature is uniform across the face of the catalyst, which is very different from Riverside's air injection system. The material used in the fabrication of the SCR and structure were not proper for the temperatures; the catalyst used at that time was coated not impregnated as is done today. The maldistribution of tempering air resulted in high temperatures spots, which caused the coating on the catalyst to crack and flake off.

29. Furthermore, as we reported in the Brattle Report, seal failure and improper installation of the catalyst was a major factor in the failure of at Riverside. For example, the catalyst was installed backwards and fell out of the racks. It would not be reasonable to expect these problems to recur at Marsh Landing or with another F class frame with SCR

application, as both ATCO and MPSA commented that they have incorporated enhanced designs that provide better seals in the catalyst frame (often referred to as cassettes) and the larger frame that houses all the catalyst and directs the air flow through the SCR reactor. These seals need to be properly designed for the range of bulk temperatures experienced in the SCR to allow for adequate thermal expansion without failure.

30. There is less known about the overall operation and design of Cambalache, but the exact cause of the failure of the SCR has been documented as "…catalyst poisoning due to high SO_2 emissions,"[22] and does not, contrary to the assertion of Mr. Niemann, pose a risk for the F class frame with SCR.[23] Cambalache was designed for firing oil only. The operator of the facility used oil with a significantly higher sulfur content than the catalyst was designed for, as Mr. Ott confirms that the wrong fuel oil was used. An operating error of this magnitude would have caused both frame and aeroderivative machines to fail. But such an error would seem impossible for the proxy plant, which will only run on gas with backup ultra low sulfur diesel ("ULSD") oil.[24]

C. The Dual Fuel Requirement for the Proxy Unit Does Not Pose a Barrier to High Temperature SCR Application

31. Several protests focused on the back up fuel oil requirements that an F class frame with SCR would face in NYC.[25] It first must be noted that the back-up fuel in question is ULSD. This fuel is a heavily refined fuel that has most of the sulfur removed during the

[22] *Available at*: <http://www.ct.gov/csc/lib/csc/pendingproceeds/petition_841/attachment_f_bulk_exhibit_air_permit_app_june07.pdf>

[23] Indicated Suppliers, Niemann Affidavit at P 16.

[24] The Cambalache Facility's operating permit limits the sulfur content of its fuel to 1,500ppm. ULSD contains a maximum of 15ppm sulfur, which is two orders of magnitude less.

[25] IPPNY, Ott Affidavit at P 14, Indicated Suppliers at 28, Baker Affidavit at PP 15-17.

refining process to lower SOx emissions during combustion. The refining process also removes much of the impurities from the fuel oil such as metals and other particulates that can foul the catalyst. This further reduces the concerns expressed by the Protestors.[26] MPSA pointed out to us that an SCR operating on an aeroderivative machine burning refined fuel would face the same technology issues as a frame machine. In fact since frame machines operate at higher temperature it reduces the time when deposits could contaminate the catalyst.

32. There are several misstatements in the protestors' affidavits regarding Marsh Landing's ability to demonstrate the viability of a dual fuel unit using ULSD.[27] Considering the NYISO requirement that a dual fuel unit must operate at least 30 days per year, a prudent SCR design would include sufficient catalyst to meet environmental compliance based on ULSD. As Entergy correctly points out such a design requires more catalyst – for both an aeroderivative machine and a frame machine it would require about 1.6 times the amount of catalyst to be fired on fuel oil. ULSD does not contain any more catalyst poisons than does natural gas. The extra catalyst is needed to compensate for the higher NOx emissions that occur when firing ULSD. Designing on this basis would also extend the catalyst life when operating on gas and ensure compliance during ramping and startup conditions. However, the ammonia system would not have to be more complex. The following table clearly illustrates the removal required to achieve a LAER level of 2.0 ppm NOx at 15% O_2. This table shows that the Frame unit firing oil is no more challenging than a LMS 100 machine.

[26] Exhibit 7.

[27] *See, e.g.* Indicated Suppliers, Baker at P 6.

Gas Turbine	Fuel	Uncontrolled NOx	Reduction to achieve 2 ppm NOx
LMS 100	ULSD	42	95.2%
LMS 100	Nat Gas	25	92%
Frame 5000F5	ULSD	25	92%
Frame 5000F5	Nat Gas	9	77.9%

33. Based on my review of the designs principles used by MPSA and ATCO my judgment is that they address all of these design and construction flaws that we found related to the Riverside, and I am confident that the failure mode of the Cambalache facility would not be repeated in New York.

34. It is important to note that the ULSD NOx emission rate for the Siemens machine is 25 ppm[28] and that this results in significantly less NOx removal to meet the BACT/LAER emission requirements than was anticipated by S&L and the Protestors when evaluating the F class frame machine with SCR. It should further be noted that Ms. Bonnie Marini at Siemens communicated to me that the Siemens turbine could meet the 45 second auto swap requirement established by Consolidated Edison for all units interconnected in New York City.[29] In no respect does the auto swap requirement pose any undue risk for the effectiveness of the SCR.

35. On July 9, S&L made a presentation to the NYISO ICAP Working Group in which they outlined both remedies and design considerations for the application of SCRs to simple cycle machines. I compared each of the criteria used by S&L in that presentation and

[28] Exhibit 8.

[29] Exhibit 9.

found the MPSA incorporated these items in their design for Marsh Landing. Therefore I believe that Marsh Landing is relevant to be evaluated in comparison to the Proxy Unit.

V. Ongoing Due-Diligence and Additional Data

36. Furthermore, since the Brattle Report was issued, I have obtained the official compliance test report dated June 6, 2013 for Marsh Landing ("Official Compliance Test Report").[30] The report was prepared by the AVOGADRO GROUP, LLC. I obtained the report from Kiewit the General Contractor for the Marsh Landing project. The Official Compliance Test Report has been submitted to the Bay Area Air Quality Management District and has been accepted. This report states that compliance testing began January 14, 2013 and was competed on April 21, 2015. Operating data from EPA is not available for all four units at this time however; the test report does demonstrate that units were running starting in January. Tests were conducted at full load, minimum load and in startup and shutdown conditions. The compliance test showed that the NOx were about 2 ppm and startup (full load) could be achieved between 8-11 minutes and shut down in 5 minutes. The attached test shows compliance with the permit conditions including startup and shutdown.

37. In addition, Mr. Ott[31] and the Indicated Suppliers[32] argue that Marsh Landing had limited operational data since it went commercial in May 31, 2013. In my judgment, this concern is not valid. In fact, there is significant data showing that the plant is meeting its permit requirements. Emission and load data for Marsh Landing has been available on EPA's web site since March of 2013. Startup of the Marsh Landing units began in

[30] Exhibit 10.

[31] IPPNY, Ott Affidavit at P 15.

[32] Indicated Suppliers at 24.

November 2012. Brattle and I evaluated the Marsh Landing operating data for the period running from March 12, through September 30, 2013 to inform our conclusions provided in the Brattle Report. EPA data for the facility's operation through the end of the fourth quarter will soon be available. As I discuss above, I have reviewed the official compliance test report for the Marsh Landing facility. This report includes data that confirms that prior to commercial operation, all of the Marsh Landing units demonstrated environmental compliance. Nothing we have learned from the data available from the EPA's Clean Air Markets website suggests that the units have had any compliance issues. In addition, Unit #1 operated at full load (212 MW) in January 2013.

38. With the addition of this information there is now approximately one year of operational data for Marsh Landing. The Official Compliance Test Report provides "[t]he average test results are presented in Tables 1-1 through 1-10. Summarized results from individual test runs are presented in Tables 5-1 through 5-28. The test results indicate compliance with the permit conditions for the facility." The Official Compliance Test Report showed that Unit #1 operated at full load in January 2013. And all the units ran at full load through April. During this period the average NOx emissions was approximately 2 ppm and the ammonia slip was well within compliance of the 10 ppm limit enumerated in the permit to construct.[33]

39. After reading the Official Compliance Test Report I believe some of the questions concerning the compliance of the Marsh Landing units with emissions requirements can now be addressed. The EPA data we used does not address when a unit is in ramping

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[33] *See* <http://www.baaqmd.gov/Divisions/Engineering/Public-Notices-on-Permits/2010/032210-18404/Marsh-Landing-Generating-Station.aspx> and <http://www.energy.ca.gov/sitingcases/marshlanding/index.html>.

condition and for how long since the EPA data is based on one hour averages. Some of the days we observed were days when ramping tests were performed. Marsh Landing has a separate permit limit for these periods of ramping. The Official Compliance Test Report states that the tested units were in compliance during all permit conditions including startup, shutdown and ramping.

40. While several protests continue to claim the inapplicability of Marsh Landing and the other high temperature SCR applications evaluated for the Brattle Report, it is important to note that since Marsh Landing began operations, both MPSA and ATCO have communicated to me that they have submitted bids on other F class frame simple cycle projects and have been selected to supply SCRs for retrofit applications on frame units. Both ATCO and MPSA have stated that they each have been selected for projects and are awaiting final contracts.

VI. Cost Estimates

41. The Indicated Suppliers allege that the cost estimates for the F class frame with SCR were "substantially too low."[34] This is not a valid criticism. Brattle and I reviewed the SCR operating cost estimates prepared by S&L for reasonableness. I also reviewed the operating cost developed by S&L for the LMS100 and then adjusted the cost to the frame unit. We also shared these costs estimates with MPSA and all parties agreed with S&L's adjustment to the operating cost in that it covered the cost of ammonia and catalyst replacement or regeneration. In S&L's design for the SCR, they reduced the temperature to 750°F, while MPSA and other vendors recommend reducing the temperature only to 850°F. Therefore, the power consumption that S&L calculated for the tempering air fans

[34] Indicated Suppliers, Niemann Affidavit at PP 33-34.

is conservative. No additional personnel have to be added to the staff for the SCR. Marsh Landing's catalyst was overdesigned to compensate for high ramp rates; as a result MPSA used about 70% more catalyst then you would need for steady state load operations. When designing the same machine for dual fuel firing instead, I calculate that you would add about 60% more for the higher emissions resulting in firing ULSD, making the volumes of catalyst very comparable. Reviewing the data with S&L and MPSA, Brattle and I determined that the factors used by S&L to adjust from the LMS100 to the Frame unit were appropriate. Using S&L's costs facilitates cost consistency for the ICAP Demand Curve reset process.

This concludes my Supplemental Affidavit.

ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

Anthony Licata

Anthony Licata

Subscribed and sworn to before me
this 31 day of December, 2013.

Cynthia

Notary Public

CYNTHIA MOLINA
No. 01MO6019362
Notary Public, State of New York
Qualified in Westchester County
My Commission Expires 10/10/~~2002~~ 2014

My commission expires: 10.10.14