

Environmental measurements at LLO

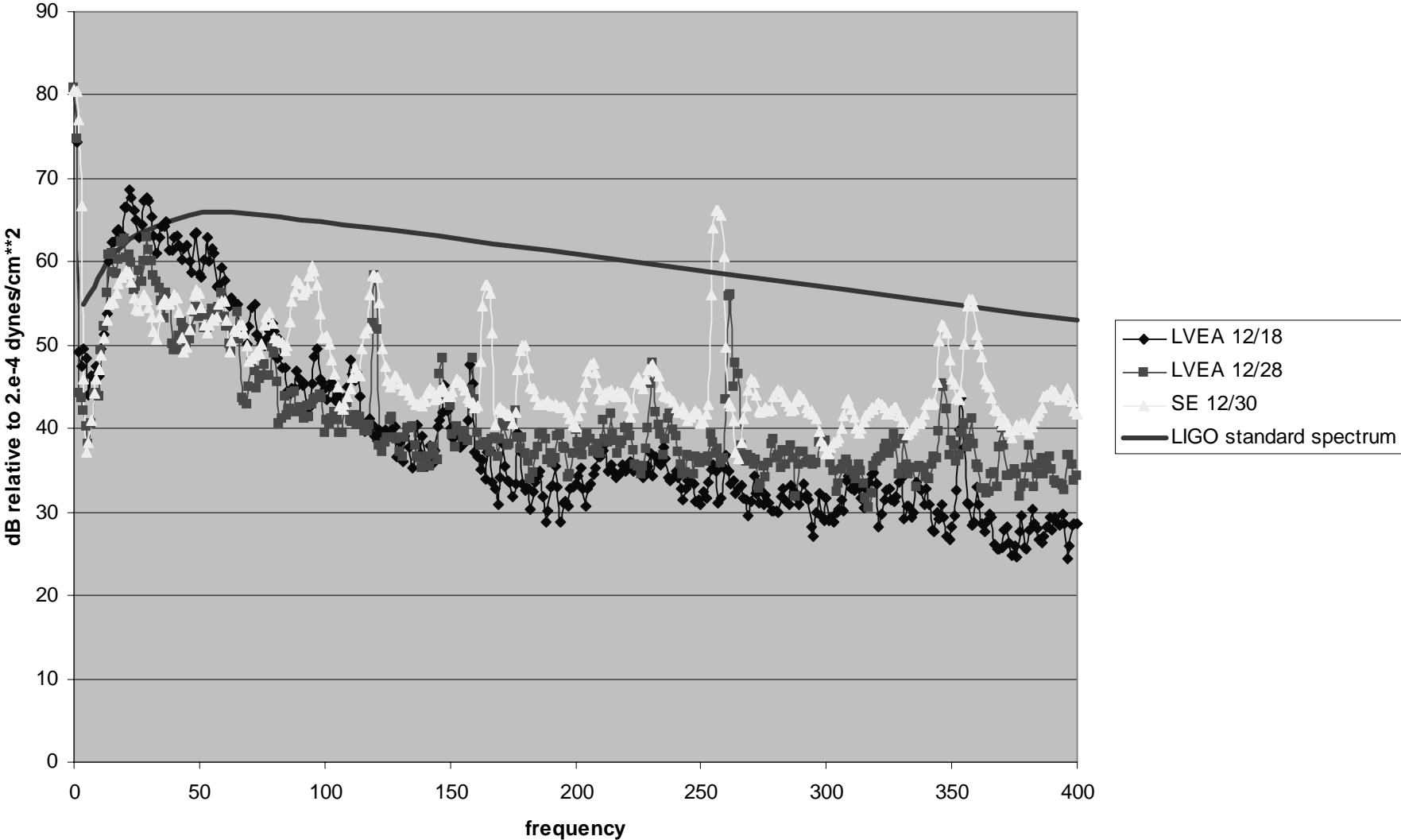
Mark Coles
LLO

Objective:

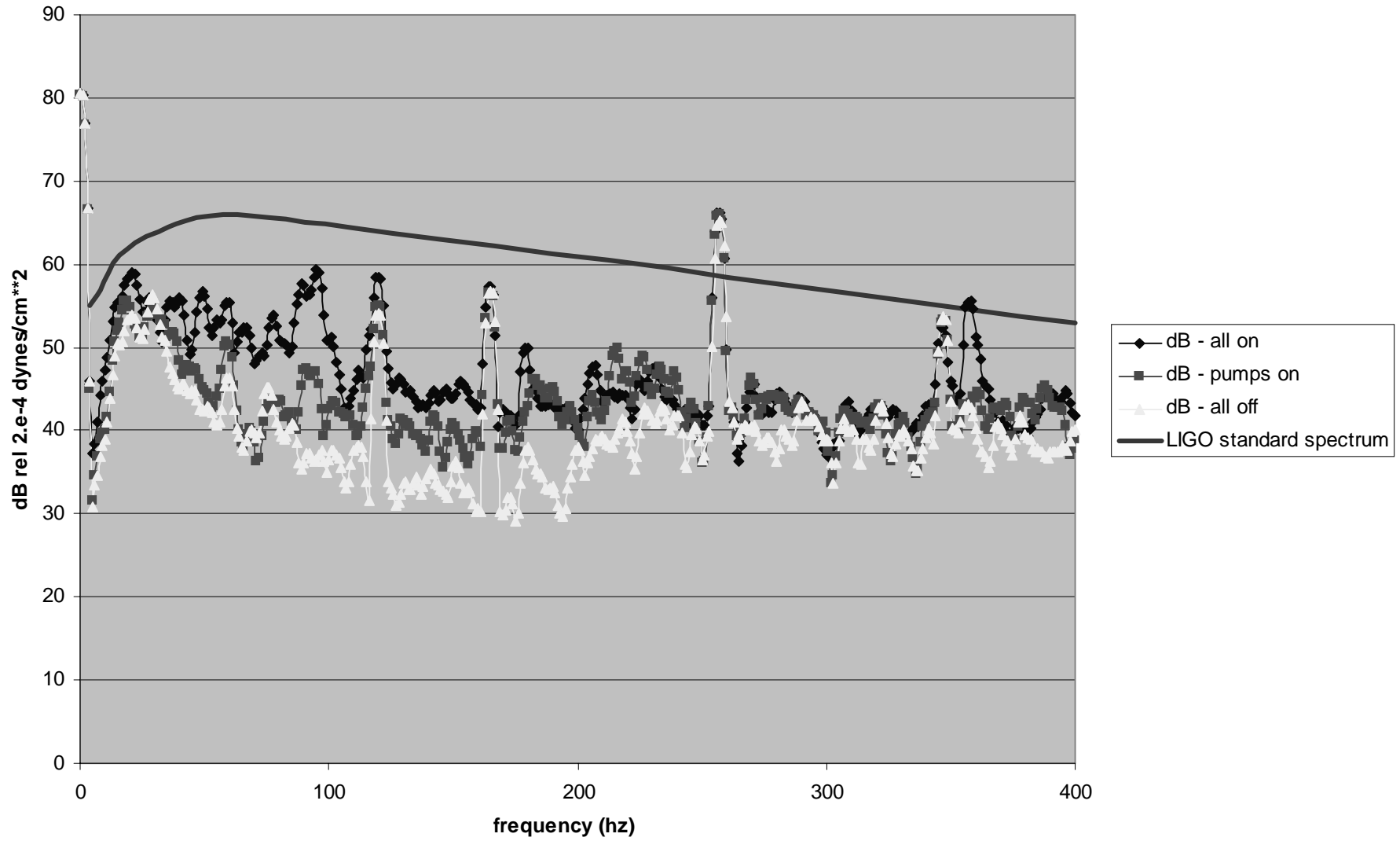
- Characterize site now that buildings and major components are here to see what operating environment looks like.
- Initial characterizations done by Rai Weiss et al on Dec. 18.
- Data shown here is from Dec. 28-March 1 and is primarily from south end station



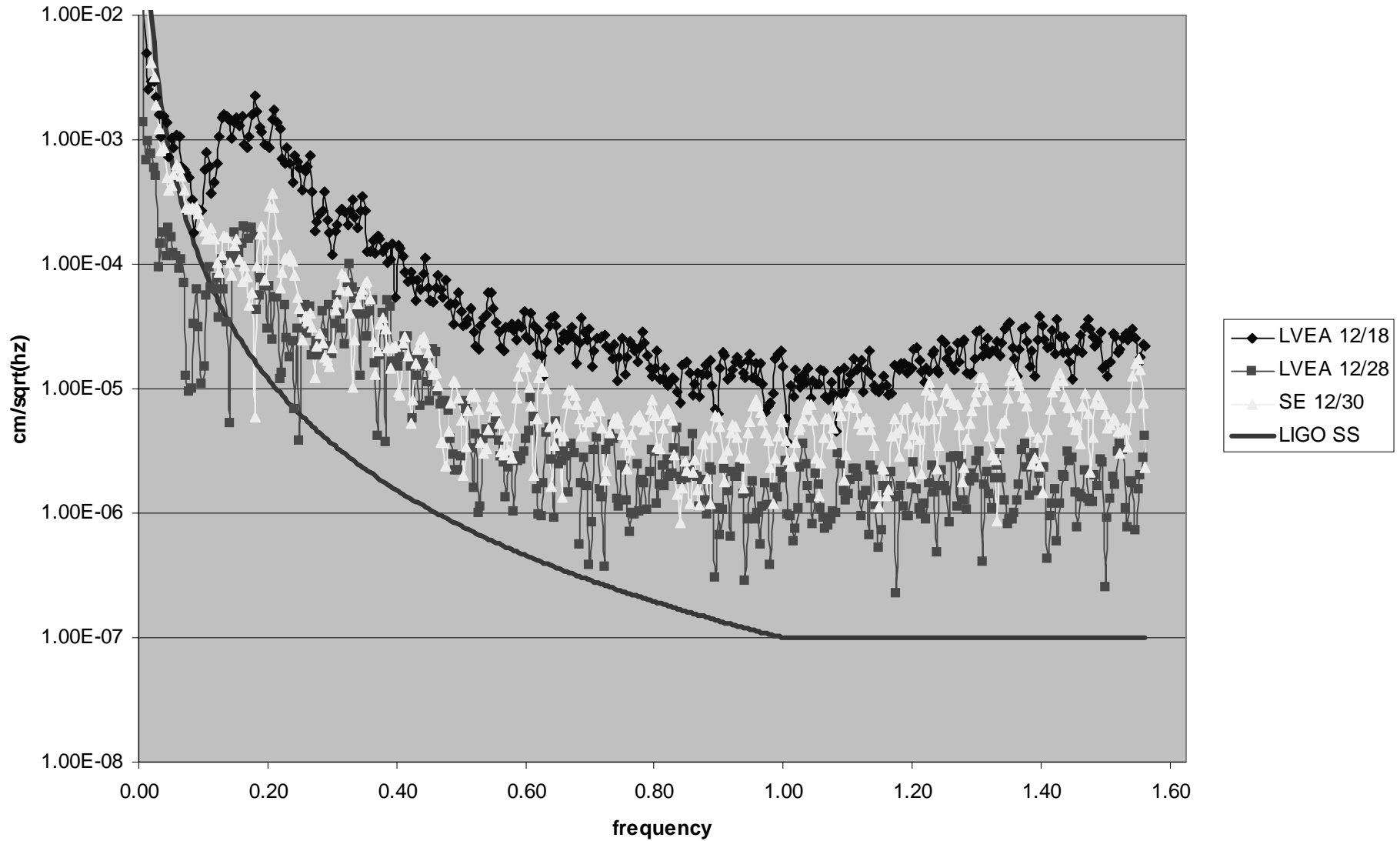
LVEA Acoustic Measurement Comparisons



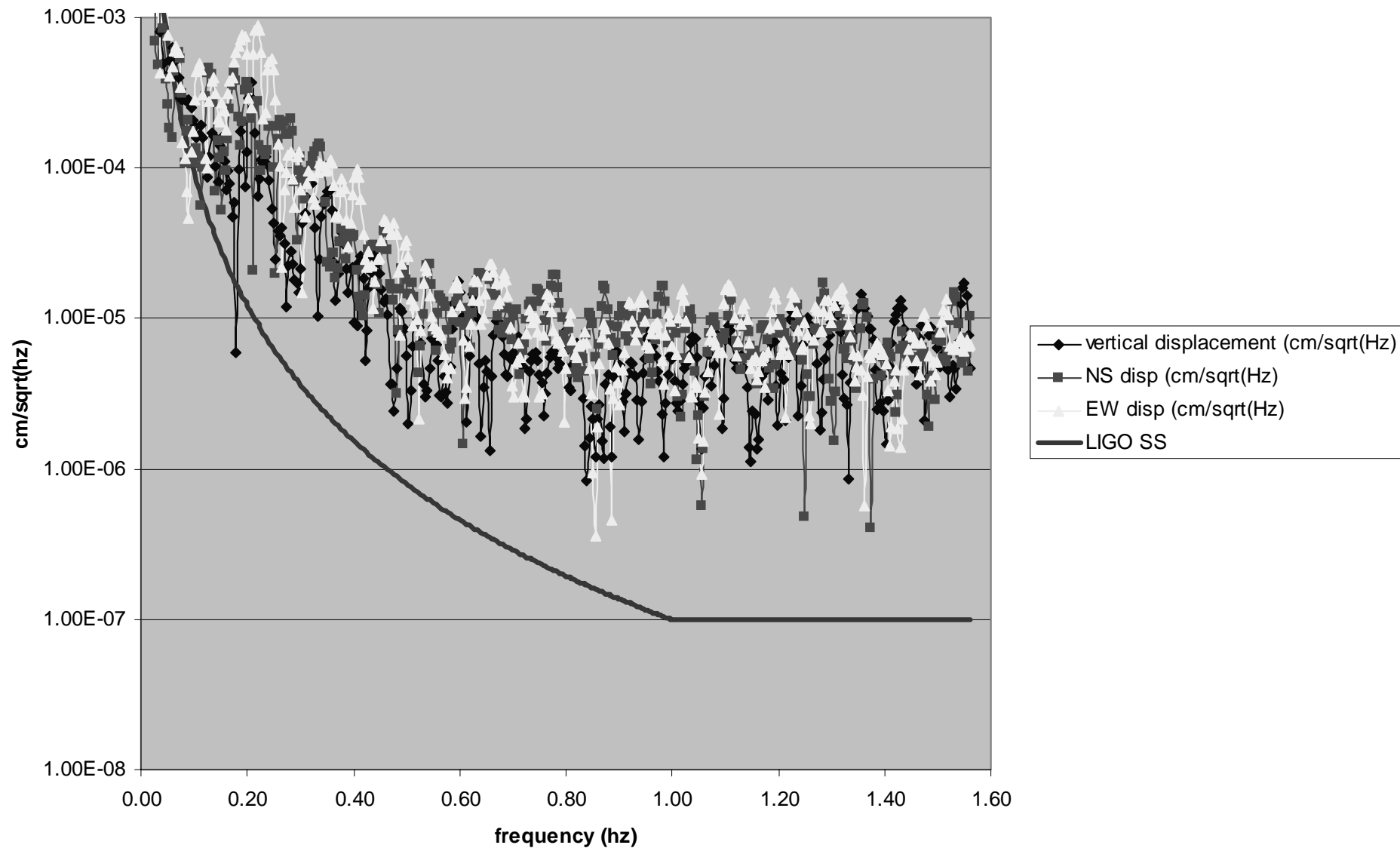
South End Station Acoustic Pressure



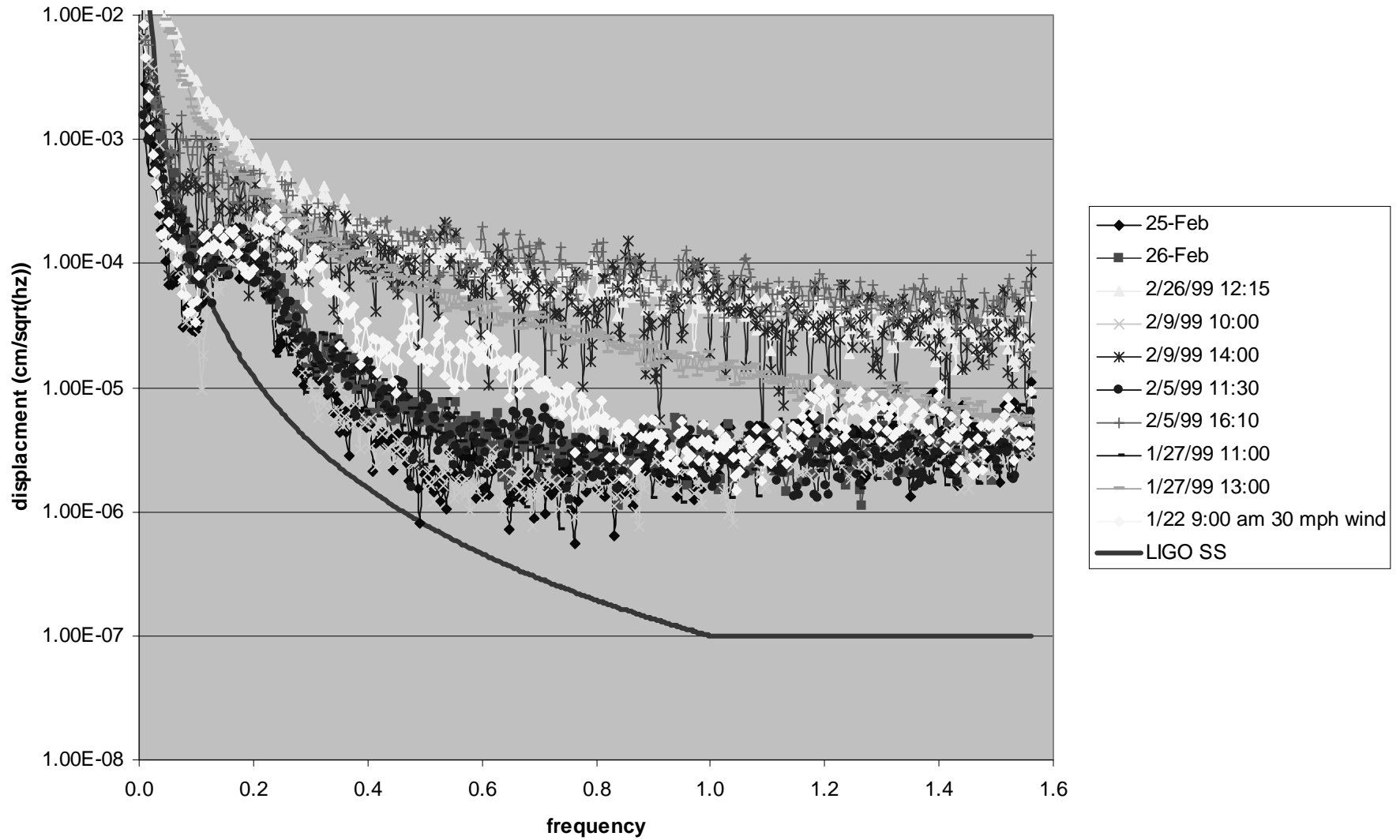
Vertical displacement spectrum comparison between LVEA and south end station



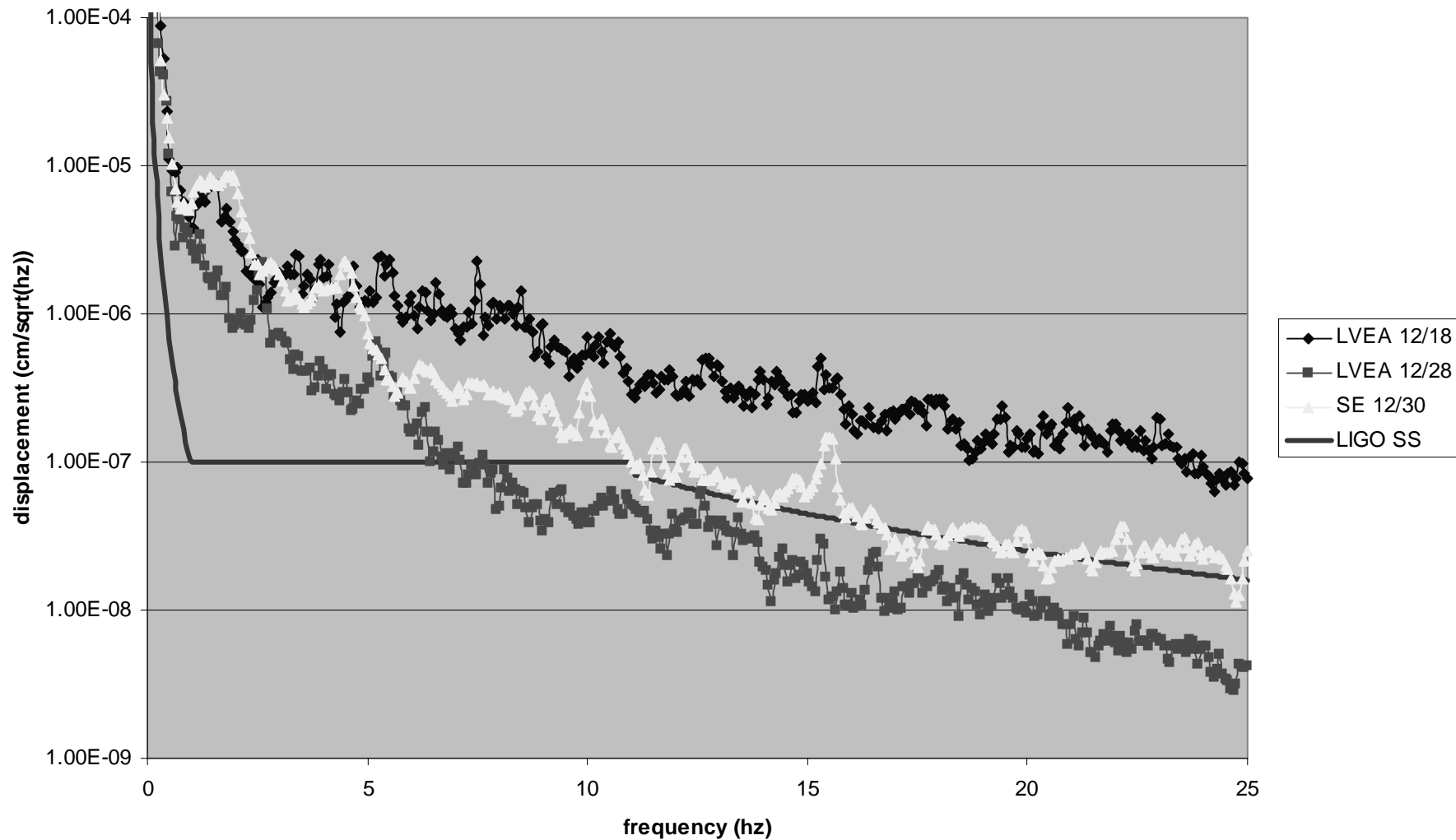
South end station displacement spectra with HVAC on



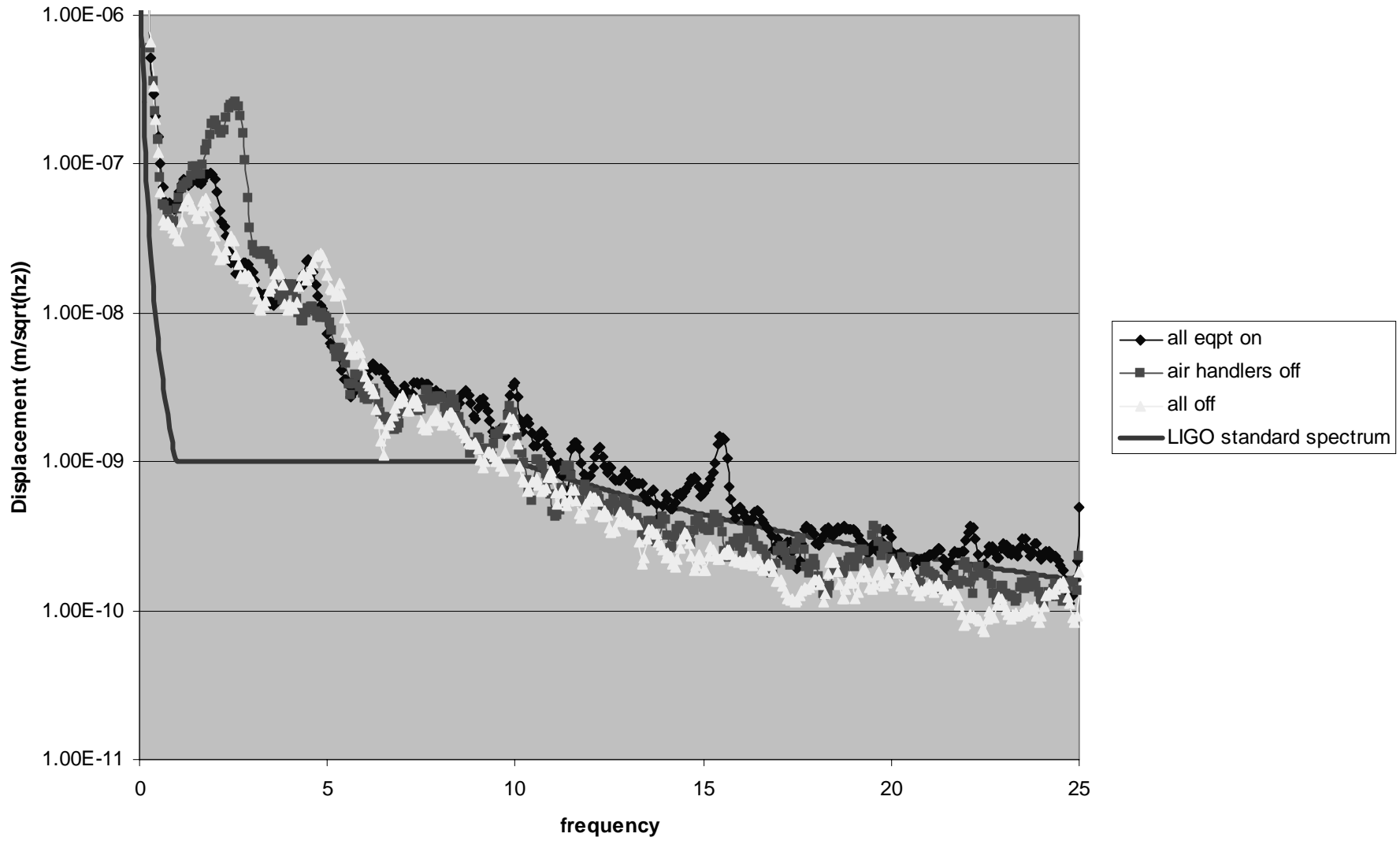
Variations in vertical seismic spectrum



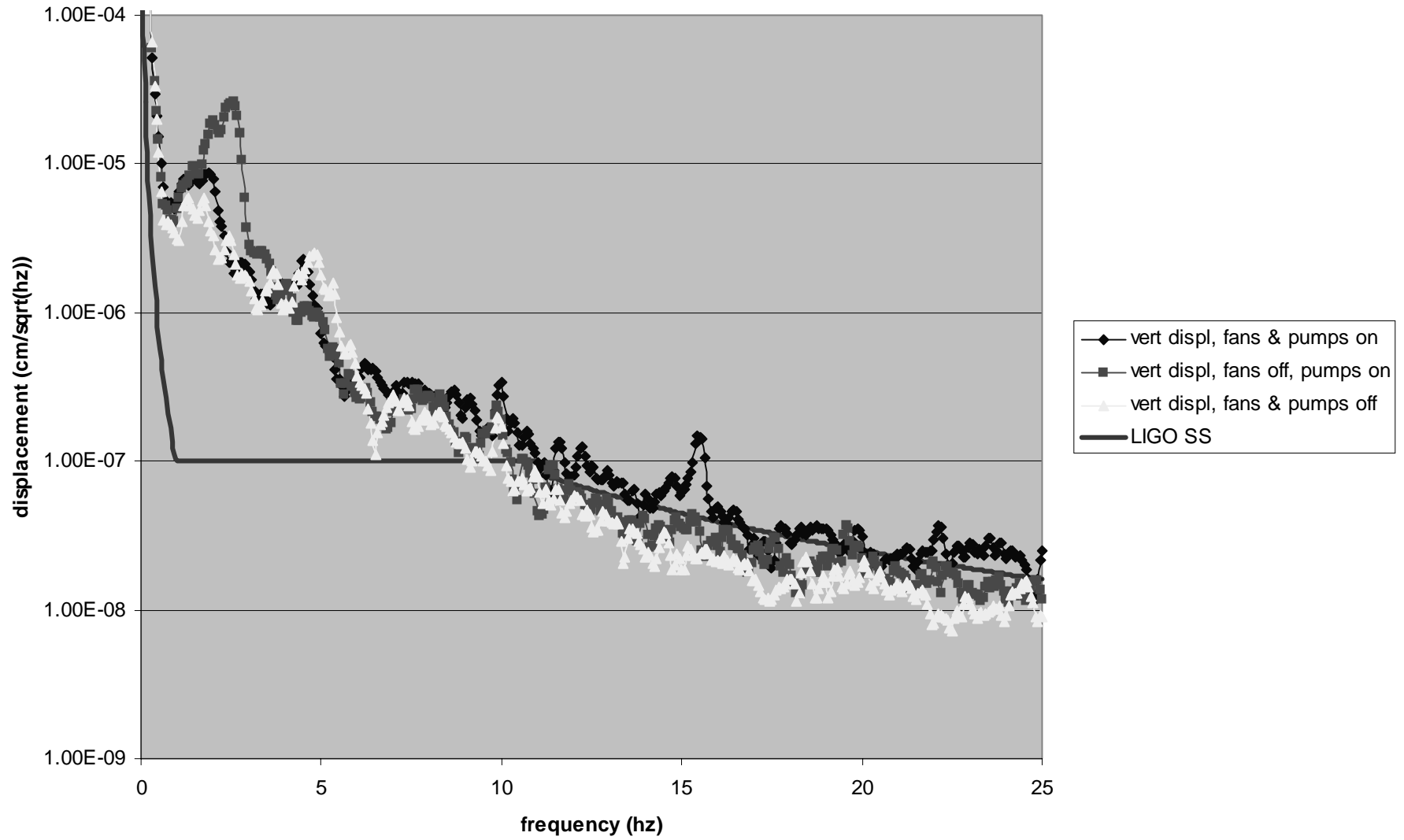
Vertical Displacement Comparison between LVEA and South End Station,
All HVAC Systems On, Frequency Span = 25 Hz



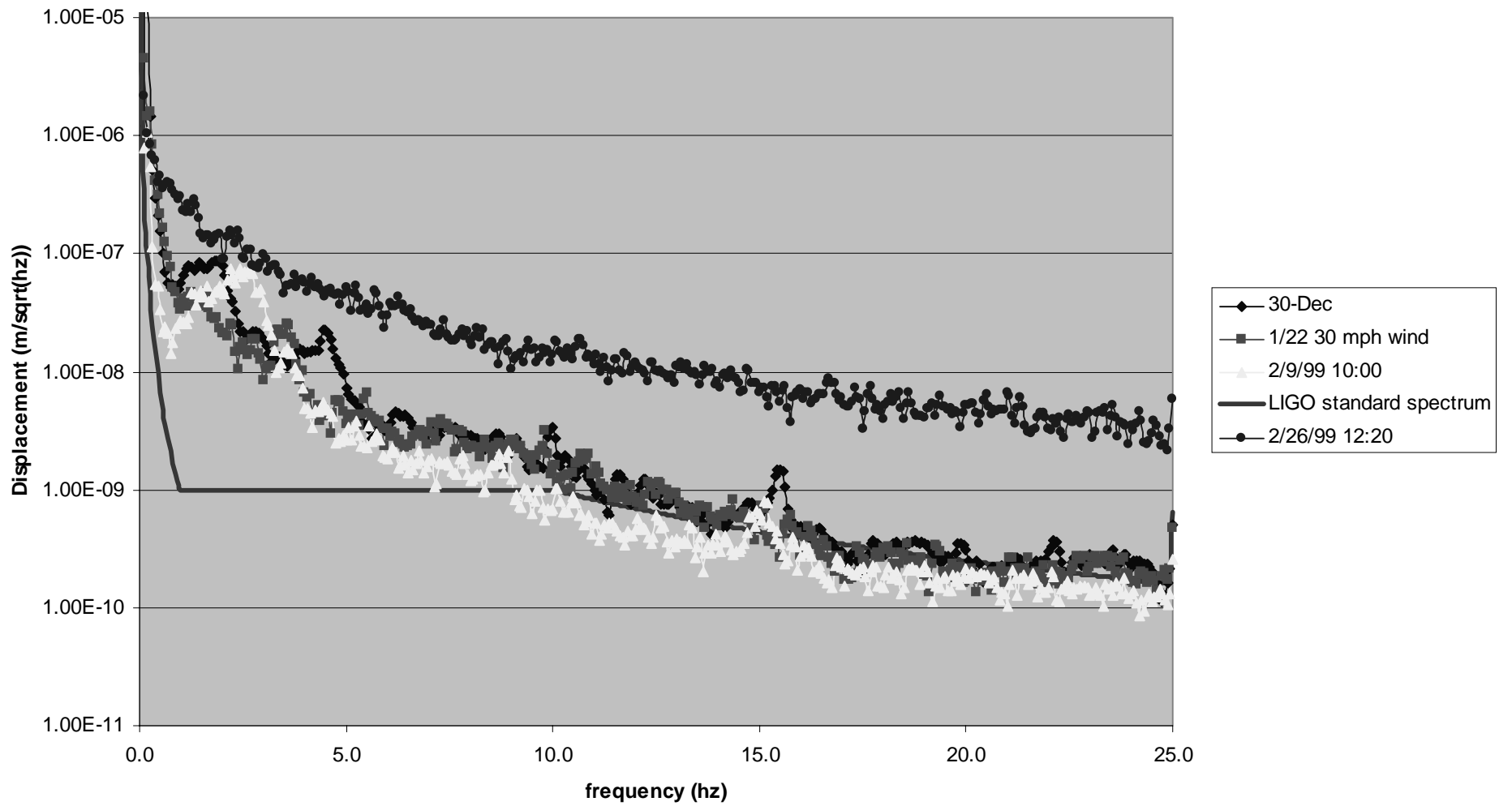
South End Station Vertical Seismic Spectrum



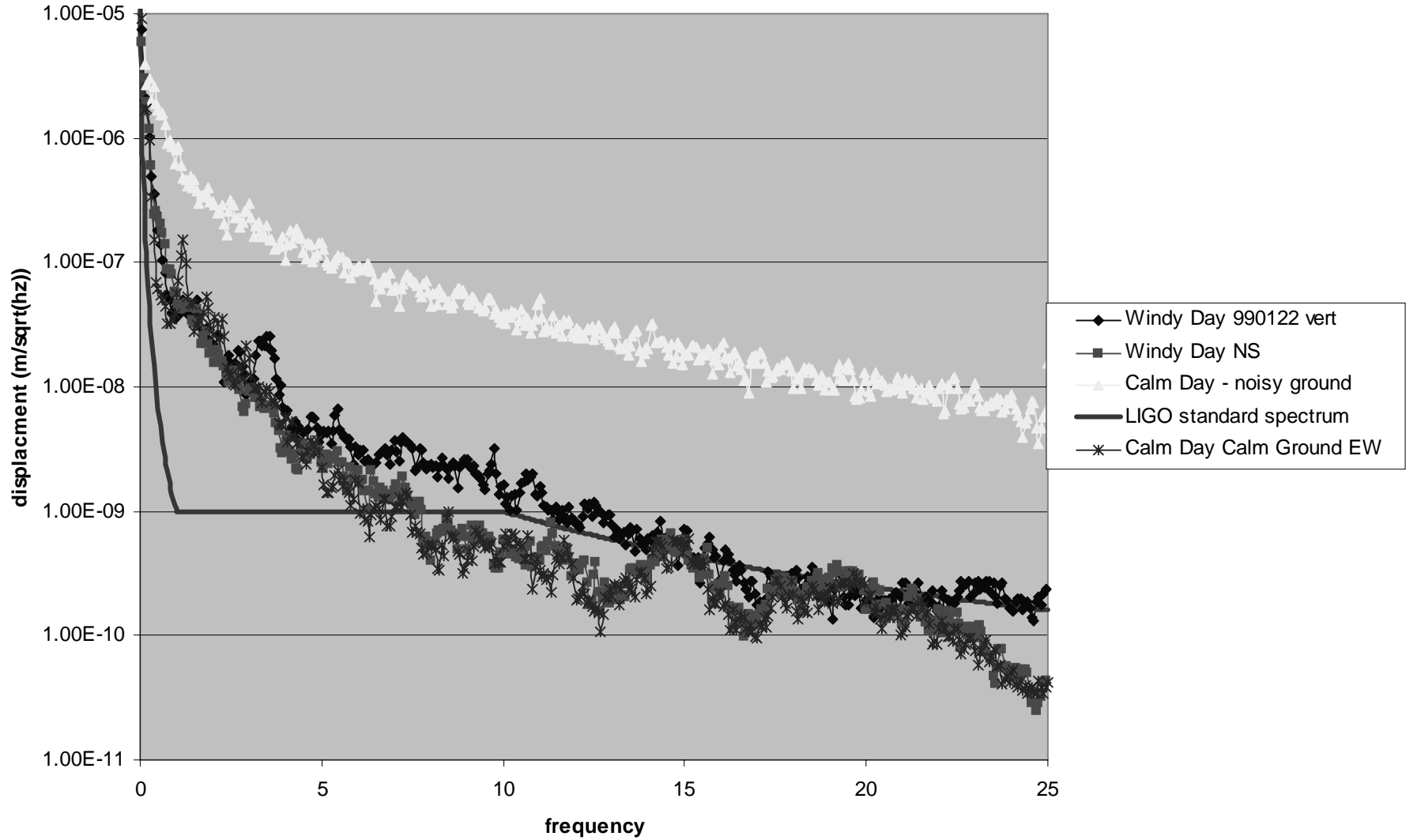
South End Station Vertical Displacement Spectrum



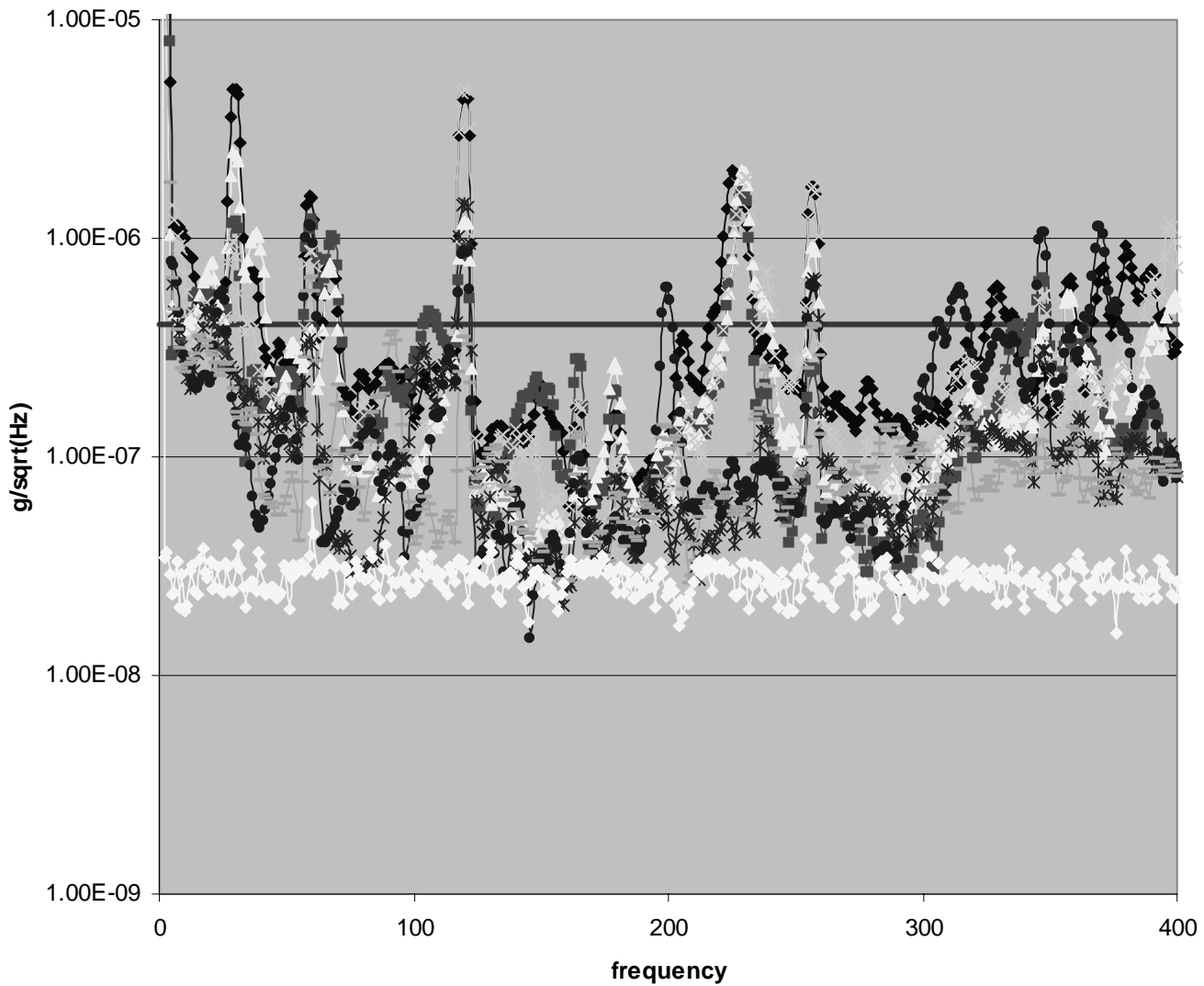
South End displacement spectrum summary



Displacement spectrum comparison noisy day and windy day

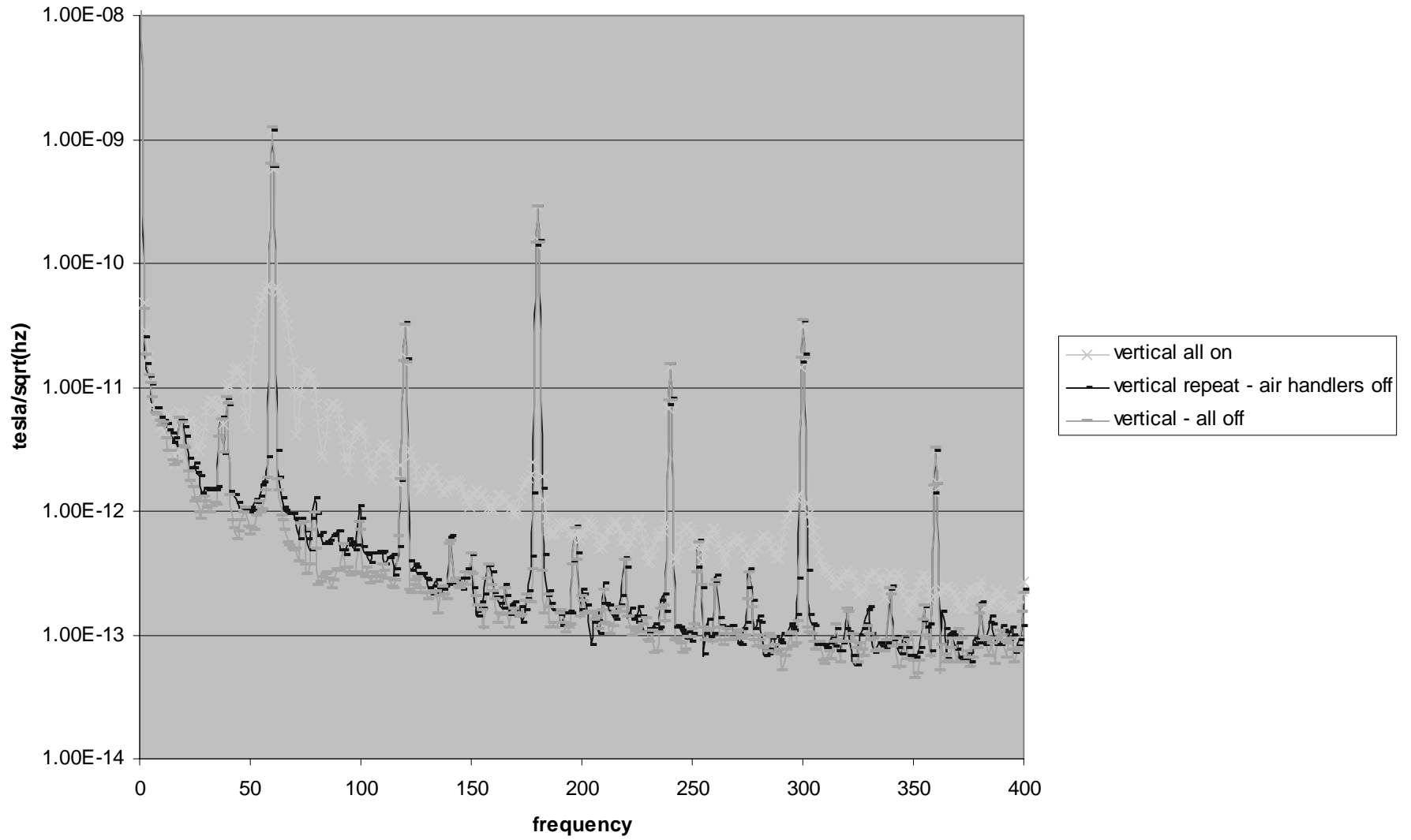


Accelerometer

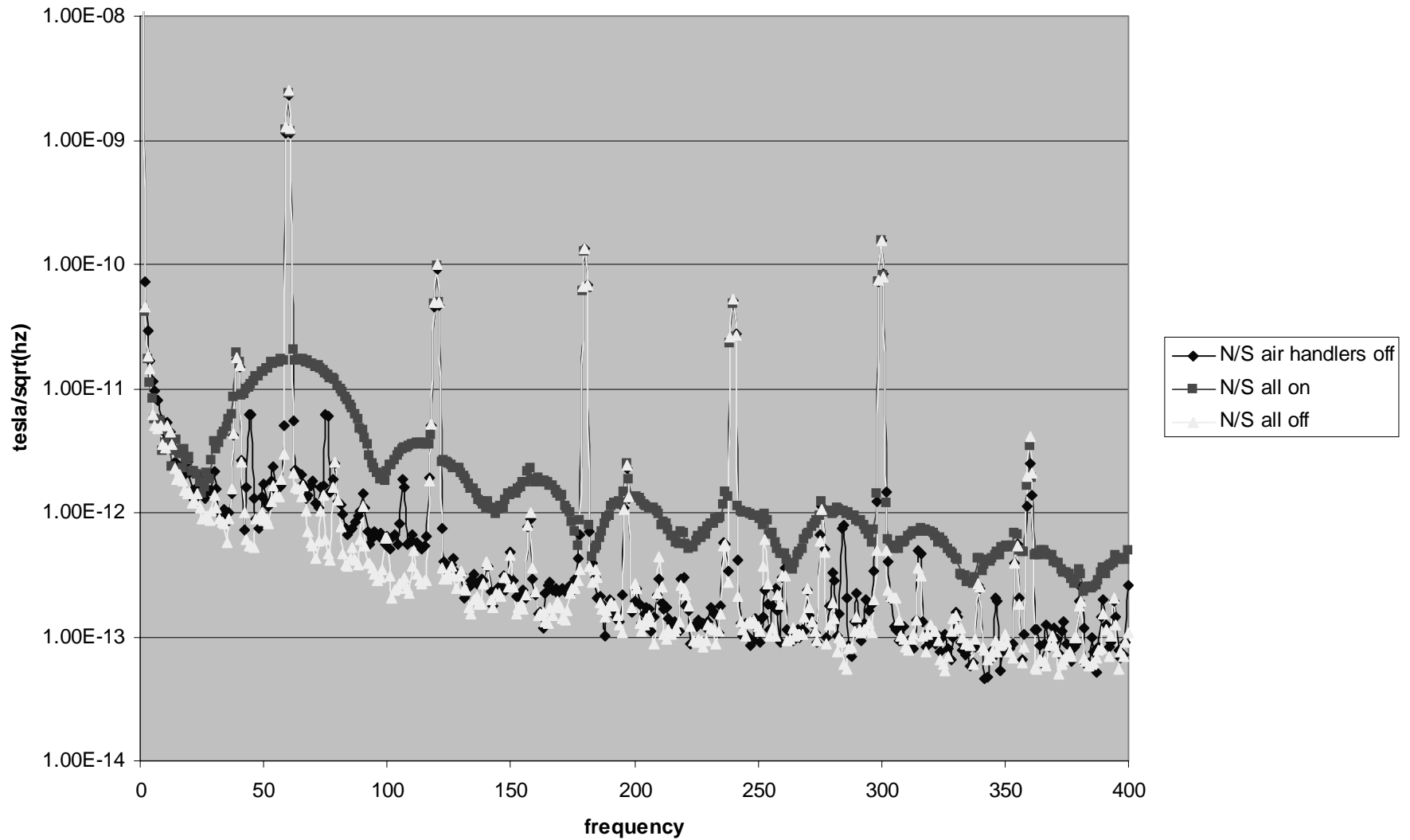


- ◆ accel vert (g) fan,pumps on
- accel NS (g) - fan, pumps on
- ▲ accel EW (g), fan pumps on
- × accel vert (g) fan off, pumps on
- * accel E/W (g) fan off, pumps on
- accel NS (g) fan off, pumps on
- accel E/W (g), fan & pumps off
- ◇ noise threshold
- LIGO SS

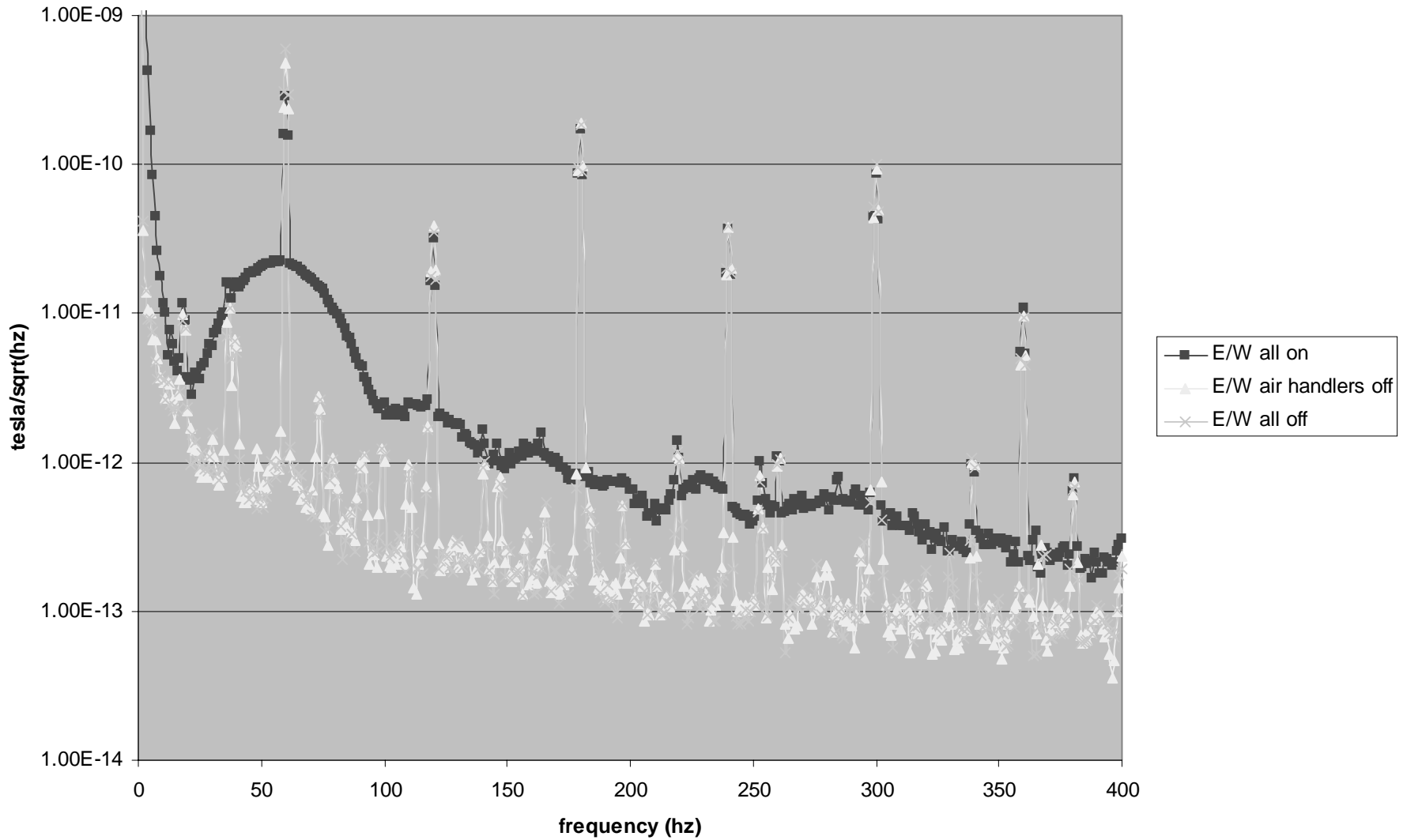
Vertical magnetic field - south end station



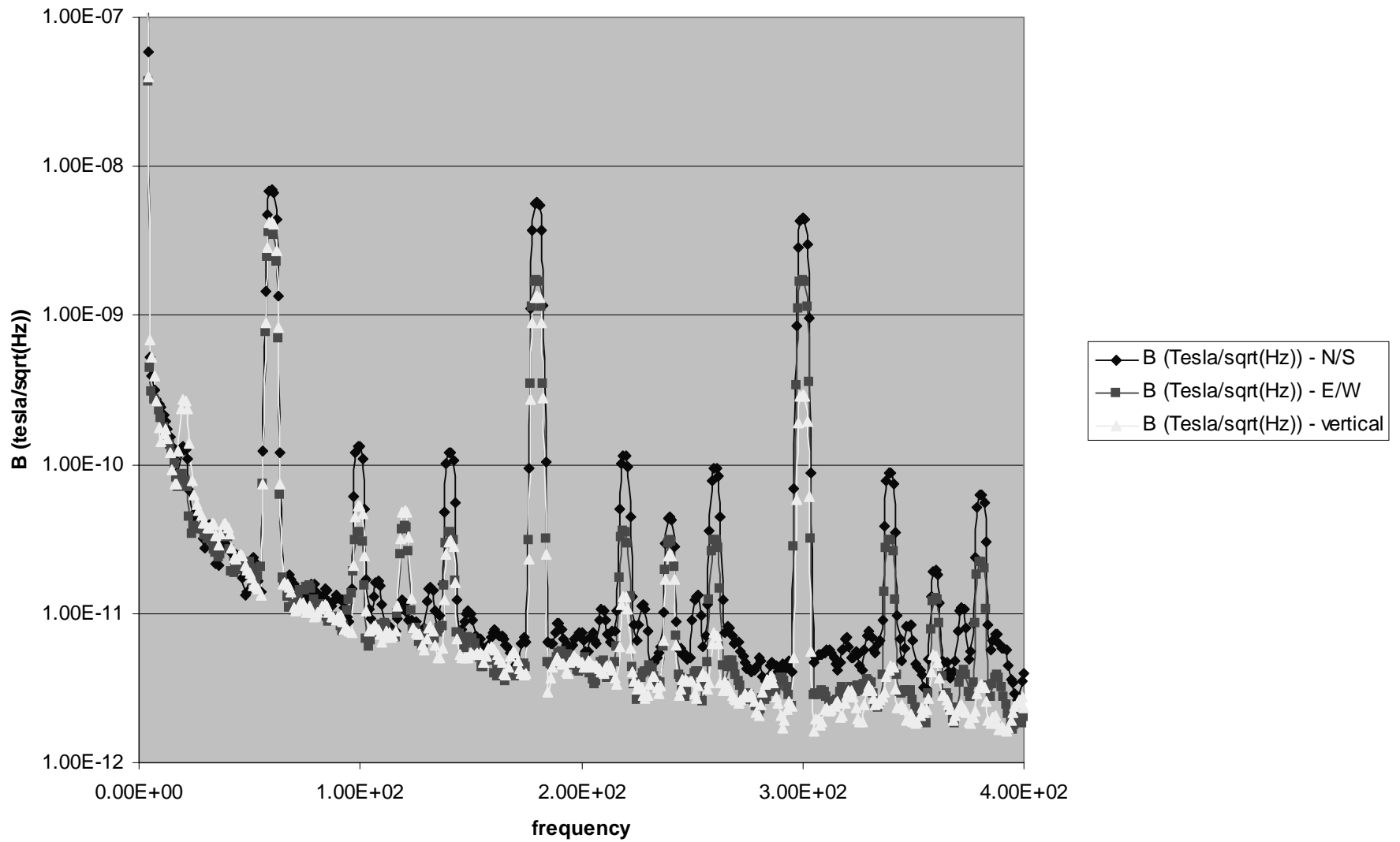
North-south magnetic field intensity spectra measured in the south end station VEA



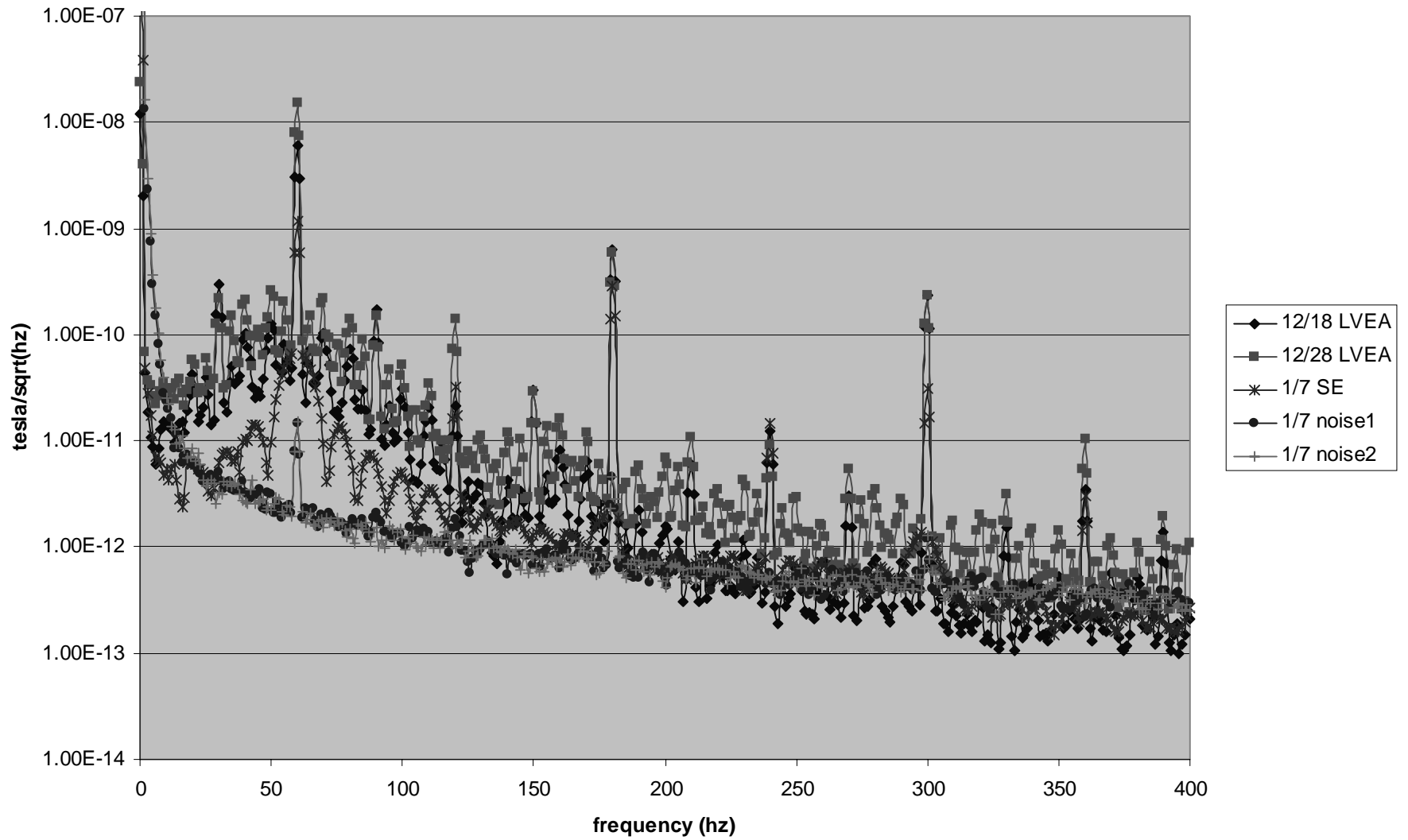
South end station E/W field comparison



Magnetic Field Spectral Density - south end station 981230



Vertical magnetic field comparisons of LVEA and VEA



SUMMARY

Effects of building infrastructure on operating environment are largely OK:

- Effects of HVAC and compressors small
- Some narrowband spikes produced which can be addressed if needed

Seismic measurements

- at < 10 Hz: larger than LHO as in initial studies done earlier, no surprises.
- We have observed intermittent noise at levels larger than this data, sources not yet understood, under investigation - perhaps some surprises.

Acoustic

- Buildings are quiet! - design validation

Magnetic

- Air handlers affect SE environment
- Is it a problem?