5 Key Questions That Must Be Addressed When Analyzing the Data

After you have successfully deployed a series of electronic data logging monitors (EDLMs) and collected the data from your data acquisition system or EDLM, the next step is to gather the data into a meaningful report. The data report should be able to communicate to an approver or regulator that your mapping study is thorough and is based on relevant data. The report should support your conclusions or recommendations.

What are the key points to include in the final data analysis report?

The first step in analyzing the data is to compare the data to the acceptance criteria that was adopted before the start of the mapping. Out of range readings, lost or missing data, and high or low readings can be a red flag indicating serious flaws in the mapping study. It is important to make sure explanations for any data outside of the acceptance criteria along with the reason for the variation are noted in the documentation. In addition to scanning the data manually, it is a better idea to use a software tool, such as a spread sheet or other type of software, to scan for errors or unacceptable out of tolerance data.

Another equally important step is looking at the overall stability and variations or trends in the readings. Graphing the data can also be very helpful in documenting these trends that may occur during a mapping. The graphing range should not be set so wide that the trend cannot be seen, especially if there are numerous logger data per graph. It is best to zoom into the range at which the individual logger data begins to separate on the screen or page. This step alone is often enough to catch data or specific loggers that may be a problem for your acceptance criteria.

What calculations should be included in the mapping report?

Depending on the logging system employed, statistical data such as minimum, maximum, and average readings may need to be generated from the data. It is important to decide what data to present, and what data is meaningful. These calculations are critical to understanding where the hot and cold spots reside. The use of a minimum and maximum should not be overlooked since this is an indicator for readings that may be out of tolerance for the intended space. This is particularly true for room mappings where seasonal variations may change the hot and cold spot locations.

Consider the mean of the readings and any specialized calculations that are important to your type of study. For example, warehouse mappings often include the MKT (mean kinetic temperature). When mapping equipment, other specialized thermal calculations may be added to enhance the documentation and show proof of the equipment's reliability. Be certain not to include calculations that are not relevant. Calculations that do not apply to a study may create questions or uncertainties to an approver or regulator. It is easier to add a requested calculation from an approver later than to explain a calculation that is not useful in the interpretation of the data.

What is the best way to present or group the data and calculations in the report?

The grouping of data can be very useful in understanding the physical traits of a mapped area. For example, you may want to group the data for the top layer of a heated chamber. Deriving the average for each of the top, middle, and bottom zones can show the temperature strata for each layer. Since hot air rises, one would expect that

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the top half of a heated chamber would be the warmest on average over the other mapped layers. If the top layer is not the warmest, there may be another factor that is effecting the environment.

As discussed in the previous section, make sure that the grouped data is important to your study. Again, adding information that is not necessary may create questions from approvers and regulators that you will need to support with extra documentation.

It is also worth noting that many temperature mappings do not include any grouping other than min, max and averages for the entire mapping. Grouping of data can be very useful tool, but if you include it in the documentation make sure it supports a meaningful concept of the mapping.

How many pages should the final document include?

There is no set answer. If the mapping plan was well-documented, and executed as stated, the final report may be easy to assemble. Most of the material will likely be the data itself along with a thorough analysis. The analysis, including digital data, charts, and calculations, can be added to an appendix of the mapping plan.

The mapping plan itself may only require slight modification with only a few additional items. Many mapping study reports entail just a few pages along with several pages of supporting data attached. Other reports can be quite extensive due to the complexity of the mapping. Equipment mappings with multiple cycles and multiple runs, for example, can be quite large.

What conclusions or recommendations should be stated in a final mapping report?

This is similar to "How many pages should the final document include?". There is no set answer. The conclusion should relate to the intended purpose of the mapping. If the mapping was written clearly stating the acceptable operating range for the mapping, the conclusion is pretty straight forward. The conclusion can be as simple as a pass or fail. If the mapping study was performed to find the thermal properties of the area and how those properties affect a certain product, the conclusion may be relatively long.

All conclusions or recommendations should be sound and supported with data. Do not feel that a recommendation is required in any of the documentation. Many mappings are conducted to ensure quality. Any changes that may be needed in the system are provided and documented by other groups or individuals. Remember that in some cases, conducting a mapping study that failed to verify the acceptance criteria may have served an even more important purpose. Mappings are done to prove you have a stable and reproducible system that is within the stated acceptable ranges. A corrective action from a "failed acceptable range" mapping may help to ensure that the product is produced properly and stored in a correctly controlled environment.