ENEL-UC Berkeley Short-Term Monitoring Plan

**Instrumentation**

Analyzers:

1. Optasense ODH-3 Distributed Acoustic Sensor interrogator (Φ-OTDR)
2. Luna Innovations ODiSI6000 Commercial system (OFDR)
3. Alicia (BOTDR) (Currently being repaired)

The tower was instrumented with NanZee Sensing NZS-DSS-C02 single mode, tightly buffered fiber optic cables.

**Monitoring Plan**

Short Term Plan

The short-term testing program will consist of hammer tests under different bolt configurations (loosening up to 10% torque or 60 degrees loosening)

A picture containing circle, oval, pattern

Description automatically generated

Loosen Bolt

Hammer Here

Hammer Here

Cables

Loosen Bolt

Loosen Bolt



Detailed Testing Plan

3 Bolt configurations

1. Bolts as is
2. One Loose bolt (60 degrees loosening), directly under one of the longitudinal cables
3. One Loose bolt (60 degrees loosening), “between” two longitudinal cables
4. For each bolt configuration
   1. Turbine turned off (Alicia)
   2. Hammer Test (ODH3 and Luna)
      1. One at the first flange (Just above the flange)
         1. Right above one of the channels
         2. In between two of the channels
      2. One at the topmost flange (Just above the flange)
         1. Right above one of the channels
         2. In between two of the channels
   3. Sway test (ODH3 and Luna)
      1. Conditional on Enel – Try to have someone sway at the top of the topmost flange to excite the first mode
   4. Nearby Vibration Generation (ODH3 and Luna)
      1. Driving away from the tower, down the road and back
      2. Drive around the turbine
   5. Normal operation (Attempt to record at the same time as other tests). Do this twice, at different times of the day.
      1. During normal operation (~11 am and ~2 pm) (Alicia)
      2. Record for 15 minutes (~11 am and ~2 pm) (ODH3 and Luna)
   6. If applicable, retighten bolts and measure strain (Alicia)

Notes:

* Make sure that signal loss isn’t severe in any load scenario
* Record a log of testing times so that we can request the corresponding SCADA data after
* For the dynamic measurements, wait for the transient response to die out ~ 3 minutes
* Try to record data at roughly the same time of each day
* Try to be consistent in driving (We can use our own car, or a pickup truck that Enel has)