

SUPPLEMENTAL DIRECT TESTIMONY OF
J. MICHAEL SILVA

PRESIDENT
ENERTECH CONSULTANTS OF SANTA CLARA, INC.

Subject: Magnetic Field Evaluation

1 INTRODUCTION

2 Q. Please state your name and business address.

3 A. My name is J. Michael Silva and my business address is 300 Orchard City Drive,
4 Suite 132, Campbell, California.

5 Q. What is your occupation?

6 A. I am a research engineer, specializing in assessing exposure to extremely low
7 frequency electric and magnetic fields (called EMF).

8 Q. What position do you hold?

9 A. I am President of Eneritech Consultants of Santa Clara, Inc. ("Eneritech").

10 Q. What is Eneritech?

11 A. Eneritech is a 22-year old consulting and scientific research firm that specializes in
12 applied research projects, engineering, exposure assessment, and the development
13 of EMF measurement instrumentation and computer modeling software. We have
14 approximately 20 employees in two offices and are involved in a variety of
15 research and consulting projects.

16 Q. Have you previously submitted testimony in this proceeding?

17 A. Yes. I submitted written direct testimony and exhibits as HECO T-10.

18 Q. What is the scope of your supplemental testimony?

19 A. My testimony will provide an overview of Eneritech's Magnetic Field Evaluation,
20 dated July 21, 2004, for the East Oahu 46 kV Phased Transmission Line
21 Project, which is attached as HECO-ST-1001.

22 Q. What was the purpose of preparing the Magnetic Field Evaluation?

23 A. The Magnetic Field Evaluation was performed to evaluate present and future
24 levels of magnetic fields at various locations associated with the proposed project,
25 and to measure and calculate magnetic fields for existing and proposed electrical

1 facilities.

2 Q. Can you summarize the measurements and calculations in your Magnetic Field
3 Evaluation?

4 A. Magnetic field measurements were conducted at eleven selected segments
5 associated with the proposed project to characterize field strengths due to existing
6 electrical facilities. Existing electric facilities surveyed included 12 kV, 25 kV,
7 46 kV, and 138 kV power line facilities. In addition to field measurements,
8 magnetic field calculations were also performed for 2009 forecasted normal and
9 Pukele outage conditions (which are identified in Appendix G of our report) for
10 eleven different project segments. EMF levels associated with the installation of
11 new transformers within certain substations, manholes in the streets, and risers on
12 wooden poles at sidewalk locations were evaluated by measuring EMF due to
13 comparable existing facilities. In addition to measuring and calculating magnetic
14 fields for electrical facilities associated with the proposed project, magnetic field
15 measurements were performed at ten different locations in Honolulu. These
16 measurements were performed to provide a range of magnetic field levels
17 encountered in everyday locations and for comparison with the magnetic field
18 levels associated with the proposed East Oahu Transmission Project.

19 Q. Please summarize the results of the measurements and calculations in your
20 Magnetic Field Evaluation for the eleven project segments.

21 A. Existing magnetic field levels from HECO facilities are typical of levels from
22 similar facilities throughout the State of Hawaii. Existing magnetic field levels
23 along the eleven segments measured by Eneritech range from a few tenths of a
24 milligauss (mG) to over 25 mG, depending upon location. For streets and
25 sidewalks where no overhead or underground power lines were immediately

1 present, measured magnetic field levels ranged from a few tenths of a mG to about
2 2 mG. Sidewalk locations with overhead power lines were measured and
3 typically ranged from about 1 mG to about 5.5 mG. Street and sidewalk locations
4 with underground power lines typically ranged from about 1 mG to a maximum of
5 over 25 mG directly above the underground power line in the street.

6 The magnetic field levels were also calculated for 2009 forecasted normal
7 and Pukele outage conditions for each of the eleven project segments. The
8 difference in projected magnetic field levels between the existing and proposed
9 power line configurations under 2009 forecasted loading can decrease slightly,
10 remain unchanged, or increase depending upon the project segment. For Segment
11 'I' (where no 46 kV power lines presently exist), the projected magnetic field
12 generally remains unchanged since the proposed underground 46 kV power lines
13 would only be utilized under Pukele outage conditions. For Segment 'E' (east of
14 Kamoku Substation where modifications to an existing overhead 46 kV power
15 line are proposed), the range of projected magnetic field levels decreases slightly
16 since the 2009 forecasted load is somewhat lower for the proposed configuration
17 than for the existing configuration. At all other segment locations, the projected
18 magnetic field increases due to the proposed power line configuration under 2009
19 forecasted loading conditions. While the largest magnetic field increases typically
20 occur within street locations, projected magnetic field levels can also increase at
21 sidewalk locations. Under proposed 2009 Pukele outage conditions, the projected
22 magnetic field increases at all segment locations.

23 If the project is implemented, the proposed underground circuits would
24 have little effect on EMF levels at nearby institutions. A magnetic field
25 assessment was performed to evaluate present and future levels at various

1 institutions along the proposed project. Several institutions are located near
2 portions of the proposed project, including day care centers, pre-schools and
3 schools, hospitals, churches, and retirement homes. Distance measurements were
4 taken to determine the closest building edge to the proposed project. Using these
5 distance measurements, the projected magnetic fields for 2009 loading conditions
6 were evaluated for each of these institutions. Six different institutions are located
7 within 100 feet of the proposed project. Four of these institutions would have no
8 projected magnetic field under normal operating conditions, since the
9 underground power lines along this segment will be only loaded during Pukele
10 outage conditions (and even then the projected field at the closest building edge is
11 less than 1 mG). The two closest institutions are the Kaplan Test Preparation
12 Center and the Lunalilo Elementary School. For the Kaplan Test Preparation
13 Center, projected 2009 magnetic field levels of 0.0 mG with the existing power
14 line configuration would increase about 1.1 mG with the proposed configuration
15 under normal loading. For the Lunalilo Elementary School, projected 2009
16 magnetic fields of about 4.0 mG with the existing power line configuration would
17 decrease to about 3.3 mG with the proposed configuration under normal loading
18 (due to some field cancellation). There are five additional institutions located
19 within 200 feet of the proposed project. Of these, two institutions have projected
20 magnetic fields of about 0.6 or less under Pukele outage conditions, and three
21 institutions would have no projected magnetic field under normal operating
22 conditions (since the underground power lines are only loaded during Pukele
23 outage conditions and have negligible projected magnetic field influence of about
24 0.1 mG). Beyond 200 feet, the projected magnetic field influence from the
25 proposed 46 kV project is negligible.

1 The proposed substations, manholes, and risers of the East Oahu
2 Transmission Project will be similar to existing facilities and have very low EMF
3 levels at a relatively short distance away. The magnetic field from a substation
4 transformer or manhole is typically reduced by about 90% at a distance of about
5 20 feet away from the facility (for transformers, magnetic fields due to these
6 sources are typically reduced to ambient levels at the substation perimeter). For
7 risers, the magnetic field is typically reduced by over 90% at a distance of about 3
8 feet away from the riser.

9 Q. Please summarize the results of the measurements for selected Honolulu locations
10 as described in your Magnetic Field Evaluation.

11 A. There is a wide variety of EMF levels and sources encountered in everyday life
12 that are comparable to EMF due to electric power facilities. Magnetic field
13 measurements of everyday environments were performed at ten different locations
14 in Honolulu. These measurements were performed to provide a range of magnetic
15 field levels encountered in everyday locations and for comparison with the
16 magnetic field levels associated with the proposed East Oahu Transmission
17 Project. Measured magnetic fields ranged from 0.1 mG to over 99 mG in
18 everyday environments. Many of these magnetic field sources are common
19 appliances and electrical devices, such as refrigeration units in supermarkets,
20 electric stoves in food preparation areas, library security gates, escalators, vending
21 machines, display counters, video games, cash registers, and ATM machines.

22 Q. Are there Federal or State of Hawaii health standards for 60 Hertz magnetic
23 fields?

24 A. No. As stated in our report, over the past two decades, there has been research
25 investigating exposure to EMF, and two organizations have developed guidelines

1 or limits: the International Commission on Non-Ionizing Radiation Protection and
2 the American Conference of Governmental Industrial Hygienists. The measured
3 and projected magnetic field levels associated with the proposed East Oahu
4 Transmission Project are far below these guidelines or limits. There are at least
5 two states that have adopted “status quo” engineering standards for magnetic
6 fields. The purpose of most of these standards is to make the field levels from
7 new power lines similar to the field levels from existing overhead transmission
8 lines. The measured and projected magnetic field levels associated with the
9 proposed East Oahu Transmission Project are well below these other state
10 standards.

11 Q. Does this conclude your testimony?

12 A. Yes.

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