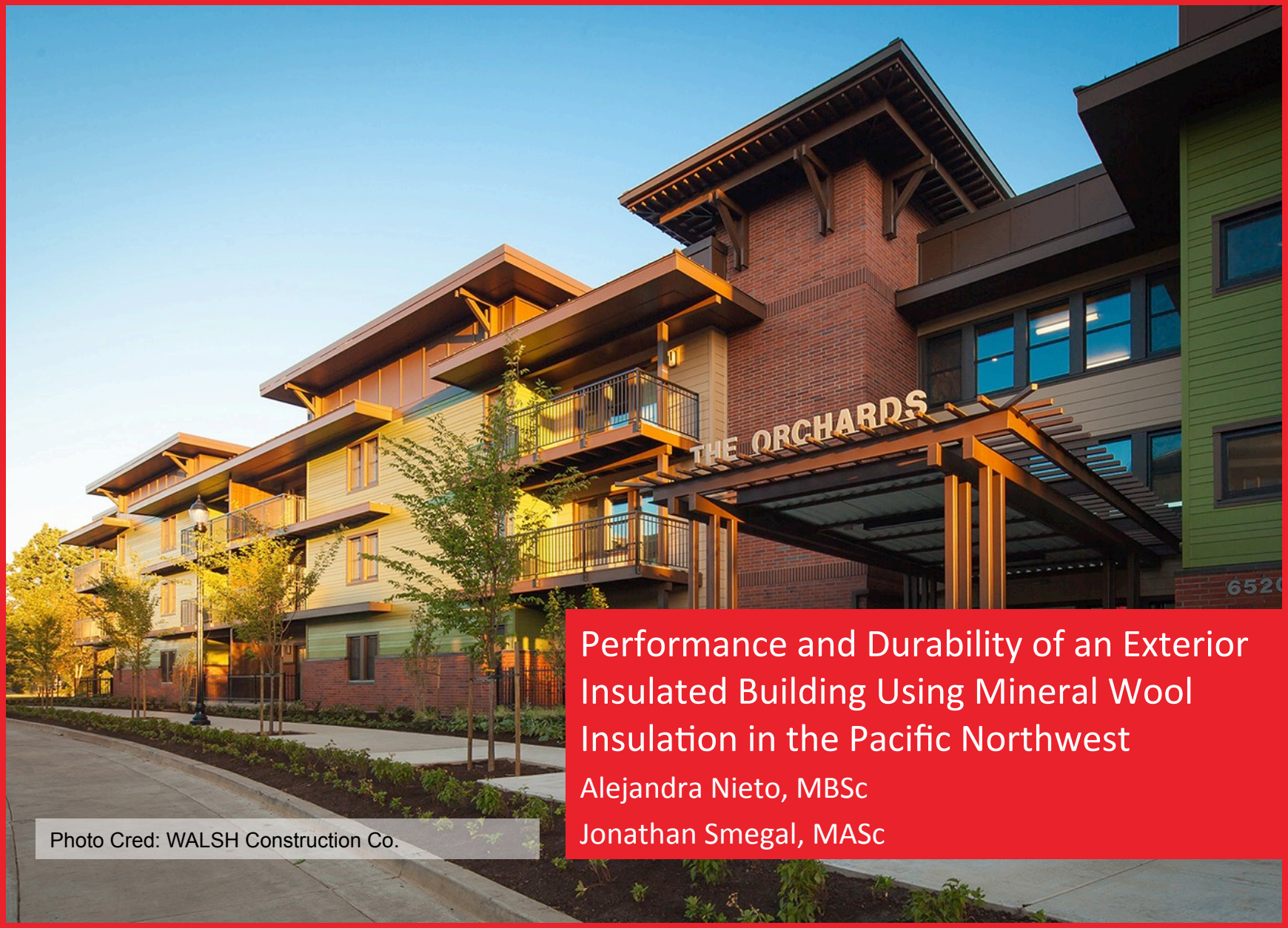

Performance and Durability of an Exterior Insulated Building Using Mineral Wool Insulation in the Pacific Northwest

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Photo Cred: WALSH Construction Co.

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Agenda

1. Introduction & Methodology:
    - Description of research project
    - Instrumentation
2. Analysis Discussion:
    - Analysis criteria and thresholds
    - Graphed results
3. Conclusion:
    - Summary of key analysis points
    - Future Work
    - References

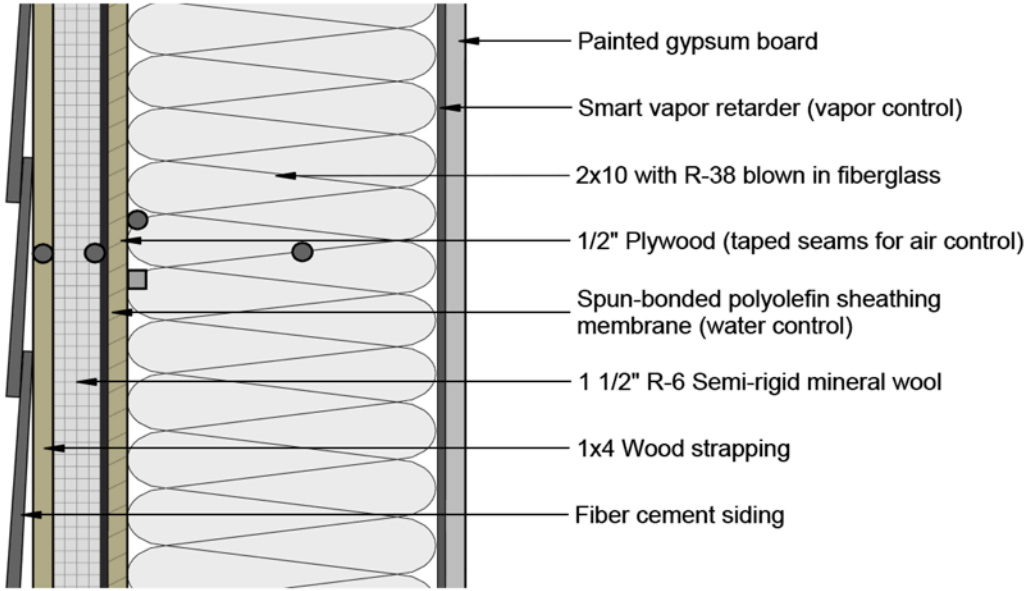
Mineral Wool Insulation in the Pacific Northwest

Photo Cred: WALSH Construction Co.

Exterior Wall Assembly

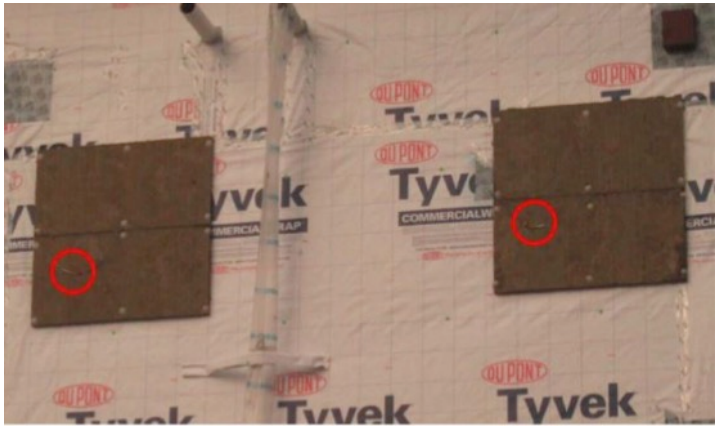
Sensor Legend

- RH and Temp Sensor
- Temperature Sensor
- MC and Temp Sensor

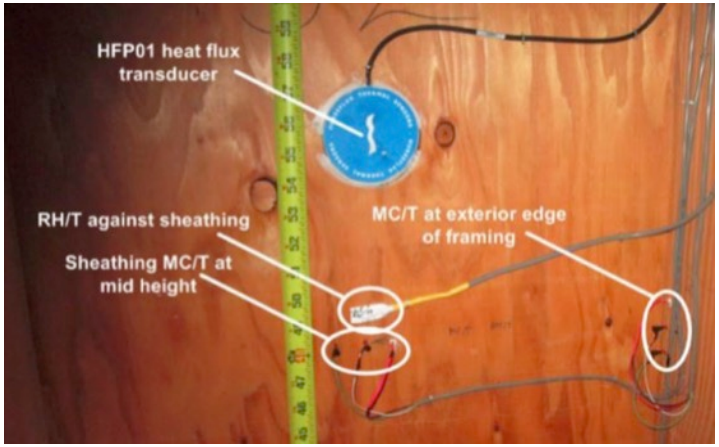


Instrumentation

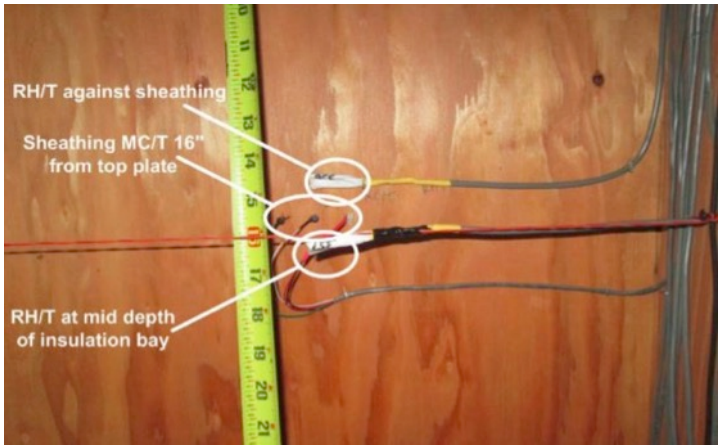
1. RH/T sensors on exterior drainage plane



2. RH/T sensors on exterior of mineral wool insulation



3. RH/T, MC/T & Heat Flux sensors on interior side of sheathing (mid-cavity)



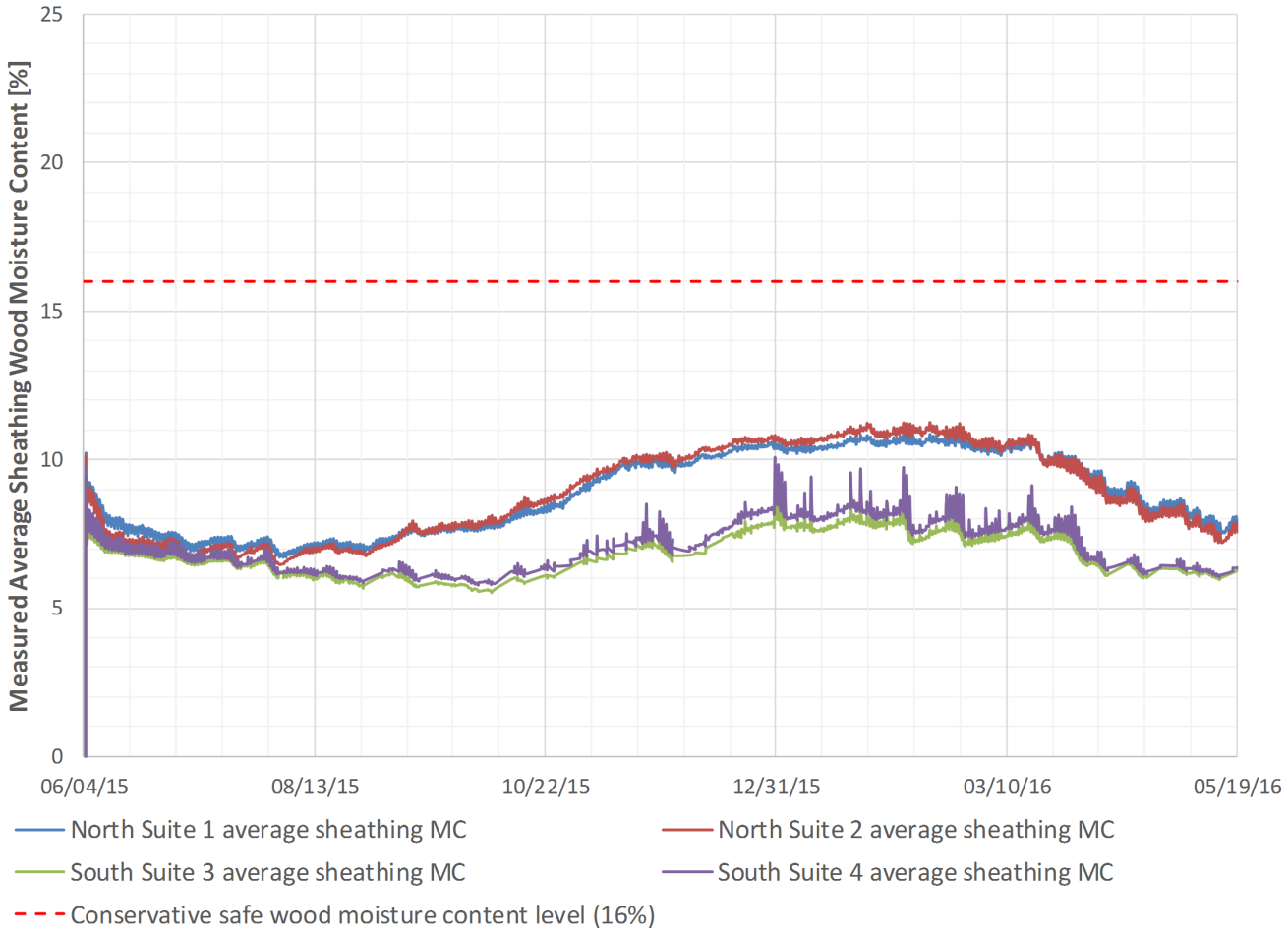
4. RH/T & MC/T sensors on interior side of sheathing (16” from top plate)

Analysis Criteria

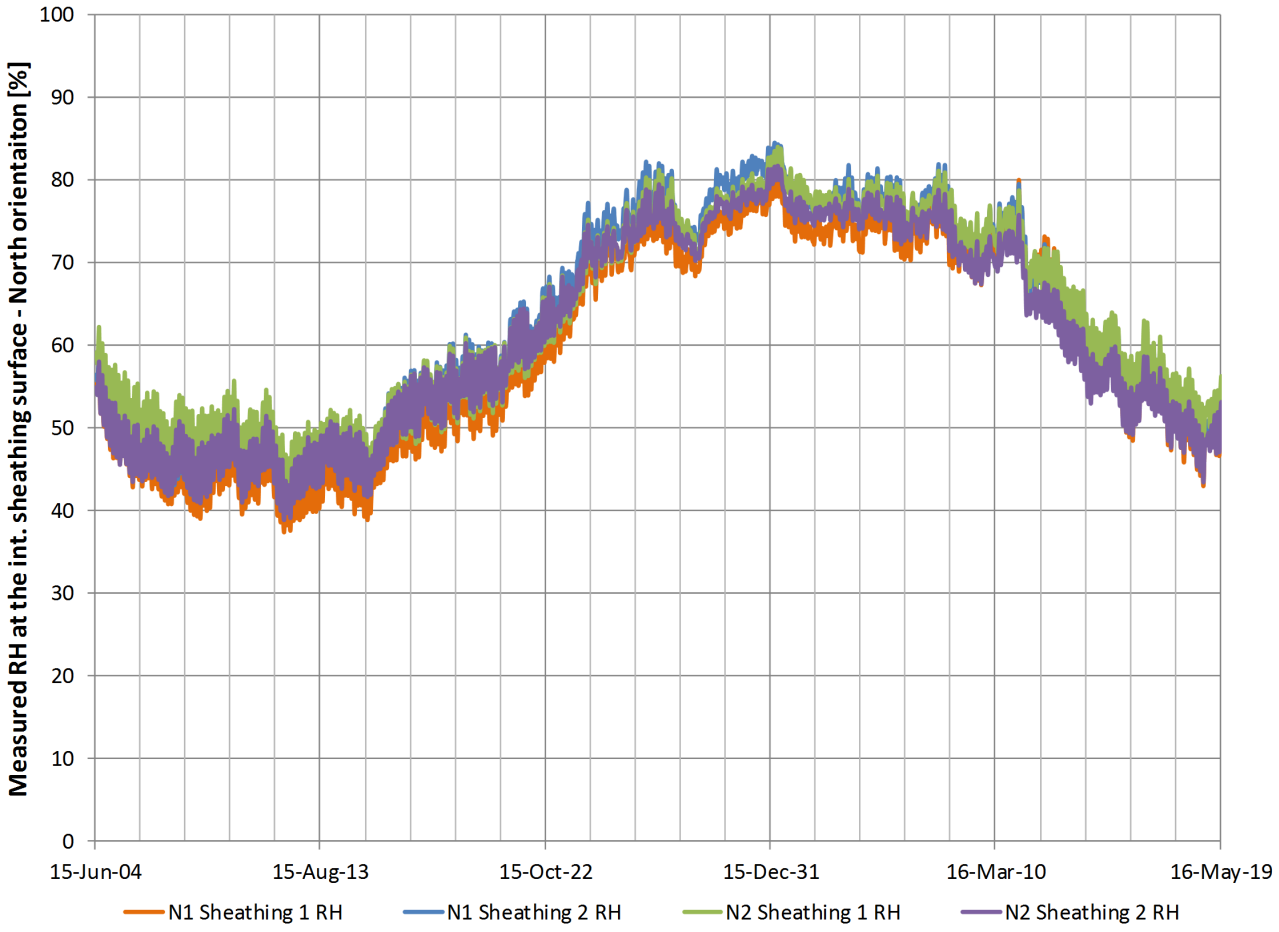
- The relative humidity at the plywood sheathing layer should remain below 80%, with peak levels not surpassing 90% for more than very short periods of time.
- For ideal conditions, the moisture content at the plywood sheathing should remain below 20%. At peak moisture loads between 20%-28%, depending on the duration and drying rate, there is potential for mold growth. At peak moisture loads >28%, moisture and durability concerns are expected.
- The temperature of the sheathing should be measured against the calculated dew point temperature of the interior air to determine condensation potential from interior air leakage if below the dew point temperature.

* Long-term durability analysis generally assessed with respect to relative risk, as opposed to being judged on a pass/fail basis.

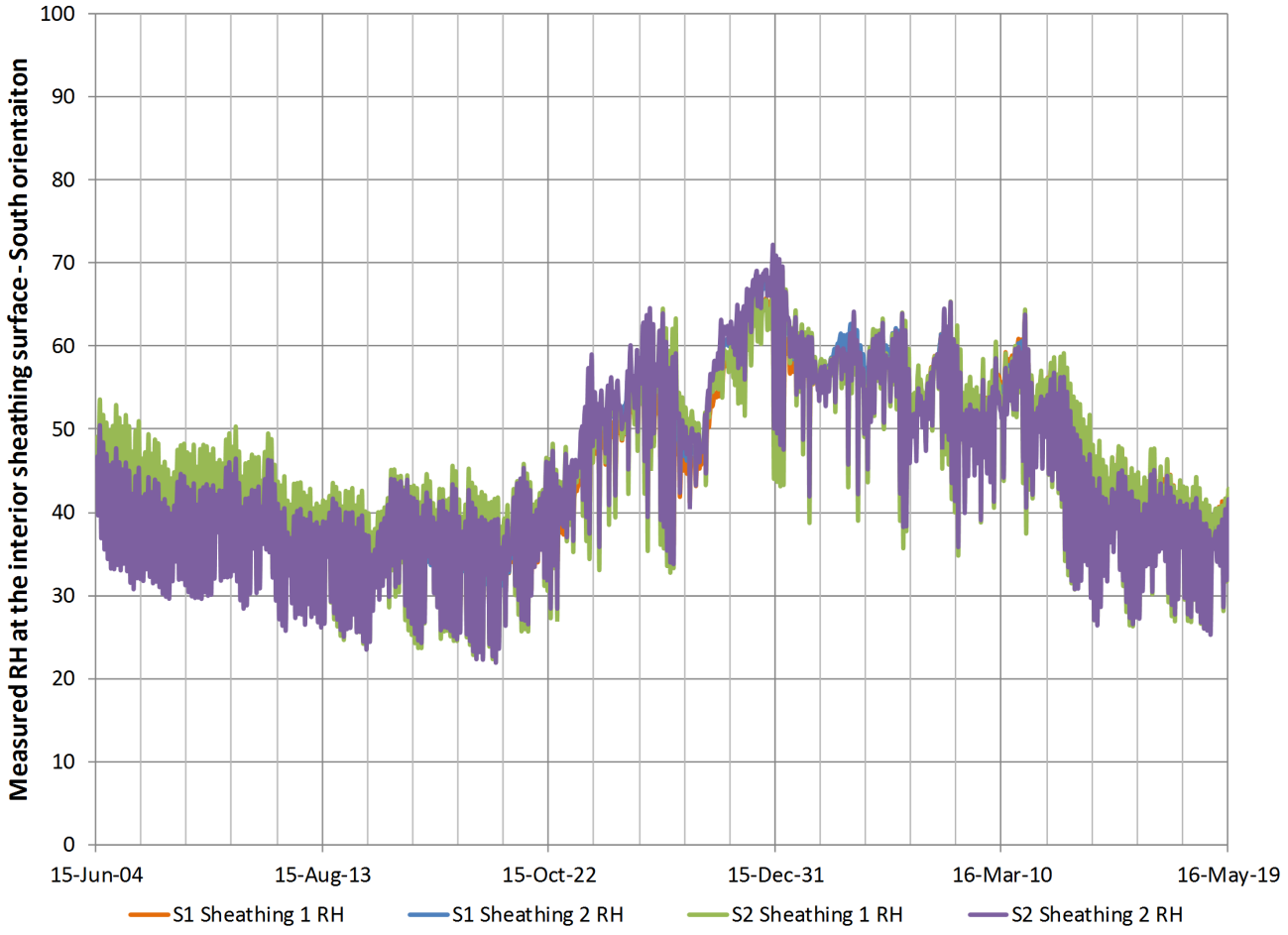
Measure Average Sheathing Wood MC [%]



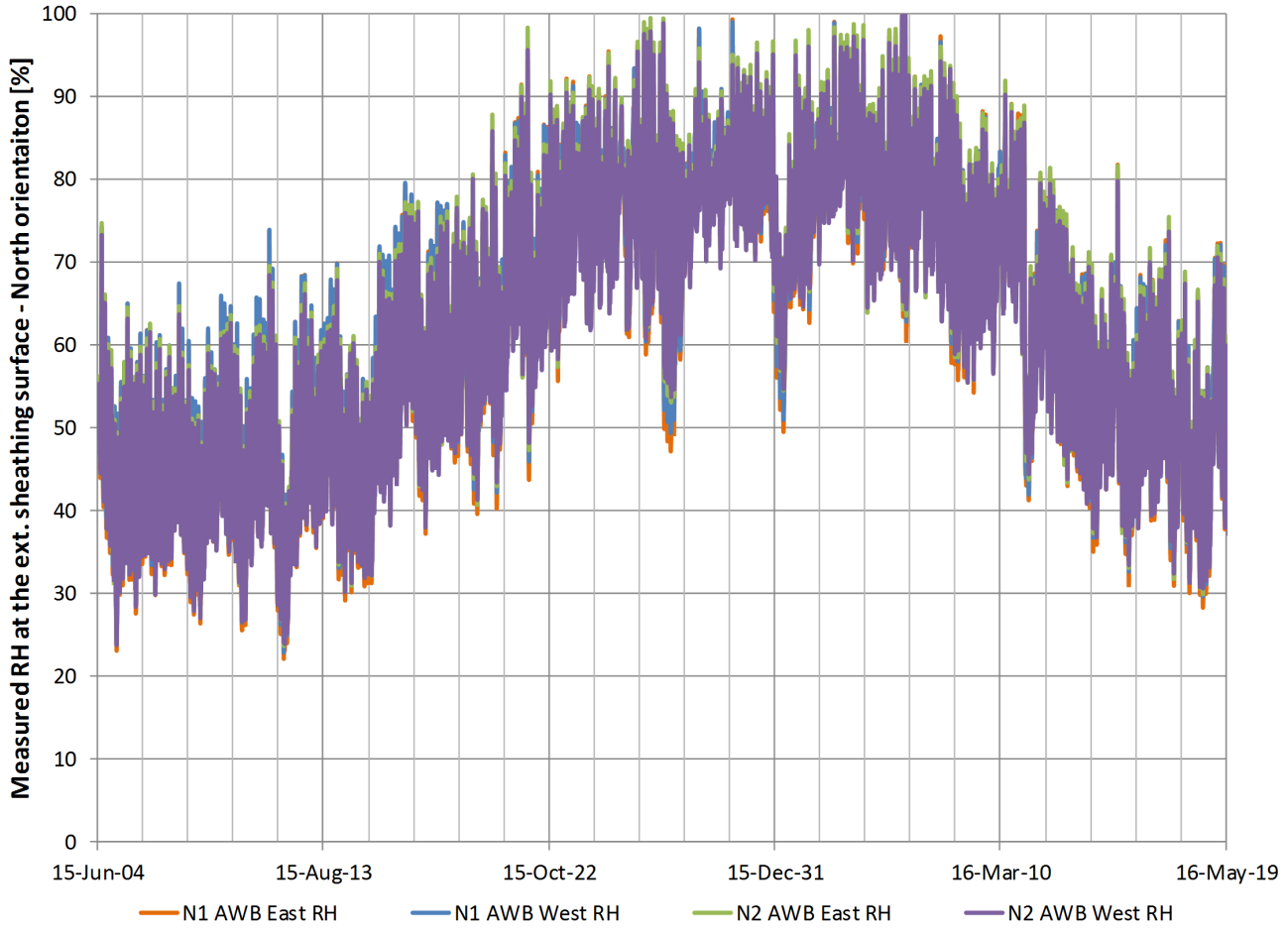
Measured RH at Interior Side of Sheathing – North



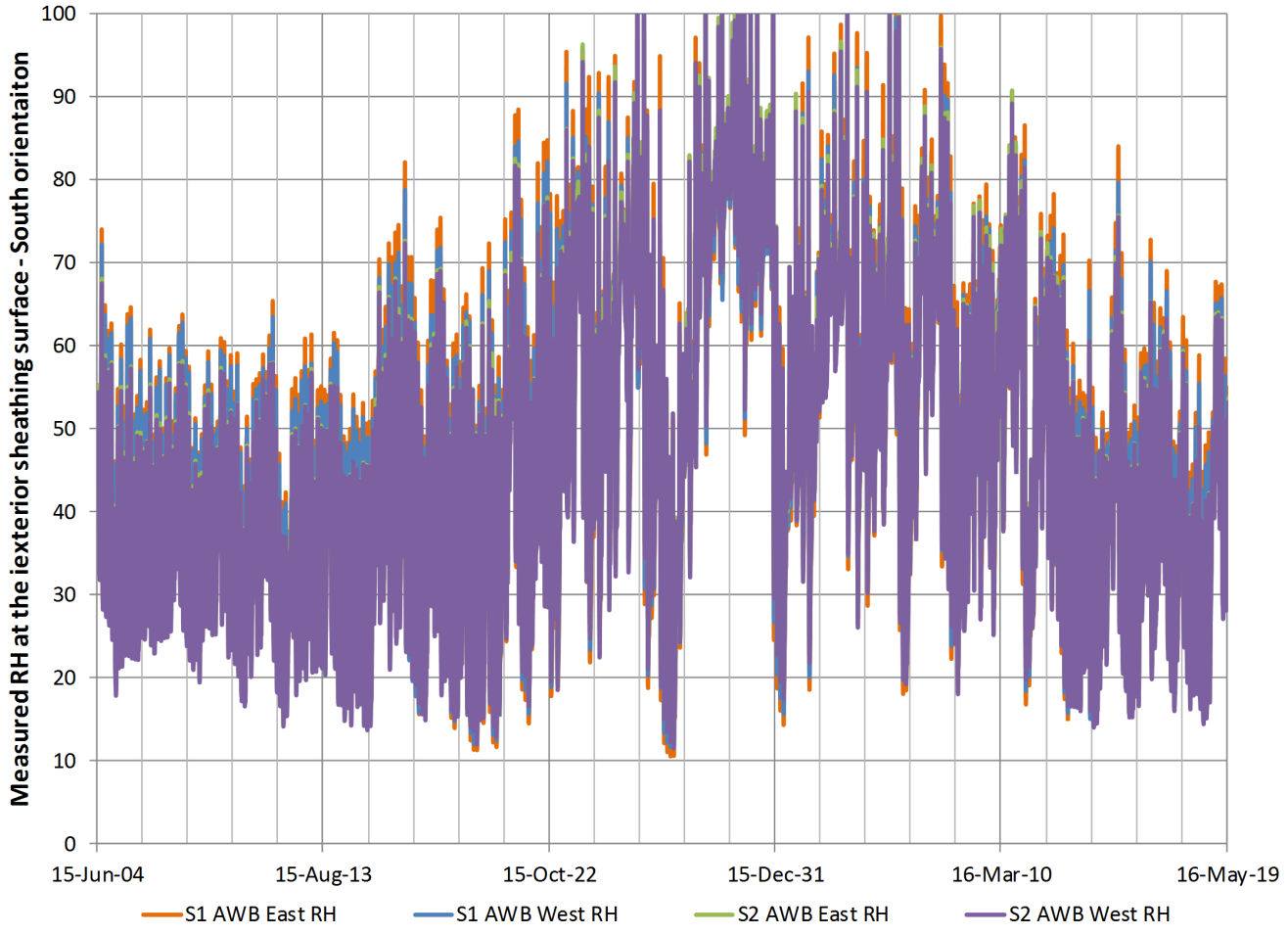
Measured RH at Interior Side of Sheathing – South



Measured RH at Exterior Side of Sheathing – North



Measured RH at Exterior Side of Sheathing – South



Summary of Analysis

- Overall, the measured moisture content in the sheathing and the measured relative humidity at both the interior and exterior surfaces indicate that there is little risk for moisture-related concerns in this assembly. All of the temperature, relative humidity and moisture content sensors are demonstrating consistent, high performance, with no moisture accumulation throughout the one (1) year of monitoring.

- The relative humidity at the exterior of the sheathing is lower than the ambient measured relative humidity. This is an indication that the mineral wool insulation is not adsorbing or absorbing any measureable amount of water vapor or liquid water.

- In this climate zone (4C) with this wall assembly, it is unclear whether there are durability advantages to using a mineral wool insulation compared to lower permeance exterior insulations under normal operating conditions, without water leaks, air leakage or high moisture levels in the stud cavity.

Future Work

- This research report will be followed up by further monitoring of the wall assemblies for a minimum of one (1) full year to ensure that the results are consistent.
- Full condensation potential analysis will be conducted using the measured temperature of the sheathing and the dew point temperature. Preliminary analysis indicate sheathing temperature mostly above the dew point.
- Heat flux analysis will be conducted, using the data from the heat flux transducers installed in all four (4) enclosure assemblies, to determine the in-situ thermal performance of both the blown-in batt stud cavity insulation and the mineral wool continuous insulation layer.
- Compare performance of monitored walls to performance of test hut walls in similar climate (Vancouver climate zone 4C)

References

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Thank you!