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BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of
McLaren Backup Generating Facility

Docket Number 17-SPPE-01

Supplemental Testimony of Robert Sarvey for Helping Hand Tools (2HT)

Q. Please provide your name and qualifications for the record.

A. My name is Robert Sarvey and my qualifications have been previously submitted in Exhibit 300 The Reply Testimony of Robert Sarvey.

Q. What is the purpose of your testimony.

A. On September 28, 2018 the committee issued a notice of Status Conference and Further Orders. While the order did not solicit any testimony or announce an evidentiary hearing the applicant submitted prepared testimony in response to the committee's announcement and this testimony is in response to the applicant's testimony and the committees September 28, 2018 questions.

Q. Staff and applicant continue to assert that the modeling the of air quality impacts of emergency operations of the MBGF is not feasible. Staff has finally admitted in its latest submission that, "*Short-term CO and acute Health Risk Assessments were based on all the engines operating at the same time for every hour of the 5 modeling years in the analysis. Chronic hazard index and cancer risk were based on all engines operating at the same time for 50 hours/year. For 1-hour NO₂ (nitrogen dioxide) impacts, staff analyzed testing of each engine one at a time.*"¹ Considering this latest admission do you agree with CEC Staff and the applicant that modeling NO₂ and diesel particulate matter emissions from emergency operation is speculative?

¹ TN 22409 Page 9

A. Staff is being inconsistent much like they have been with the topic of generating capacity. In the Santa Clara Data Center Proceeding CEC Staff's first data request to the applicant requested the applicant to, *"Please provide the operations modeling analysis, which includes all on-site operations emission sources that represent expected worst case operational impacts."* The applicant responded with information not only on normal operations but also provided modeling for emergency operations as well.²

Sierra Research conducted an air quality impacts analysis for compliance with both the federal 1-hour NO₂ National Ambient Air Quality Standard (NAAQS) and the California 1-hour NO₂ standard. Sierra's initial modeling results were presented in a report submitted to BAAQMD entitled "NO₂ Air Quality Impact Analysis & Diesel Particulate Health Risk Assessment for Xeres Ventures, LLC, Santa Clara Data Center, Santa Clara, California", October 2009 (Attachment A). This analysis considered both non-emergency operations at various load levels (operation of one engine for: 30-minute test runs at 75%, 50% and 25% loads; load-banked startup at 100%, 75% and 50% loads; uncontrolled startup at 25% load; and controlled operation at 100%, 75%, 50% and 25% loads), **as well as emergency operations (operation of all 32 engines for: 30-minute emergencies at 75% and 50% load; emergency startup at 75% and 50% loads; and controlled emergency operation at 75% and 50% load).** At BAAQMD's request, Sierra Research performed more refined modeling analysis for compliance with the 1-hour NO₂ NAAQS and California ambient air quality standard, as summarized in a memorandum dated March 12, 2010, "One- Hour NO₂ Air Quality Impact Analysis and Health Risk Assessment for Xeres Ventures Santa Clara Data Center" (Attachment B). BAAQMD reviewed these analyses and the underlying modeling filed and confirmed their results.

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CEC Staff some of who worked on the Santa Clara Data Center application are fully aware that modeling emergency operation of the MBGF is feasible as the applicant demonstrated in the Santa Clara Data Center case in response to CEC data Request Number 1. The applicant in the Santa Clara Data Center application modeled, "emergency operations (operation of all 32 engines for: 30-minute emergencies at 75% and 50% load; emergency startup at 75% and 50% loads; and controlled emergency operation at 75% and 50% load)."

Q. Have you had the opportunity to review the applicants Exhibit 30 which is an August 25, 2017 letter from the executive director of the CEC, Robert Oglesby, to Vantage Data Centers

² Santa Clara SC-1 Data Center, Application for Small Power Plant Exemption Response to Informal Data Requests <https://efiling.energy.ca.gov/GetDocument.aspx?tn=62975> Page 2 of 67

³ Santa Clara SC-1 Data Center, Application for Small Power Plant Exemption Response to Informal Data Requests <https://efiling.energy.ca.gov/GetDocument.aspx?tn=62975> Page 2 of 67

Director of Operations Matt Silvers concerning the calculating of generating capacity and CEC Jurisdiction?

A. Yes, I have reviewed it. First of all, the letter was not issued to determine jurisdiction of the CEC over the MBGF. The letter concerns two other data centers being constructed by Vantage, V4 and V5, which are being collocated on another parcel owned by Vantage located at 2820 Northwestern Parkway, Santa Clara, CA 95051. At the time of the letter Vantage had three data centers operating on the property and they were seeking exemption from CEC jurisdiction on constructing V4 and V5. The construction of V4 and V5 would bring the facility's total critical load to over 50 MW triggering CEC jurisdiction. CEC Staff concluded based on evidence provided by Vantage, *"that V1-V3 should not be considered as part of the same project as V4 and V5 as it does not appear that they were part of a foreseeable plan of development and, therefore, do not together constitute the same project. Units V1-V3 were expanded or constructed at various times in 2011 and there is no information or evidence that units V4 and V5 were contemplated or planned at that time."*⁴ According to published reports the V4 data center was constructed adjacent to the V1 facility which would certainly make V4 part of the same project as V1.⁵ The six megawatt (V4) facility was completed in Q4 2016, bringing total capacity of the Santa Clara campus to more than 50 megawatts of critical load.⁶ Under any method of computation the Vantage Data Center should have been reviewed by the Commission but CEC Staff failed to assert jurisdiction. To make matters worse the jurisdictional letter dated August 25, 2017 never mentions the fact that Vantage had already began construction on another data center the V6 facility at its flagship Santa Clara campus in late **2016** and opened its doors less than a year later in October 2017.⁷ Ironically the jurisdictional letter from Executive Director Oglesby goes on to state, *"If the generating capacity of this project is increased, the existing data centers are expanded, or new information arises that contradicts the details above, staff reserves the right to reexamine or change its conclusion regarding jurisdiction."*⁸ Many months before this letter was issued Vantage had not only planned another data center at the first Santa Clara Campus they had already begun construction in 2016 a year before the letter was issued. The jurisdictional letter is factually inaccurate and the circumstances in which the jurisdictional letter was issued were erroneous.

⁴ Exhibit 30 Page 1

⁵ <https://www.newswire.com/news/vantage-data-centers-announces-new-six-megawatt-building-on-santa-clara-campus> "The new two-story building, referred to as V4, will sit adjacent to the existing V1 facility. V4 will feature outside air economization to deliver ultra-low PUEs and will run a fully redundant 2N electrical system. This new building will add 43,000 total square feet, including 30,000 square feet of white space, to the Vantage Santa Clara campus."

⁶ <https://www.newswire.com/news/vantage-data-centers-announces-new-six-megawatt-building-on-santa-clara-campus>

⁷ <https://vantagedatacenters.com/vantage-continues-to-expand/>

⁸ Exhibit 30 Page 2

Q. In the applicant's latest testimony the applicant again states that the McLaren Data Centers maximum demand is 98.67 MW.⁹ CEC Staff still argues that the maximum demand is 94.1 MW.¹⁰ According to the applicant the maximum demand of the data center is based on the data center never exceeding a PUE of 1.43. What is your response based on the evidentiary record of this proceeding?

A. First of all, the applicants witness is estimating the PUE for the facility based on the design of the data center. The estimated PUE is much like an EPA mileage estimate on a car, its nothing more than an estimate. Until the data center is operated there is no certainty it will achieve a maximum PUE of less than 1.43. The applicants two witness's Stoner and Meyers are project managers and have admitted they are not engineers so their testimony lacks credibility. The applicants engineer, *"has projected peak PUE of 1.5 for this facility."*¹¹ Further the applicants mechanical engineer has stated, *"Exact load profile predictions are difficult. Actual data hall demands vary greatly depending on the requirements of each client. They determine the maximum load per data hall. The load profile presented in this letter represents those clients who utilize the maximum amount of resources available to them in the shortest possible time frame."*¹²

The applicant retained Rosendin Electric to estimate the maximum load of the McLaren Data Center. Based on the earlier design of the data center with a maximum IT load of 54 MW the project could draw as much as 76 MW of load. With the latest design of the project the maximum IT load of the project is 69 MW and with a PUE of 1.5 the projects maximum load would exceed the 100 MW SPPE level. Rosendin Electric has been consistent in its estimation of data center load projections and PUE's for Vantage as Rosendin was also hired by Vantage to estimate data center load and PUE for both the V5¹³ and V6¹⁴ data centers at Vantages other Santa Clara Campus. Both of the V5 and V6 data center load analysis concluded that the maximum PUE would be 1.5.

The Committee also needs to realize that PUE is not a well-defined concept and is computed differently by different data center operators. For example, PUE can include only the IT critical load and the cooling, and reflect a lower PUE but if the projects total power consumption including site substation, generators, transformers, and electrical losses are included the projects PUE can be much higher.¹⁵ (See example below)

⁹ Exhibit 31

¹⁰ TN 224909 Page 8 of 14

¹¹ Exhibit 4 Page 153 of 1100

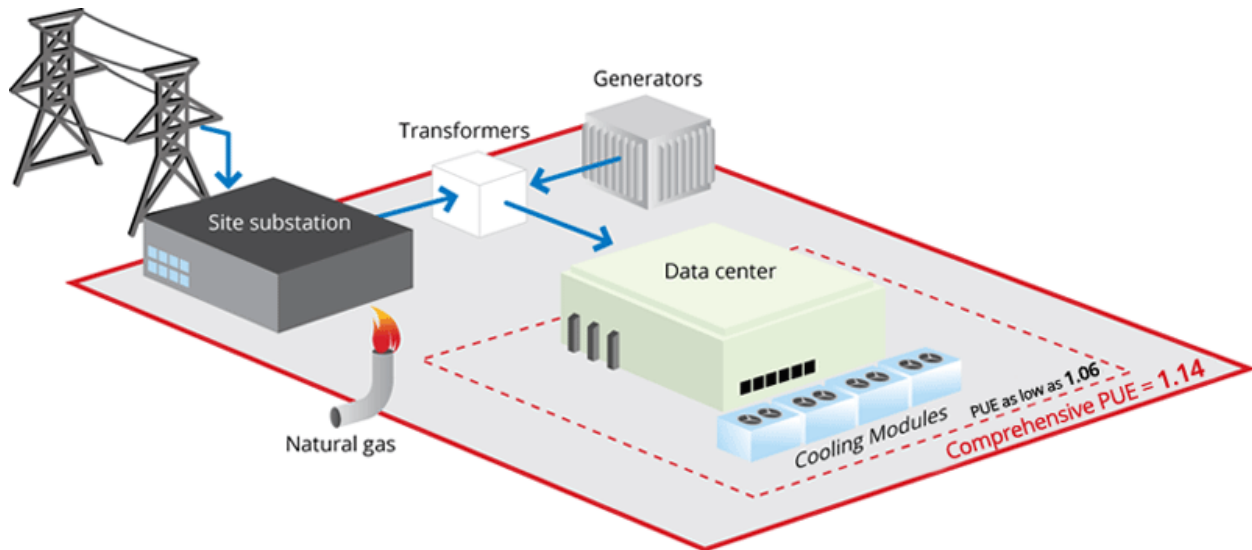
¹² Exhibit 4 Page 155 of 1100

¹³ Exhibit 308

¹⁴ Exhibit 309

¹⁵ The applicant appears to include only the IT Load and Cooling in his calculation of PUE,

MR. MYERS: In simple terms, the computer load or the server load equals 1. The quantity above that is the amount required to cool it. So the mechanical cooling is the rest of the story above the 1. And so that's how we -- that in layman's terms, that's PUE.



There is additional evidence in the proceeding that the projects maximum PUE is 1.5. During the City of Santa Clara’s review of the McLaren Data Center the applicant was asked to conduct a feasibility study to determine whether the project could meet an annual PUE of 1.2 or lower. The applicant Replied:

The commenter also states that the project could be required to meet a Power Usage Effectiveness (PUE) of 1.2 or less. The project’s PUE depends on customer demand and, as such, is more difficult to manage for a multi-tenant data center like the project, as compared to a single-user data center (e.g., Google). As stated on page 77 of the IS/MND, the Uptime Institute² conducted a study in 2014 and concluded that the average data center PUE in that year was 1.7, down from 1.89 in 2011. **With a PUE of 1.5, the project would be below the 2014 average PUE (the most recent year for which data is available), resulting in a more efficient than average facility.** As stated on page 78 of the IS/MND, Measure 2.3, Data Centers, of the CAP calls for completion of a feasibility study of energy efficient practices for new data center projects with an average rack power rating of 15 kilowatts to achieve a PUE of 1.2 or lower. The proposed project would have an average rack power rating of 8-10 kilowatts. This rating is below the criteria in Measure 2.3 and, therefore, a formal feasibility study of energy efficient practices and achievement of a PUE of 1.2 or lower is not required.¹⁶

Q. What measures, if any, are available to mitigate the Project's potential to exceed the threshold of significance for daily and annual NOx emissions to a less than significant level?

(Prehearing Conference and Evidentiary Hearing Recorded Transcript 9-30-2018 Page 63 of 123 line 25 and Page 64 Line 1-5)

¹⁶Exhibit 8 Page 295 of 311 McLaren Data Center Project RESPONSE TO COMMENTS

A. First the applicant could utilize an alternative fuel. Liquid natural gas has emerged as a viable back up electrical source at data centers. Wartsila a dominate player in the backup diesel generation industry is now touting natural gas as a cleaner alternative to back up diesel engines. According to Wartsila a major provider of emergency backup generators a backup,

“Engine does not have to run on diesel fuel anymore – especially, when there is a cleaner and more economically effective alternative: natural gas. Compared with other fuel-based technologies used in large-scale commercial power industry, gas engines meet all the features of a smart power backup system. It is fast to start, cheap to build, and extremely flexible. Not long ago, gas-fired engines suffered a major drawback in terms of very delayed start-up timing – at times as high as 10 minutes. But recent years have seen huge progress on this front. Now these state-of-the-art gas engines can be started and brought to full power in considerably less than one minute of the starting order, ushering them into the world of emergency power supply. Gas engines have also taken care of the issue of fuel storage. Recent years have seen emergence of small-scale affordable gas storage technologies, especially in the form of liquefied natural gas (LNG). As a matter of fact, small-scale LNG storage and regasification plants are so reliable and safe that they are currently being installed on passenger ships. Clearly, modern gas engines hold enough power to become a potent alternative to diesel generators. However, gas engines go far beyond merely providing an equivalent solution. Restricting carbon emissions is very important amid growing environmental concerns. And adopting gas engines is the need of the hour as natural gas is the cleanest of all fossil fuels. Using gas means less CO₂, which in turn means corporations can reduce their carbon footprint besides reducing costs.”¹⁷

Caterpillar has recently introduced its new natural gas power backup generator the CAT G 3512. Caterpillar announced the release of the new Cat[®] G3512 in 2016 as the first natural gas generator set on the market engineered to meet a full suite of critical standby market requirements. According to Caterpillar:

“ the G3512 is appropriate for office buildings, **data centers**, retail complexes, schools, government buildings, universities and research facilities. With an updated package design, the G3512 is modeled after the standby diesel solution to minimize installation costs and commissioning time on-site. A high power density 12-cylinder engine offers market leading load acceptance and transient response. Designed for reliability, this engine is built on established 3500 technology and features a robust design with steel pistons and a protection monitoring system. The G3512 is compatible with NFPA 110 Level 1 Type 10 applications, where backup power is required for mandatory building functions such as egress lighting, elevators, ventilation or data equipment, among others. The G3512 generator set starts and accepts power load in as quickly as 6.5 seconds,

¹⁷ <https://www.wartsila.com/twentyfour7/in-detail/transforming-data-centers>

depending on conditions at the site. “The combination of performance, certifications, and other critical customer requirements addressed by the Cat G3512 generator set checks all the boxes for the standby market segment,” said Mike Yohe, product line management with Caterpillar Energy Solutions. “This is built upon a robust diesel 3500 platform with a proven track record, and dependability is critical for customers who use these generators during utility outages.”¹⁸

Other alternative fuels exist to power the backup generators at the McLaren Data Center and reduce their NOx and diesel particulate emissions. Propane is a viable alternative with much less pollution than the diesel fired generators.¹⁹ Biogas could also be utilized in the backup generators. Dual fuel fired generators using a diesel pilot and natural gas would also reduce potential emissions from the MBGS.

Additional emission controls on the back up diesel generators can be utilized and are likely to be required by the BAAQMD. Santa Clara Data Center across the railroad tracks from the MBGF is equipped with SCR to reduce NOx emissions to prevent violations of the State and Federal NO2 standards.²⁰ Additional limitations on the hours of testing and maintenance for the diesel engines can also be required. BAAQMD limited the combined testing hours of the 32 diesel engines at the Santa Clara Data Center to 700 hours combined per year.²¹ According to the testimony in this proceeding BAAQMD limited the hours of testing for the 32 Santa Clara Data Center Backup diesel generators to around 20 hours per year per engine, “due to the initial risk assessment for the project coming out as not passing.”²²

Q. Does that complete your testimony?

A. Yes.

¹⁸ https://www.cat.com/en_MX/news/engine-press-releases/caterpillar-introduces-new-g3512-natural-gas-generator-set-for-emergency-standby-applications.html

¹⁹ <https://www.wartsila.com/twentyfour7/in-detail/wartsila-delivers-the-first-propane-fired-power-plant> The propane engine is not a new engine type, but the Wärtsilä 34SG is optimized for using propane. The same engine can be used with propane, natural gas and also ethane, making it, in fact, a tri-fuel engine. Fuels can be changed on the fly without stopping the engine. We see this new development as a natural extension of the fuel flexibility of Smart Power Generation power plants. Fuel security is important, and customers have the capability of always choosing the cleanest and the most affordable fuels – or simply the fuels that are readily available.

²⁰ Exhibit 304 Energy Commission Decision SANTA CLARA SC-1 DATA CENTER, PHASE 2 Page 57 of 141

²¹ Exhibit 304 Energy Commission Decision SANTA CLARA SC-1 DATA CENTER, PHASE 2 Page 11 of 14

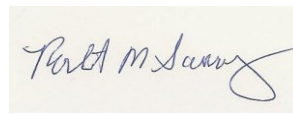
²² Prehearing Conference and Evidentiary Hearing Recorded Transcript 9-30-2018 Page 91 of 123 Lines 19-23

Declaration of Robert Sarvey

I Robert Sarvey Declare as Follows:

1. I prepared the Supplemental Testimony of Robert Sarvey for Helping Hand Tools (2HT).
2. A copy of my professional qualifications and experience is included in the previously filed testimony REPLY TESTIMONY OF ROBERT SARVEY FOR HELPING HAND TOOLS which is Exhibit 30.
3. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.
4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed in Tracy, California on October 16, 2018.

A rectangular box containing a handwritten signature in blue ink that reads "Robert M. Sarvey".

Robert Sarvey