



STATE OF HAWAII  
DEPARTMENT OF HEALTH

P. O. BOX 3378  
HONOLULU, HAWAII 96801

In reply, please refer to:  
HEER OFFICE

January 19, 1994

DOH POLICY RELATING TO ELECTRIC AND  
MAGNETIC FIELDS FROM POWER-FREQUENCY SOURCES

The Department of Health, in response to continuing but inconclusive scientific investigation concerning electric and magnetic fields (EMF) from low-frequency power sources, recommends a "prudent avoidance" policy. "Prudent avoidance" means that reasonable, practical, simple, and relatively inexpensive actions should be considered to reduce exposure.

A cautious approach is suggested at this time concerning exposure to electric and magnetic fields (EMF) around low-frequency sources, such as electric appliances and power lines. The existing research data on possible adverse health effects, including cancer, are inconclusive and not adequate to establish or quantify a health risk. For example, the biological mechanisms that might underlie any apparent relationship between EMF and cancer have yet to be clearly defined. Also, some epidemiological studies suggest that, if these fields increase the risk of cancer, it is a very small increase. Other epidemiological studies suggest that there is no increased risk.

The Department of Health will continue to collect and evaluate information on possible health hazards associated with electric and

magnetic fields. If adequate data ever become available to establish what levels may be harmful, appropriate standards will be established.

BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF HAWAII

<p>In the Matter of the Application of)</p> <p style="padding-left: 40px;">HAWAIIAN ELECTRIC COMPANY, INC. )</p> <p>For Approval to Commit Funds in ) Excess of \$500,000 for Item BT-849, ) Construction of Waiiau-CIP 138 kV ) #1 &amp; #2, Part 2, Transmission ) Lines; for Item UM-844, Under- ) grounding of Distribution Lines ) and Services along Kamehameha ) Highway; and for a Waiver of Rule ) 14 of HECO's Tariff to Allow HECO ) to Pay for Item UM-844 Service ) Conversions. )</p> <hr style="width: 40%; margin-left: 0;"/>	<p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p> <p>)</p>	<p>DOCKET NO. 7256</p>
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Excerpts From

DECISION AND ORDER NO. 13201

H.

The principal issue in the overhead versus underground debate is whether exposure to the EMF emitted by the transmission lines results in any adverse health effects. HECO's position is that the scientific literature does not support a conclusion that exposure to EMF will adversely affect health. Aki et al. and the Amfac corporations assert that the issue is still unresolved. VPCA

argues that epidemiological studies have established a significant association between EMF exposure and adverse health effects.

A total of seven witnesses testified on the health effects of EMF. HECO's witnesses were:

1. Dr. Howard Wachtel, a professor of electrical engineering at the University of Colorado and participant in several EMF epidemiological studies, who testified that it is very unlikely that the magnetic fields typically produced by power lines are a cause of cancer or other serious health effects;
2. Dr. Darwin Labarthe, a medical doctor, epidemiologist, and professor at the University of Texas Health Science Center in Houston, Texas, who testified that, based on his review of the epidemiological literature on EMF, he could not conclude that exposure to EMF causes adverse health effects, including cancer; and
3. Dr. Richard Bockman, a medical doctor and biochemist at the Cornell University for Special Surgery and professor at Cornell University Medical College, who testified that, based on his review of the scientific literature on EMF, he concluded that while exposure to some levels of EMF may cause subtle biological responses in some individuals, he could not conclude that these biological responses are associated with any adverse health effects on reproduction, growth and development, circadian

rhythms, hormonal function in the body, neurological function, calcium function, or the immune system;

VPCA's witnesses were:

1. Dr. Samuel Milham, Jr., a medical doctor and former chronic disease epidemiologist at the Washington State Health Department in Olympia, Washington, who testified that, based on the original research that he conducted on the epidemiology of EMF health effects and the results of two recent Swedish studies (Floderus, 1992 and Feychting-Ahlbom, 1992), he concluded that if the transmission lines are built as proposed by HECO, EMF-induced cancers will occur in the exposed populations.
2. Cynthia L. Sage, a geologist and owner of an environmental consulting firm in Montecito, California, who testified that, based on the epidemiologic research supporting an association between EMF and cancer, she would recommend against the installation of high voltage transmission lines near residences, schools, or playgrounds, even though the association has not yet been conclusively proven.
3. Dr. Frederick A. Dodge, a medical doctor and director of family practice at the Waianae Coast Comprehensive Health Center, who testified that, while final conclusions regarding the association between EMF and various cancers in adults and

children are not available, he would bury the proposed transmission lines, with proper shielding, as a result of two epidemiologic studies (Feychting-Ahlbom and Olsen, 1992) that have linked EMF with the occurrence of cancers.

4. Leslie K. L. Au, a toxicologist and chief of the Hazard Identification Office of the State Department of Health (DOH), who testified that "none of the states have a clue as to whether EMF is a proven health hazard and . . . what a protective level would be," and that in the absence of specific information regarding the possible health risks of exposure to EMF, the department suggests prudent avoidance.<sup>3</sup>

Based upon a thorough examination of all of the evidence presented in this docket with regard to the possible health effects of exposure to EMF, we find that a causal link between EMF and adverse health effects has yet to be established by those in the scientific community who have been researching this matter. A few studies, such as the Swedish studies mentioned above, appear to have established an association between EMF exposure and the occurrence of certain cancers. However, the results of these studies have yet to be accepted by the scientific community as proof that exposure to EMF causes cancer or other diseases.

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<sup>3</sup>Mr. Au also testified that although the DOH has adopted the term "prudent avoidance," it has "never defined the boundaries of that term."

In the absence of more definitive evidence on the health effects of EMF exposure, we find that we cannot order HECO to place the Waiiau-CIP part 2 transmission lines underground as a result of EMF concerns. We will, however, expect HECO to exercise prudent avoidance with respect to EMF.

As acknowledged by the parties in this docket, there is no universally accepted definition of the term "prudent avoidance," as it is applied to EMF. Although the DOH uses the term, it is clear from Mr. Au's testimony that the DOH has not yet defined prudent avoidance with respect to EMF exposure. For purposes of this docket and pending adoption of a definition by some other authoritative source, we adopt the following explanation of prudent avoidance, put forth by the United States Environmental Protection Agency in its Questions And Answers About Electric And Magnetic Fields (EMF), 402-R-92-009 (1992):

Prudent avoidance is an approach to making decisions about risks. This decision-making process is based on judgment and values, can be applied to groups and individuals, and can be considered for all aspects of our lives, not just EMFs. Prudent avoidance applied to EMFs suggests adopting measures to avoid EMF exposures when it is reasonable, practical, relatively inexpensive and simple to do. This position or course of action can be taken even if the risks are uncertain and even if safety issues are unresolved.

Upon review of the record, we find that HECO exercised prudent avoidance, as we utilize the term, in developing its Waiiau-CIP part 2 project. The routing report indicates that HECO's approach in this project was to "design, construct, and operate its facility in a manner that will minimize EMF where technically feasible and economically reasonable." The record shows that HECO has implemented this approach through its routing of the preferred

alignment and its adoption of such engineering design options as unlike or low-reactance phasing.

We also find that the underground placement of the Waiiau-CIP part 1 transmission lines would not constitute prudent avoidance because of the substantial cost that would be involved and the uncertainty regarding the health effects of EMF exposure. While the evidence that HECO presented at the July 19, 1993, hearing, shows that the installation of underground HPFF transmission cables would significantly reduce EMF emissions from the lines, this benefit would not appear to be sufficient to offset the increased cost of the underground alignment.

*Bertha F. Kurosawa*

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Bertha F. Kurosawa  
Chief Clerk

DATED: April 7, 1994