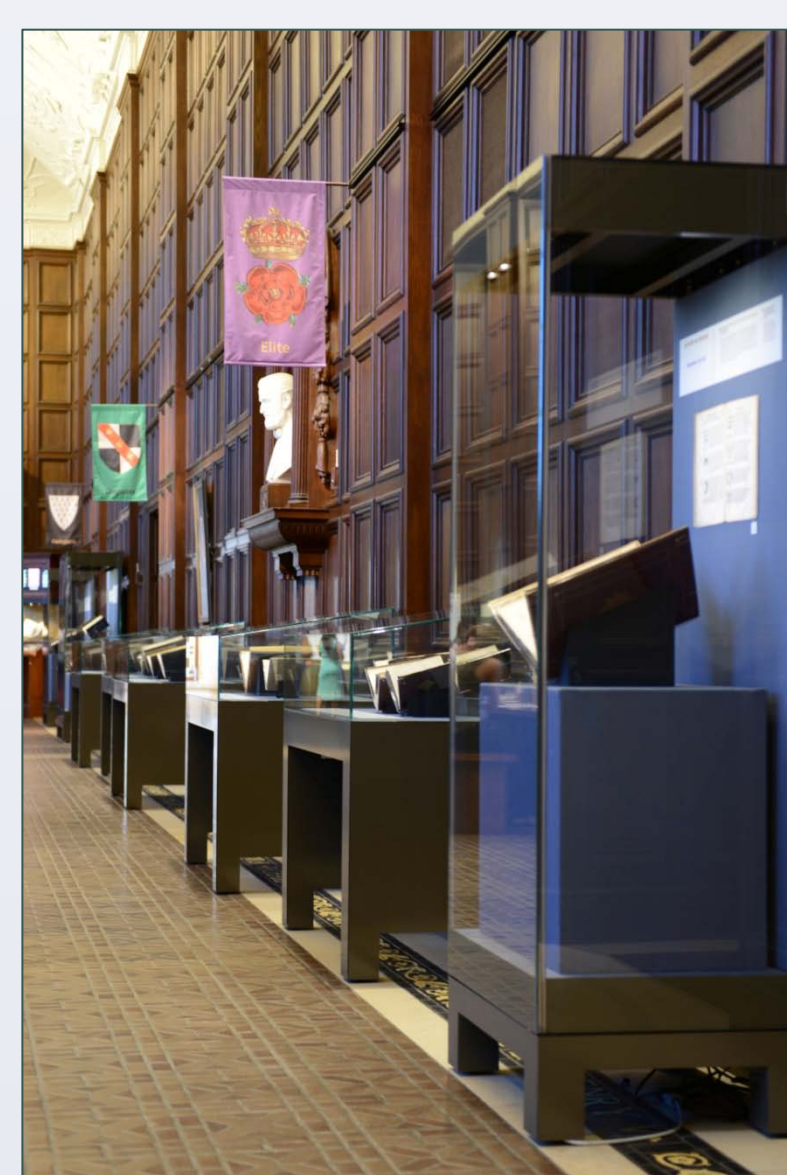


Silica Gel to the Rescue: How to put on a winter exhibition without humidification

Ms. Adrienne Bell

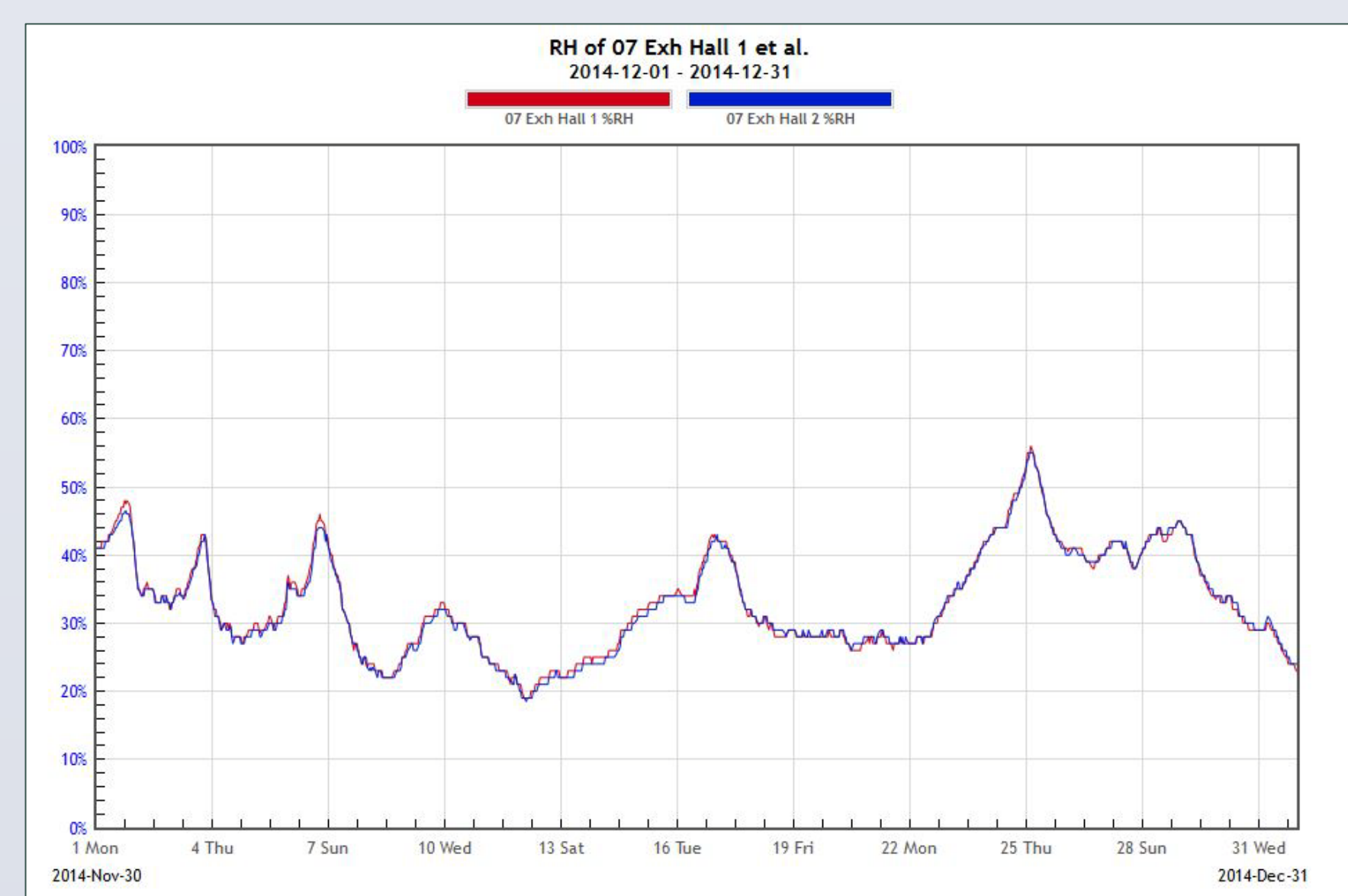
INTRODUCTION

On December 1, 2014, the clean steam boiler at the Folger Shakespeare Library was turned on and promptly turned itself back off. A replacement was required and would not be available to be installed until the middle of February. This meant the Folger would be without humidification for the bulk of the winter. While the Folger could and would accept drier conditions within the collection storage spaces for its own materials, contractual obligations for items currently on loan to the Folger and on exhibit meant something needed to be done to regulate the relative humidity (RH) in the Great Hall, the Folger's exhibition space



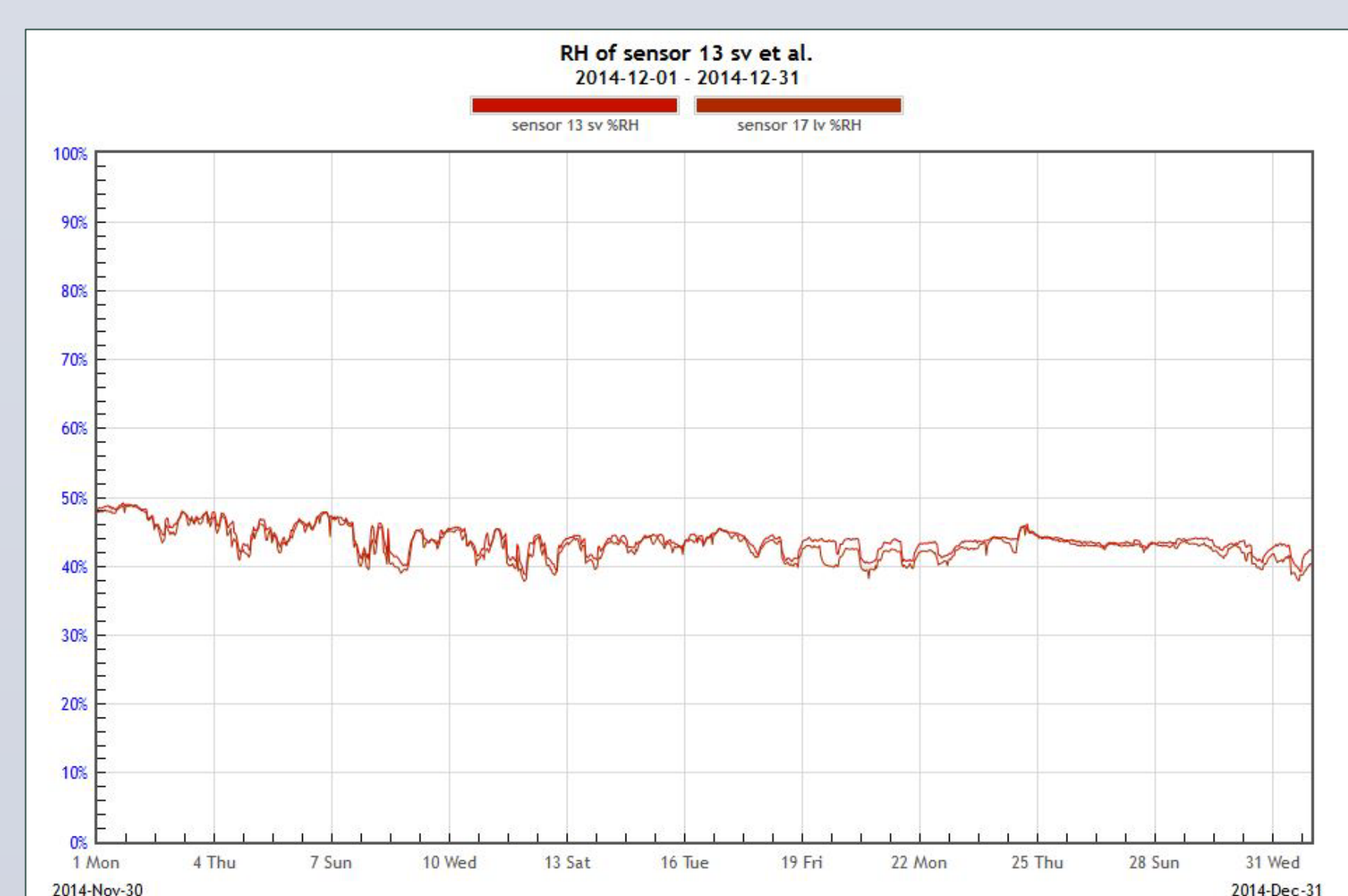
FIRST APPROACH

Installation of four portable humidifiers within the Great Hall attempted to maintain an acceptable RH within both the Hall and the display cases. This approach proved to be unsuccessful due to rate of air exchange within the Hall; the humidifiers had barely added moisture to the air before it was replaced with new air.



Great Hall

The decision was made to remove the humidifiers from the Great Hall and allow the conditions to be dictated by the outside air. As the Folger's current display cases are conditioned by silica gel, Conservation began working on an approach to maintain the environment in the cases via the silica gel instead. This was a simple enough task for the table cases as they had already demonstrated they could hold a stable RH. The drier air was more of a concern with the tall cases as they had demonstrated they could not hold a stable RH; the display area within the tall cases is approximately 5'8" tall.



Sample of Tall Cases

The tall cases are not able to hold a steady RH for several reasons: the case is not designed with a large enough silica gel compartment to condition the air held within the case; the silica gel compartment is at the bottom of the case; and the height of case allows for stratification of the environment within the case despite the presence and use of a fan.

SILICA GEL HYPOTHESIS

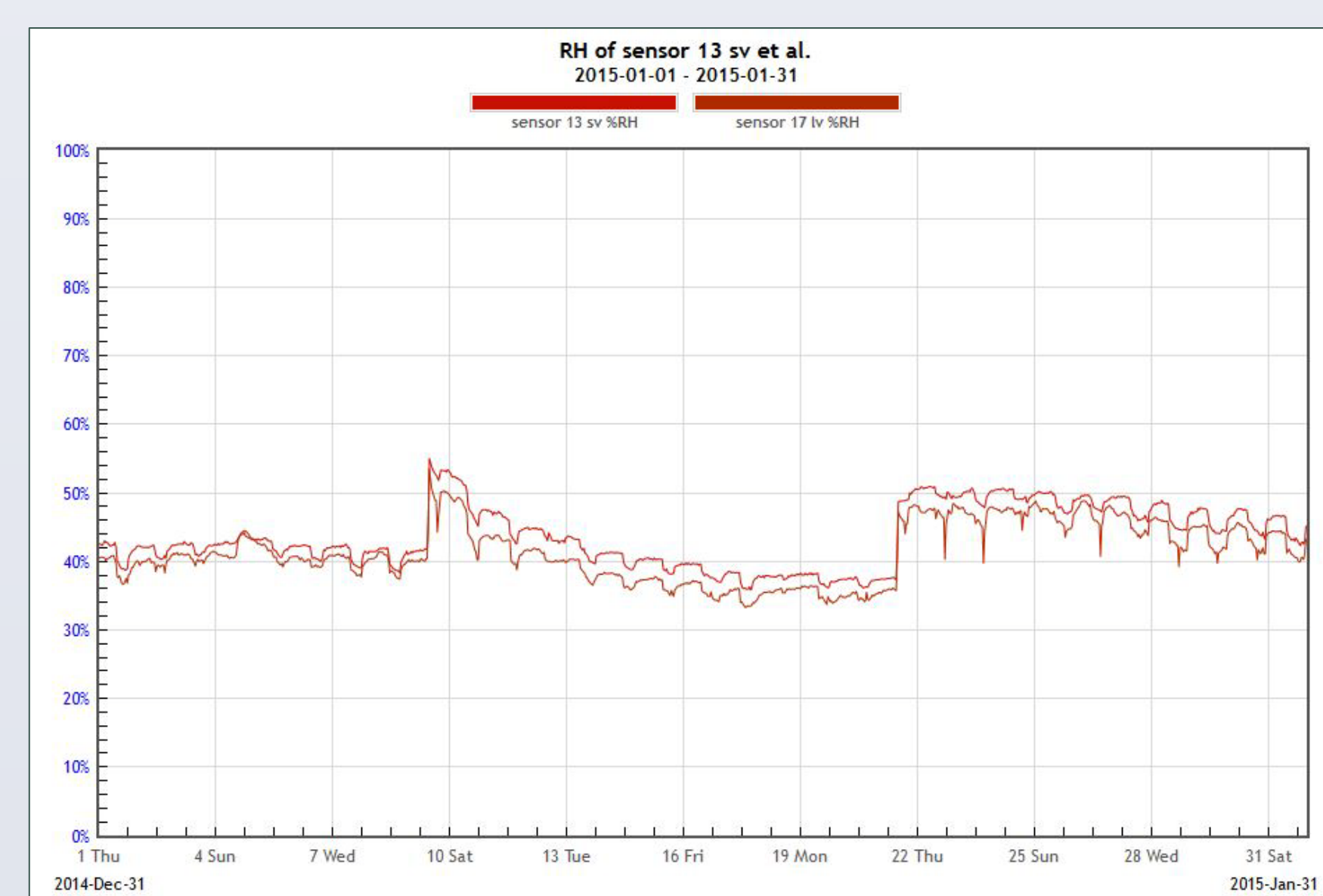
Conservation hypothesized that a silica gel conditioned to a higher than usual RH would introduce enough moisture into the environment within the tall cases to offset the lower RH of the Great Hall. Variables to be considered included:

- RH of silica gel to be installed
- How frequently the silica gel would need to be exchanged for new
- How much of the silica gel should be replaced at any given time

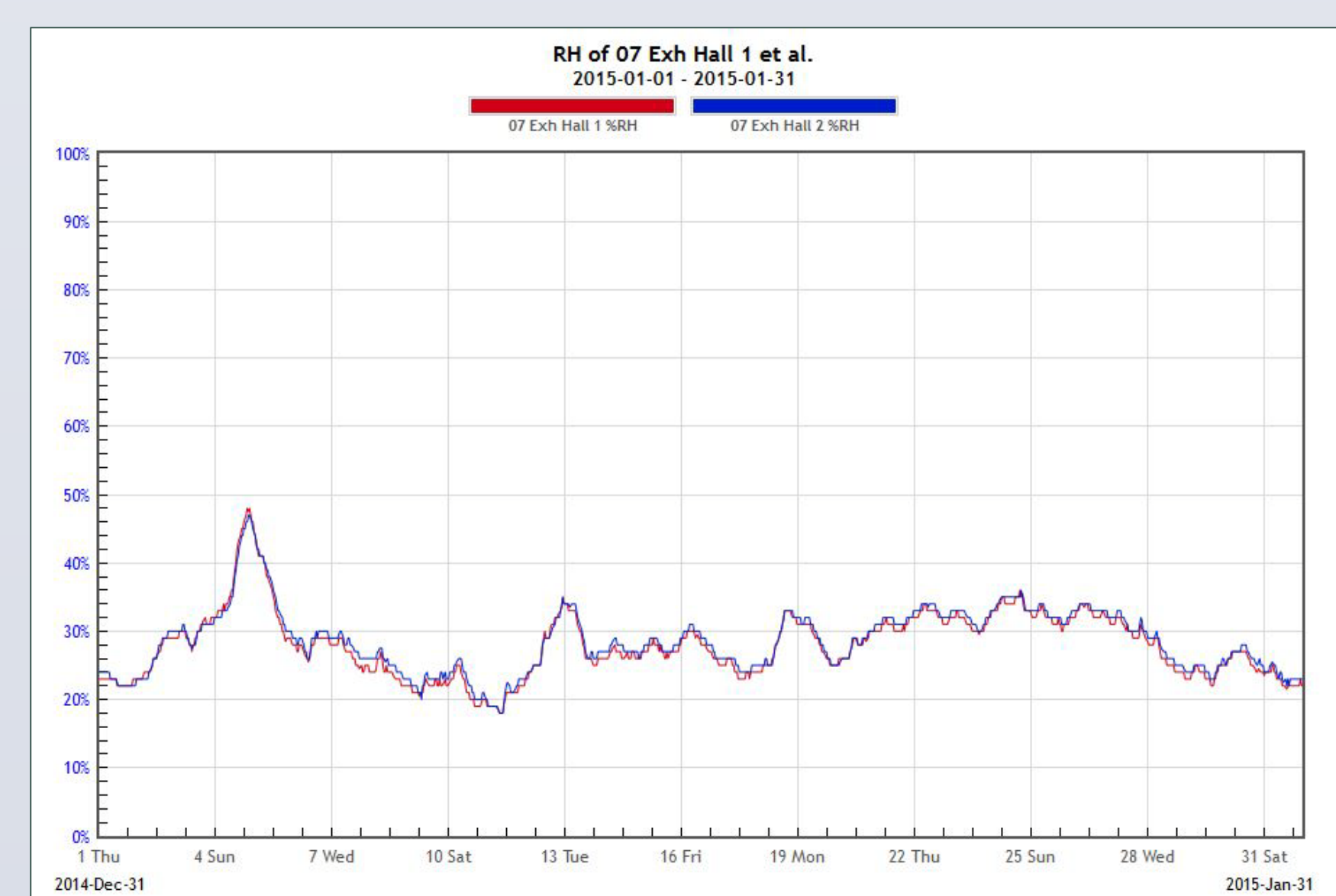
SECOND APPROACH

Conservation conditioned sachets of silica gel to 65% RH using its Manfred Mayer humidification chamber for one week; it is unknown whether the silica gel was regular or high density silica.

Initial exchange of silica gel involved the silica gel conditioned to 45% that had previously been in the cases being replaced with sachets conditioned to 65% once the RH within the case dropped to the lowest contractually allowed value. This resulted in a considerable spike in RH. The next exchange in silica involved half of the silica gel currently in the case being swapped for new silica gel conditioned to 65% once the RH within the case again dropped to the lowest contractually allowed value. This also resulted in a considerable spike in RH.

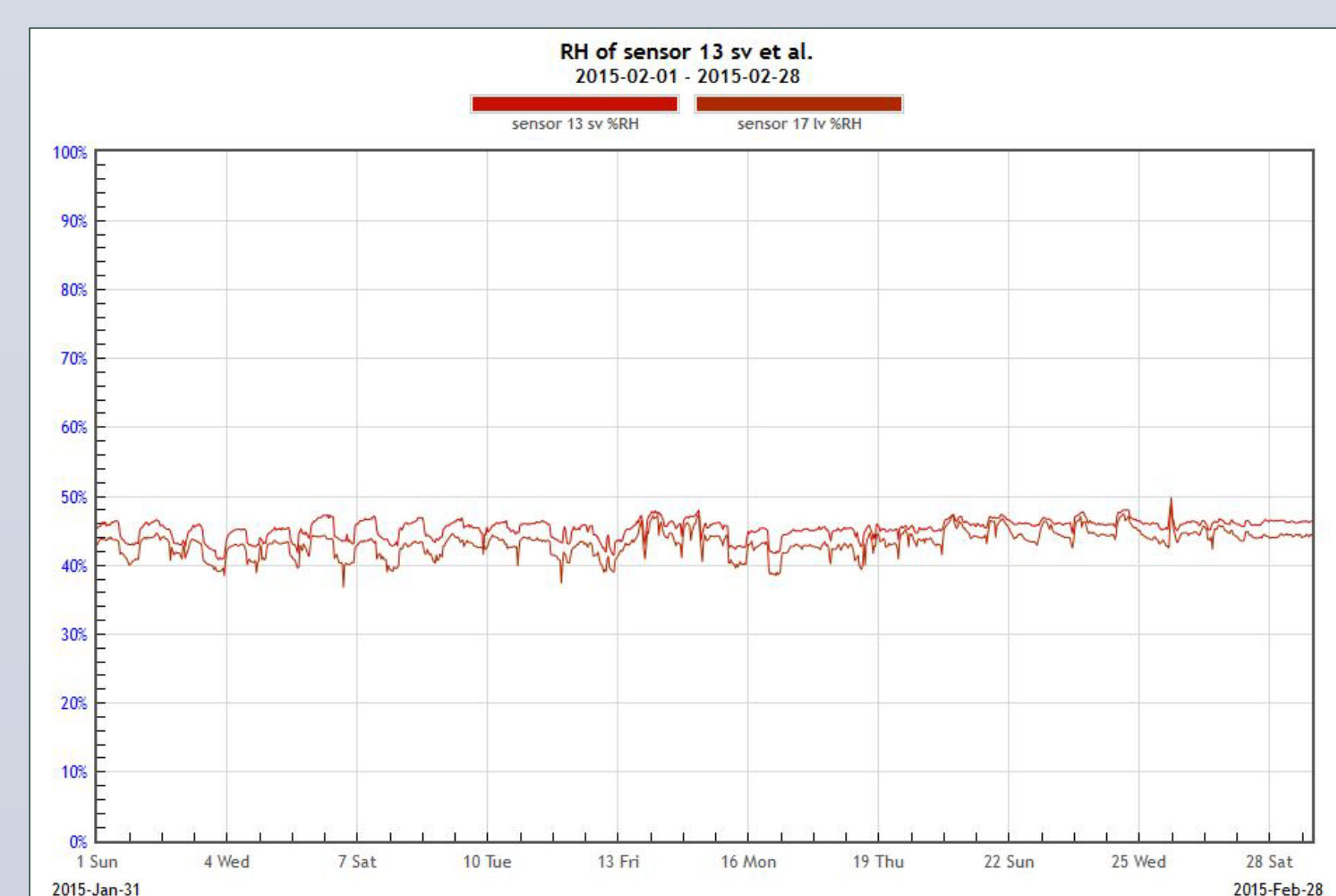


Sample of Tall Cases



Great Hall

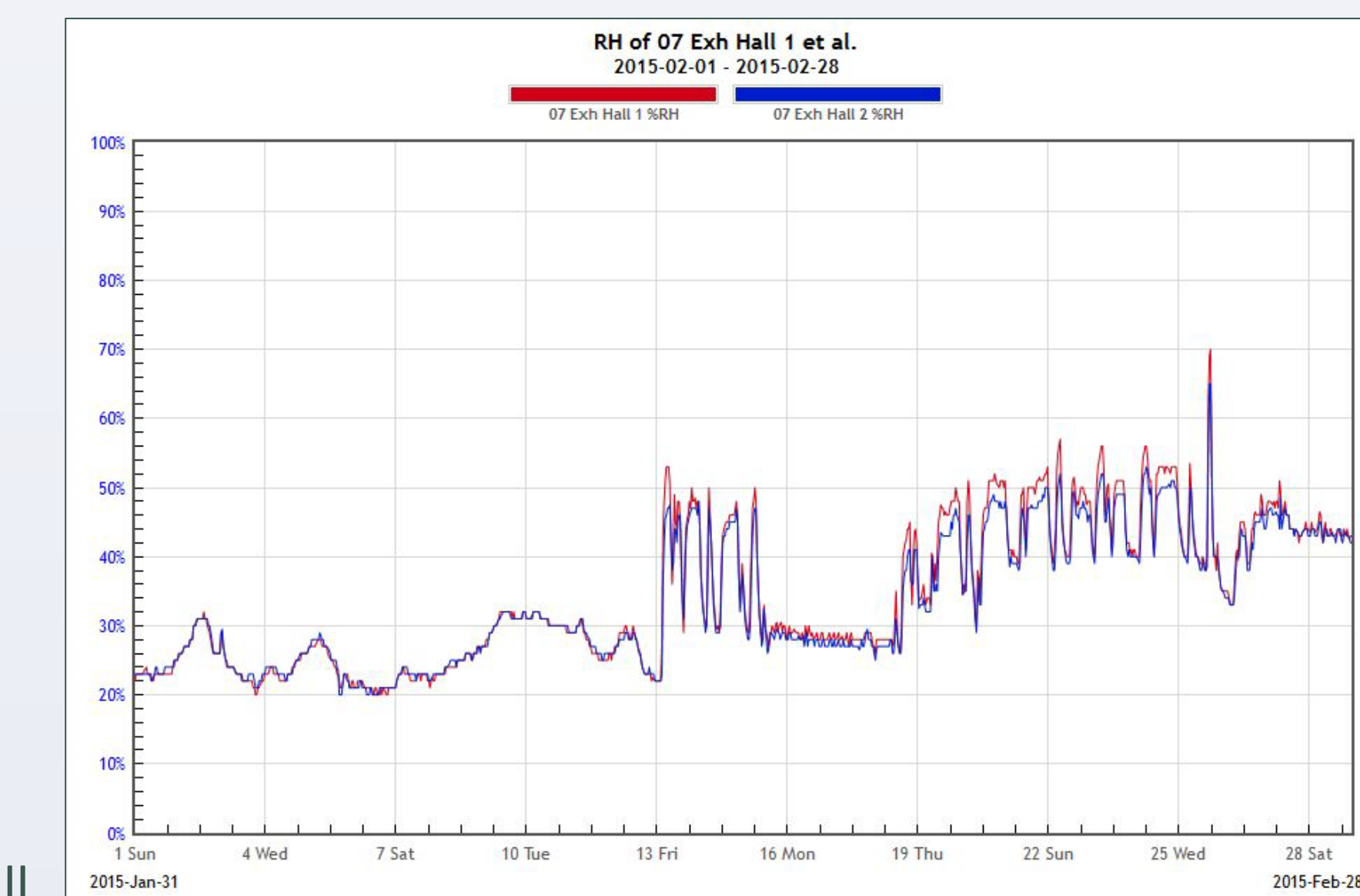
The third exchange in silica gel involved half of the silica gel currently in the case being swapped for new silica gel conditioned to 65% but this time the swap occurred when the RH within the case had dropped to the midpoint of the contractually allowed value range. Conservation felt comfortable assuming the RH in the case would continue to drop without new silica gel given past evidence. This resulted in a considerably more balanced RH within the cases.



Sample of Tall Cases

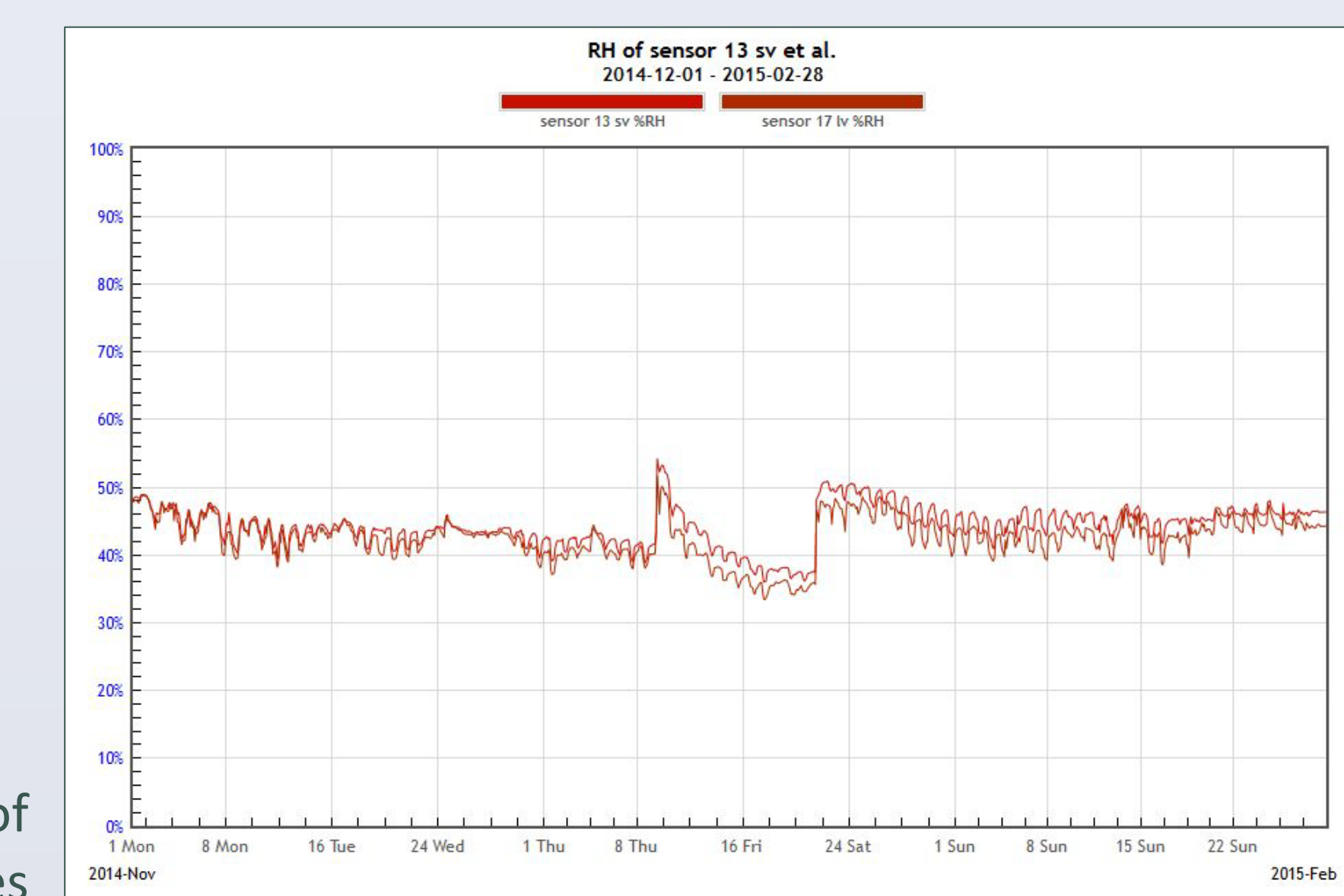
APPROACH CONTINUED

The new steam boiler was installed on February 11, 2015. The remainder of the month was spent slowly reintroducing humidity to the building and balancing the spaces again.



Great Hall

The below graph shows all three months that the steam boiler was inoperable and the results of the use of silica gel within the tall cases.



Sample of Tall Cases

CONCLUSION

It is possible to use silica gel to maintain an RH within a display case that is considerably different from the RH of the surrounding environment. Many of the variables involved in using this tool in a systematic, repeatable manner have yet to be determined:

- I. Correlation between RH of silica gel, RH of surrounding environment, and resultant RH of display case
- II. Correlation between air exchange rate of display case and Variable I.
- III. Correlation between longevity of conditioned silica gel and Variable I.

It is important to note that the variables outlined in this poster will always result in a RH within the case that is moving towards the RH outside of the case. The inability of the tall case to hold a stable environment regardless of the RH of the surrounding environment means that the RH is always going to be shifting at some rate; the closer the desired RH is to the outside RH, the slower the shift. It is possible, however, when using a display case with a very low air exchange rate to create a stable RH within the case that is significantly different from the surrounding environment. The Folger has been doing exactly this with its current traveling exhibition: First Folio! the Book that Gave Us Shakespeare. Please see the author for more details.

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