

May 14, 2013

Michael Tidwell and Gay Logg  
2833 Farmer Brown Court  
Myrtle Beach, S.C. 29579

Dear Michael and Gay,

At your request on April 19, 20 & 22, 2013. I performed an octave band frequency noise survey in and around your residence at 2833 Farmer Brown Court, at the property line of Ocean Bay Middle School, and at the fence line of the Santee Cooper Carolina Forest 23-115 KV Substation. The purpose of this survey was to determine if the referenced substation was producing a low frequency noise emissions (LFN, 10-200 Hz) that intrudes into your home causing you certain deleterious health effects.

### **Background**

High voltage overhead lines and substations can generate LFN, the level of which depends mainly on the voltage of the overhead line or topography around the substation.

Transformers are installed at many substations, and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally, provided by other structures or topography). Given the flat landscape between your house and the subject substation and the tendency of LFN to travel long distances there is little to attenuate LFN emissions from this substation.

Low frequency noise, the frequency range from about 10Hz to 200Hz, has been recognized as a special environmental noise problem, particularly to sensitive people in their homes. There have been a large number of laboratory measurements of annoyance and serious psycho physiological health effects by low frequency noise, each with different spectra and levels. The main conclusions are that serious health effects from low frequency noise increases rapidly with level. There is a possibility of learned aversion to low frequency noise, leading to annoyance and severe stress which may receive unsympathetic treatment from regulatory authorities. In particular, problems of the Hum often remain unresolved. An approximate estimate is that about 2.5% of the population may have a low frequency threshold which is at least 12dB (decibels) more sensitive than the average threshold, corresponding to nearly 1,000,000 persons in the 50-59 year old age group in the EU-15 countries. (Leventhall) This is the group which generates many complaints. Low frequency noise specific criteria have been introduced

in some countries, but do not deal adequately with fluctuations. Validation of the criteria has been for a limited range of noises and subjects.

### **Common Factors reported by people exposed to low frequency noise in their homes.**

- The problems arose in quiet rural or suburban environments.
- The noise was often close to inaudibility and heard by a minority of people
- The noise was typically audible indoors and not outdoors
- The noise was more audible at night than day
- The noise had a throb or rumble characteristic
- The complainants had normal hearing
- Medical examination excluded tinnitus
- There is often a vibration that accompanies the LFN or Hum (Leventhal)

### **The Owner Occupant Experience**

The aforementioned Common Factors are all reported by the occupants of the referenced residence. In addition the following are, also reported by the occupants and are becoming progressively worse:

- Cranial pressure
- Auditory hallucinations
- Visual hallucinations
- Auditory annoyance
- Peripheral tremors and spasms
- Thoughts of paranoia and hopelessness
- Difficulty focusing
- Loss of short term memory
- Interruption of sleep patterns
- Thoughts of suicide
- Paranoia
- Feelings of electric shock
- Irritability
- Aggression
- Nosebleeds
- Nausea

### **Noise Survey Results**

ISO 226 standard reports that urban LFN levels should average between 45 and 50dB. This a non-weighted measurement scale. (Please note that the decibel scale is not arithmetic, it is logarithmic). For example an increase in one decibel represents a tenfold increase in the noise level).

It is important to note that measurements within the residence were made with the main breaker off and the main water valve to the house in the off position.

On April 19, 2013 a level of 62.3 dB was measured in the residence of LFN. At the fence line of the substation 80.6 dB of LFN was measured. Noticeable vibration of the residential structure was documented.

On April 20, 2013 the noise level measured in the residence was 56.2 LFN. Sixty-five feet away from the fence line of the substation 86.3 dB of LFN was measured. Again, the structure was noticeably vibrating.

On April 22, 2013 a noise measurement of 64.1 dB was determined in the residence of LFN. The structure was vibrating harmonically.

At the pedestrian entrance to Ocean Bay Middle School a noise measurement of 96.8 dB was determined of LFN.

At the fence line of the substation a noise measurement of 89.7 dB of LFN was determined.

A complete tabular delivery of all of the frequency measurements will be transmitted under separate cover.

## Conclusion

Your symptoms are temporally consistent with construction and operation of the substation. Your symptoms are consistent with those described in the literature. The extensive noise measurements taken show the Santee Cooper Substation is producing significant amounts of LFN noise pollution. This is especially troubling given the fact of the proximity of two schools close by and the documented deleterious effects of LFN on children.

It is my opinion, to a reasonable degree of scientific certitude, the LFN emissions from the Santee Cooper Substation are the source of your psycho physiological health problems. Take this report along with the citations and have physical exams done by a board certified occupational and environmental physician to confirm this. Because the LFN, vibration and your health status continuing to worsen, I recommend that you immediately vacate the structure until resolution is reached with Santee Cooper to abate this noise and vibration pollution.

Thank you for choosing Risk Tech for this important project.

Sincerely,



Richard D. Bennett, MSPH, CIH



Citation: A Review

A Review of Published Research on Low Frequency Noise and its Effects  
Report for Defra by Dr. Geoff Leventhall Assisted by Dr. Peter Pelmeare and Dr. Stephen Benton