Docket: **R. 12-03-014 (Track 4)**

Exhibit No.: _____

Commissioner: **Florio**

ALJ: **Gamson**

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans.	Rulemaking 12-03-014 (filed March 22, 2012)

TRACK 4 PREPARED TESTIMONY OF HALA N. BALLOUZ ON BEHALF OF AES SOUTHLAND

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September 30, 2013

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Q. Please state your name and current employment.

A. My name is Hala N. Ballouz. I am the President of Electric Power Engineers, Inc. (EPE).

Q. What is your professional and educational background?

A. My professional and educational background is set out in Exhibit A.

Q. Did you previously perform work in connection with the Commission's Long Term Procurement Plan proceeding?

A. As part of the 2010 LTPP, EPE performed an analysis of the effect of the retirement of generating units located at Huntington Beach, Alamitos and Redondo Beach, as a result of Once-Through-Cooling (OTC) compliance requirements, and the resulting system deficiencies under such conditions. After performing the its initial study for the 2010 LTPP, EPE has continuously updated that study, as well as performing sensitivity analyses concerning local capacity resource needs in the Western LA Basin as a result of OTC retirements and the retirement of San Onofre Nuclear Generating Station (SONGS). I submitted testimony in both the 2010 LTPP (R.10-05-006) and the current 2012 LTPP (R.12-03-014) concerning the results of EPE's studies, as well as the need for local

capacity in the Western LA Basin Local Capacity Area (LCA).

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to address, based upon EPE's own studies, and my review of the testimony and analyses prepared and submitted by both Southern California Edison (SCE) and the California Independent System Operator (CAISO), the effectiveness of both generation and transmission solutions in addressing the need resulting from the retirement of the SONGS. In particular, I understand that the goal of this proceeding should be to meet that need and the State's environmental objectives in the most cost effective manner while still ensuring grid reliability in the LA Basin. My testimony examines both SCE's request to augment its Track I solicitation by an additional 500 MW in light of SCE's and the CAISO's Track IV studies, and SCE's proposed transmission solution of the Mesa Loop-In.

Q. What testimony submitted in this proceeding have you reviewed to inform your conclusions?

A. I have reviewed the testimony of Robert Sparks on behalf of the CAISO, the testimony of Garry Chinn, Colin Cushnie, Mark Nelson, Jonathan Rumble, and Carl Silsbee on behalf of Southern California Edison (SCE), and the testimony of Robert Anderson and John Jontry on behalf of San Diego Gas and Electric Company (SDG&E).

I. SCE REQUEST FOR 500 MW ADDITIONAL PROCUREMENT AUTHORIZATION

Q. Southern California Edison has requested that its Track I authorization be augmented to allow for procurement of an additional 500 MW from any technology. Is that request consistent with both EPE's studies and the studies performed by the CAISO and SCE?

A. Based upon EPE's studies, as well as the studies performed by the CAISO and SCE, I agree with SCE that at least an additional 500 MW procurement authorization is needed.

In light of those studies, however, a more prudent authorization would be for authorization of an additional 1,000 MW of procurement. EPE's initial studies showed that approximately 2,300 MW (in addition to El Segundo units modeled at 540 MW, Canyon Power units modeled at 200 MW and Walnut Creek units modeled at 500 MW), will be required at locations currently occupied by generation subject to the Water Board's Once Through Cooling (OTC) regulations, even when the SONGS units were assumed to be in operation. EPE's study also showed that the generation should be procured from OTC locations having the highest effectiveness factors; if generation were procured from alternate locations, significantly more MW's would be needed to reliability serve the Western LA Basin local capacity area. EPE's additional sensitivity analyses without SONGS, using CAISO's 2021 Trajectory base case including all CAISO approved upgrades, indicate 3,300 MW of local area capacity needs.

The CAISO's studies in this Track IV, as explained in the testimony of Robert Sparks, identifies the need to repower or replace 4,507 MW in the SONGS Study area of which 3,022 MW in the Southwestern LA Basin. (Sparks at p. 24.) SCE's studies in this Track 4 also show the need for 2,800 MW of new local capacity resource (LCR) generation, *in the most effective locations* , to meet LCR need by 2022, with all OTC facilities and SONGs retired. SCE's studies also showed that an aggressive use of preferred resources, strategically located to provide maximum effectiveness, as well as development of the Mesa Loop-In transmission project, might displace the need for new resources. However, SCE requests that the Commission authorize the procurement of an additional 500 MW of resources.

With procurement authorization at only 1,400 to 1,800 MW from Track 1 (D.13-03-029),

CAISO, SCE's and EPE's studies all demonstrate that there is a need to procure at least an additional 1,000 MW of generation.

Allowing some additional procurement now protects against the failure of preferred resources to materialize, higher than expected load growth, or permitting or other issues (as discussed below) delaying or preventing the development of the Mesa Loop-In transmission project. Further, both SCE's and the CAISO's need assessments are based upon the procurement of additional generation at the most effective locations. As EPE has previously shown in its study, procurement at other locations would require significant additional MW's. If procurement does not occur at the most effective locations, and/or if preferred resources do not materialize as anticipated, even an additional 1,000 MWs may be insufficient, and additional procurement may be necessary. However, an additional 1,000 MWs represents a "no regrets" level of procurement, and is consistent with studies performed by EPE, SCE and the CAISO.

II. MESA LOOP-IN PROJECT AS COMPARED TO BROWNFIELD GENERATION

Q. Have you reviewed SCE's proposal concerning the Mesa Loop-In Project

A. Yes, I have.

Q. Would the Mesa Loop-In Project reduce the overall need for new generation to maintain system reliability?

A. The Mesa Loop-In project would only reduce the need for generation to be procured from the LA Basin LCA. It would not reduce the overall need for new generation. If the Mesa Loop-In project were constructed, generation outside the LA Basin LCA would still need to be permitted, contracted for, and constructed to meet overall system need. EPE's analysis also shows that although the Mesa Loop-In project reduces the amount of generation procurement need from the LA Basin LCA, it introduces new overloads and

exasperates some other overloads due to import of generation into the LA Basin LCA requiring additional measures to mitigate, including the potential need to procure additional generation.

Q. What is your understanding of the permitting status of Mesa Loop-In Project?

A. My understanding is that SCE has not yet submitted the Mesa Loop-In to the CAISO for review and approval, but has stated an intent to do so in the 2013-2014 Transmission Planning Process (TPP). SCE has not yet sought the approval of the California Public Utilities Commission for the Mesa Loop -In either, but has stated an intent to seek such approval if and when the project is approved by the CAISO [SCE Track 4 testimony page 9].

Q. Does the Mesa Loop-In Project pose a risk to timely procurement of new generation to meet system needs?

A. It is my understanding that SCE has not yet begun the approval process for the Mesa Loop-In Project. As SCE notes in its own testimony, there is considerable uncertainty concerning how long it will take to complete permitting and construction. Were the permitting to uncover significant environmental concerns, or meet with significant public resistance, the timeline for permitting and construction would be further lengthened, along with increasing the risk that the project would not even be permitted by the relevant regulatory authorities. A number of recent transmission projects, including, Devers Palo Verde 2, and West of Devers all took longer to permit and construct, and/or were more costly than originally anticipated. Furthermore, the effectiveness of the Mesa Loop-In project is contingent upon completion of the Tehachapi 500 kV transmission lines; construction on those lines has not been completed yet.

There are additional uncertainties as well, in that the Mesa Loop -In would not reduce the need for generation, but would instead simply allow needed generation to be located outside of the LA Basin LCA. Therefore the time to permit, contract for, and construct new greenfield generation outside the LA Basin should also be considered. Nor is it clear what generation might be imported into the LA Basin through the Mesa Loop-In Project, nor where such generation projects would be located. Brownfield generation within the LA Basin LCA at established sites with existing transmission infrastructure may therefore prove to be a more viable solution to the local capacity needs in the LA Basin. It may also provide greater reliability benefits and be more cost effective.

Q. Please explain why generation located within the Basin will have greater reliability benefits.

A. Locating generation near load, in this case within the LA Basin, will reduce the contingency events that may result in constraints in delivery of power to the LA Basin loads, and providing important reactive power and voltage support for the area. The transmission system in the Basin area has been built and developed to deliver generation produced from SONGS and existing LA Basin OTC generation such as AES's. Importing significant amounts of power to the LA Basin and San Diego LCAs would result in large reactive power losses which under sudden demand changes would place the system under risk of voltage collapse. This is exasperated by the large amounts of distributed renewable generation that may contribute to sudden changes in demand for power. The loss of SONGS and retirement of OTC units will leave the system with power and voltage support needs that can be best mitigated by placing generation into service at or near the locations of these units which will will best maintain system reliability. The CAISO's studies further confirm the need for reactive power support in the LA Basin,

especially at or near SONGs. As Robert Sparks noted in his testimony (Sparks at page 16), "the ISO evaluated various locations for installing dynamic reactive support devices …. It is not surprising that the optimal locations for the dynamic reactive support devices are at or near SONGS, because the voltage needs to be supported to enable increased power transfer from SCE to SDG&E system under the critical contingency condition". It is also worth noting that the nature of voltage support requires that the support comes from conventional generation, combined heat and power, or specialized equipment such as synchronous condensers that operate like large electrical motors; solar photovoltaic systems, wind energy, battery storage, energy conservation, and demand response do not provide this characteristic but can reduce the amount needed.

Q. Can you further explain your statement that brownfield generation in the LA Basin may be more cost effective than the Mesa Loop In?

A. Yes. Brownfield Western LA Basin generation may be more cost effective because generation located within the Basin is likely to provide greater reliability benefits, and does not require additional costs of transmission system upgrades like the Mesa loop-In project. To the extent the Commission considers transmission alternatives in this proceeding, the estimated cost of those alternatives, plus additional greenfield generation development to meet system needs, as well as the need to provide additional voltage support in the LA Basin, should be compared to the costs associated with brownfield development. It is likely that brownfield development--which does not require transmission upgrades and will also provide voltage support--will be the more cost effective option.

Q. How does the permitting timeline for brownfield generation compare to greenfield transmission and generation permitting?

A. Due to the approaching OTC deadlines, AES Southland has already begun the process of permitting repowered generation at its existing OTC sites. As explained in Eric Pendergraft's testimony, applications for certification (AFC) have already been filed at the California Energy Commission for two of AES Southland's sites, Huntington Beach and Redondo Beach. AES Southland expects to file an AFC for the Alamitos site shortly. Permitting for repowering existing OTC generation is therefore well underway. In contrast, SCE has not yet begun the approval process for the Mesa Loop-In Project. Further, it is not clear what generation might be imported into the LA Basin through the Mesa Loop-In Project, nor where such generation projects would be located. Permitting and construction timelines for repowering existing OTC sites are therefore likely to be considerably shorter than the timeline for developing greenfield transmission and new generation.

Q. How do the environmental impacts of redeveloping existing OTC sites compare to the impacts of the Mesa Loop-In project and generation from new resources?

A. The environmental impacts associated with redeveloping existing brownfield sites are likely to be considerably less than the impacts associated with the development of new transmission lines and potentially the development of additional generation at new sites, since the OTC sites are already established. OTC generation is scheduled to retire by the end of 2020. Were the Commission to decline to authorize the procurement of additional LA Basin generation in reliance upon the development of the Mesa Loop-In project, delays in permitting that transmission upgrade, or the failure to get it permitted, could likely result in the extension of the OTC compliance deadlines in order to ensure continued reliability in Southern California. The extended operation of OTC facilities

would in turn have significant environmental impacts as compared to repowered, air-cooled, generation located at those same sites.

III. VOLTAGE SUPPORT NEEDS IN THE LA BASIN AREA

Q. Are there voltage support concerns that may result from adopting the MESA Loop-In transmission project and procuring less generation from the LA Basin?

A. Yes. As explained in my previous statements, voltage support is needed in the LA Basin area and is most reliably provided from sources located at or near SONGS or existing OTC generation, which was confirmed by CAISO Track 4 studies. The Mesa Loop-In is not expected to eliminate this need. EPE believes that the AES SL projects can provide valuable voltage support to the area in the absence of SONGS. AES SL has already proven its ability to provide voltage support solutions. It currently operates Huntington Beach units 3 and 4 as synchronous condensers to provide dynamic voltage support to the LA Basin, under a Reliability Must Run (RMR) Agreement with the CAISO. It is likely that its other generation locations are also effective in providing voltage support.

IV. SCE's LOAD SHEDDING ASSUMPTION

Q. In its studies, SCE recommended load shedding to address the critical Category C.3 contingency in SDG&E's service territory. Do you consider that assumption to be appropriate?

A. NERC Transmission Planning Reliability Standard does not allow load shedding for Category A and B contingencies, but if planned and controlled, NERC standards permit loss of demand for Category C. CAISO, being the operator of the grid is the entity that determines the reliability impact of adopting load shedding scenarios in its transmission planning. Though load shedding is allowed for Category C.3 contingencies, the CAISO determined that load shedding for the C.3 contingency considered by SCE was not appropriate for long term planning [SCE Track 4 Testimony, page 27]. CAISO is agency

tasked with ensuring reliability of the system and it is prudent in my opinion as an electric system planner not to use load shedding for long term planning of a reliable system. Load shedding should be reserved to short term solutions or to situations in which other alternatives are not feasible.

V. CONCLUSION

Q. Please summarize your conclusions.

A. In conclusion and from my review of all the testimony submitted on this Track supplemented by studies that EPE has completed:

a) The transmission system serving the LA Basin has been built around OTC generation and SONGS to effectively deliver power to the LA Basin loads.

b) Finding transmission solutions to reduce the need for procurement of generation from the most effective LA Basin generation locations may not result in the most robust or reliable system configuration. Importing large amounts of generation, particularly when system demand undergoes sudden changes, will expose the system to voltage collapse conditions.

c) Permitting and construction timelines for repowering existing OTC sites are likely to be considerably shorter than the timeline for developing greenfield transmission such as the Mesa Loop-In project and/or new generation.

d) The Mesa Loop-In project only reduces the need to procure generation from the LA Basin area. Generation will still need to be procured to satisfy system needs. Procuring generation from outside the LA Basin area to replace SONGs may not be the most reliable nor cost-effective

solution.

e) The Mesa Loop-In project has not been approved or studied by CAISO, depends on the completion of the Tehachapi 500 kV loop, and may face risks in meeting the timeline for completion by 2020. Moreover, and if the purpose of this project is to reduce procurement from the LA Basin area, then this results in a) the introduction of additional time to evaluate and approve the project before initiation of procurement of new generation from outside the LA Basin, b) deprive the LA Basin area of the voltage support that generation located near the SONGS site would otherwise provide, c) require additional studies for voltage collapse which may result in the need to procure additional voltage support in the LA Basin, and d) likely be more costly than developing new generation at existing brownfield sites in the LA Basin.

e) EPE recommends that SCE be authorized to procure an additional 1,000 MW of generation in addition to what was approved at the conclusion of the Track 1 process.

Q. Does this conclude your testimony?

A. Yes.

Exhibit A
Statement of Qualifications

HALA N. BALLOUZ, President, Electric Power Engineers, Inc.

PROFESSIONAL EXPERIENCE:

- President, Electric Power Engineers, Inc.
- Partner and shareholder, International I.G.M. s.a.r.l.
- Board Member, Texas Renewable Energy Association
- Board Member, Texas Renewable Energy Association
- Board Member, Association of Women in Energy

Hala Ballouz, President and Owner of Electric Power Engineers, with multiple offices in the U.S. and internationally, is a lead consultant in the Electric Power Industry since 1991, specifically for generation energy development and electric grid analysis. She has over 15 years of experience in transmission system analysis, substation and distribution system design, resource and grid integration feasibility studies, generation energy development, distribution System planning and operations, and Design/Engineering/Procurement for generation projects. Her experience includes, but is not limited, to the following:

- Over 19 years of power generation, transmission, and distribution engineering consulting
- Transmission system analysis using state-of the-art analysis software.
- Power generation development from site assessment to shovel ready
- Feasibility studies and evaluation of energy resource projects (including renewable)
- Distribution System Planning and Operations
- Design/Engineering/Procurement for conventional, wind and solar generation projects
- Expert Witness

EDUCATION:

M.S., Electrical Engineering, Texas A&M University, College Station, Texas	1991
B. S., Electrical Engineering, Texas A&M University, College Station, Texas	1989

PROFESSIONAL MEMBERSHIPS and REGISTRATIONS:

Professional Engineer, State of Texas (License #80999)
Professional Engineer State of Idaho (License #12315)
Professional Engineer State of Rhode Island (License #8696)
Board of Engineers, Lebanon
Texas Society of Professional Engineers
National Society of Professional Engineers
The Wind Coalition, Board Member
Texas Renewable Energy Association (TREIA), Board Member
Association of Women in Energy (AWE), Board Member
American Wind Energy Association (AWEA), member
Institute of Electrical and Electronics Engineers (IEEE)
Power Society of IEEE