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# OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD

## BOARD STAFF'S REVIEW OF PETITION FILE NO. 551

Petitioner: Mr. Roland L. Rudolph,

Submitted by: Michael Nelmida
Title: Senior Engineer-Standards
Date: January 8, 2016

# INTRODUCTION

On August 27, 2015, The Occupational Safety and Health Standards Board (Board) received a petition dated August 27, 2015 from Mr. Roland L. Randolph, (Petitioner).

Labor Code Section 142.2 permits the interested persons to propose new or revised regulations concerning occupational safety and health and requires the Board to consider such proposals and to render its decision no later than six months following the receipt. In accordance to Board policy, the purpose of this evaluation is to provide the Board with relevant information upon which to base a reasonable decision.

The Petitioner requests that the Board consider requiring an AC Gauss meter (magnetometer) as an aid to ensure employees comply with the safe approach distances tabulated within Section 2940.2. According to the Petitioner, such a device would provide an audible or a visual warning when an employee is in danger of contacting energized high voltage power lines. Employees would wear such a device, if small enough; otherwise, employers would affix larger devices to vehicles that are capable of contacting energized high voltage power lines.

## HISTORY

There were no prior requests found to apply magnetometers as an aid to maintaining safe approach distances to energized high voltage power lines. The Board, however, has reviewed requests for similar aids utilizing different technology.

In Petition 329, dated February 16, 1993, the Board considered a petition for a device that would be affixed to mobile cranes and warn the operator that the boom was in danger of contacting energized high voltage power lines. The Board denied Petition 329 because of concerns including the technological limitations of the device.

In Petition 422, dated July 11, 2000, the Board considered a petition, that in part, required the use of electronic proximity warning devices (EPWD) for electronic news gathering (ENG) vehicles with an extensible mast. The Board directed an advisory committee to review seven of the nine issues raised by the petitioners, including EPWD. The advisory committee did not recommend that the Board adopt requirements for EPWD for ENG vehicles.

There is a basic similarity between the device described in Petition 329 and the present petitioner's concept in that both devices would alert the operator when the device detects source of high voltage electricity at a predetermined distance. However, a magnetometer based detection system differs from the electrostatic detection systems described in Petitions 329 and 422. Magnetometers detect the magnetic field from a power line and the devices described in Petitions 329 and 422 would detect the electric field from a power line.

## REASON FOR THE PETITION

The Petitioner takes the position that a magnetometer could avoid future instances of accidental contact with energized high voltage power lines. The Petitioner, stated that he had lost two family members because of accidents involving contact with energized high voltage power lines in the last 6 years. While the Petitioner states that he has lost family members in the tree care industry due to contact with high voltage power lines, nothing within the petition specifically

directs the Board to look specifically at the tree care industry or even specifically the activity of "Line Clearance Tree Trimming".

The Petitioner submits as part of his petition "NFPA 70E's Table for Approach Boundaries to Live Parts for Shock Protection" and an excerpt from an article by "ECMWEB.com" containing statistical information. The statistics, the Petitioner represents, reflect deaths and injuries as a result from contact with electric current. The Petitioner does not provide any additional context for the excerpt he quotes, nor is there any clarification of the numbers of incidents that involved contact with high voltage electrical equipment. Moreover, the Petitioner does not indicate how many of these incidents could have been prevented or mitigated by following his recommendation.

The Petitioner provides no specific regulatory language for the Board to consider. Attempts to contact the Petitioner have been unsuccessful.

## NATIONAL CONSENSUS STANDARD

The Petitioner mentions in his petition equipment such as aerial devices (governed by ANSI A92.2) and backhoes (governed by ISO 20474-1:2008), neither of the respective consensus standards requires the use of magnetometer for detecting power lines. Moreover, there are no consensus standards known to Board Staff that requires the use of magnetometers for the purposes of ensuring employees maintain a safe distance from energized high voltage power lines.

## FEDERAL STANDARDS

Federal OSHA does not require the use of devices to aid employees in maintaining the safe working distances from high voltage power lines. Under 29 CFR 1910.333, both "qualified" and "unqualified" are required to adhere to specific distance requirements from power lines without requirements for detection aids. Similarly, requirements exist for specialized electrical work and line clearance tree work under 29 CFR 1910.269, which also do not require the use of such detection aids.

## DIVISION EVALUATION

The Division, in their evaluation dated, November 19. 2015, recommended DENIAL of Petition 551. The Division recommended that magnetometers should not be allowed as a means to protect employees from the hazards of accidental contact with high voltage conductors. The Division's analysis raises concerns that magnetometer based systems are less effective than electric field base systems. The Division also points out that NIOSH had already evaluated electric field based systems and did not recommend those systems as a sole means to prevent inadvertent contact with high voltage conductors.

## BOARD STAFF EVALUATION

There are no magnetometer based warning devices known to Board Staff that would reliably accomplish Petitioner's stated safety objective.

Put simply, magnetometer based warning devices do not appear to be effective. The Petitioner supposes that a 'calibrated' magnetometer would detect the presence of a power line thereby alerting in time for the employee to take appropriate action to avoid power line contact.

Any device an employee would rely upon to ensure they maintain a safe distance from an energized high voltage line must be stable and consistent. Magnetometer based warning systems must rely on the detecting strength of the magnetic field emanating from a power line, which can be calculated. There is an equation for determining the distance from the magnetometer to the magnetic source (power line). The equation is a simplified version of Biot-Savart law of magnetic fields. The equation relates the magnetic field strength to the distance from its source and the amount of electric current in the power line. Unfortunately, it would be impossible to know the amount of electric current flowing through a power line at any given time. The voltage is consistent, fluctuating in a narrow band, but the current fluctuates with the demand for more or less electricity throughout the day. Electrostatic detection devices described within Petitions 329 and 422 rely on detecting voltage rather than current.

Since the current in the power line would vary throughout the day, the strength of the magnetic field would vary as well. Staff could not identify an effective means to 'calibrate' such a device to provide an employee any reliable warning. An increase in the power demand with in the power line could be sufficient to trigger an alarm without movement of an employee toward the power line. In the worst-case scenario, the device may not alarm until an employee had already crossed the safe working distance outlined in Title 8, nullifying both the distance and the detection measures that the Petitioner proposes for protecting employees.

## RECOMMENDATION

Board Staff has discussed the Petitioner's request with DOSH and evaluated the request in detail including any and all relevant subject matter literature relevant to the request. For reasons described in the preceding evaluation, the Board Staff recommends that the petitioner's request be DENIED.