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Mock Soils and Mock Soiling

A “mock soil” and “mock soiling” are two different things. A “mock soil” is a soil which is not a routinely manufactured product that is used in the validation protocol to represent the actual soil present on the equipment surfaces at the time of cleaning. “Mock soiling” is a process by which I apply a soil to the equipment surfaces not by a routine manufacturing process, but in another way to represent the soil on the equipment surface at the time of cleaning.

Some may use the term “artificial soil” in place of “mock soil”. Some may use the term “artificial soiling” in place of “mock soiling”. Note that I may use a mock soil and a mock soiling process together or separately. Here are the three situations:

1. Use of a mock soil, but soiled in a routine manufacturing process. That is, a mock soil is used to soil the equipment surfaces, but it is applied by utilizing a standard manufacturing process.
2. Use of the actual product itself, but that product is applied to the equipment surfaces in a manner (mock soiling) other than the standard manufacturing process.
3. Use of a mock soil in a mock soiling process. That is, a mock soil is applied to equipment surfaces in a manner other than a standard manufacturing process.

Note that some may quibble and argue that any time I am using a mock soil, that I am always using a mock soiling process because I am clearly not using the standard manufacturing process used for the actual soil (product). That certainly can be a valid consideration. However, I would like to make a distinction between a situation where I go through a complete manufacturing process with the mock soil and a situation where the mock soil is sprayed (for example) onto equipment surfaces.

Why would I want to use either a mock soil or mock soiling (or both)? There may be several reasons. Let’s take the case first of using the actual soil, but applying it in a mock soiling process. Probably the most common reason for utilizing mock soiling is that I don’t want to make three (or whatever the number) batches of product to complete my validation. For example, I make one batch of product. I clean the equipment after processing that batch, and that is my first validation run. But, I then use that same product batch to soil the equipment surfaces in an artificial manner. The details of how I do that soiling process will depend on the nature of the product and the nature of the equipment. However, I want to perform that mock soiling in a manner so that the nature of the soil on equipment surfaces either is the same as the nature of the product on equipment surfaces during routine manufacturing, or so that it represents a worst case as compared to routine manufacturing. Considerations include the amount of soil left on the surface and the nature of the soil (freshly deposited, dried on, baked on at elevated temperature). Note that the effects of both processing and the dirty home time should be considered in that last point. There may be other considerations such as bioburden level and effects of impaction (during the manufacturing process). In any case, the manner of mock soiling must be carefully considered and documented.

I might want to use a mock soil for a variety of reasons. One reason, given in PIC/S PI 006-3, is that I am concerned about the toxicity of the actual soil, and I don’t want operators swab sampling equipment that has unknown levels of that toxic material on the surface. The PIC/S document states that material which simulates the “physicochemical” properties may be used because of toxicity and/or hazard concerns of the manufactured

drug product. [Note that a definition is given for “simulated product” in the glossary of PI 006-3; however, the context suggests that that definition is used only for operational qualification studies in process validation.] Another reason is that as a contract manufacturer, I want a product as my worst case for cleaning validation purposes to be a product that I control. In this situation I design a product which can be manufactured on my equipment by typical manufacturing processes, but which represents a worst case as compared to any product from a client that I might be called on to manufacture. Probably the most important considerations for choosing a mock soil is to choose a product which either has the same difficulty of cleaning as actual products, or which is more difficult to clean as compared to actual products. I might determine this by whatever criteria I utilize to select the worst case product in a grouping (matrixing) approach. Other considerations include safety, cost and continued future availability of the raw materials (especially the active). Note that while it is theoretically possible to have a mock soil without a pharmaceutical active, it is probably preferable to select a mock soil with an actual pharmaceutical active.

It should be clear that I could have similar reasons for using both a mock soil and a mock soiling process. However, it does require more justification, and other thing being equal, I would prefer to use mock soiling with an actual product or to use a mock soil with actual manufacture. However, the use of the two together should not be completely ruled out. Realize that as much as possible, using actual product with an actual manufacturing process will clearly cause fewer questions in an audit. To avoid unnecessary scrutiny, it is best to have appropriate written rationales in advance as to why mock soils and/or mock soiling are representative of cleaning performance in routine product manufacture.