Regulatory Basis:
FDA Quality Systems Regulations

Reference: FDA CFR - Code of Federal Regulations Title 21

General Discussion
This document recommends sampling locations, frequencies, and testing activities associated with the commissioning and qualification of new installations or major revisions of Clean/Pure Steam Systems (*e.g.* the addition of new subloops or other system wide retrofitting).

This document defines the sampling location, frequency, and testing activities utilizing a risk based approach for supporting the commissioning and qualification for a clean/pure steam system. The recommended practices are derived from the latest edition of the ISPE Good Practices Guide "*Commissioning and Qualification of Pharmaceutical Water and Steam Systems"*.

Clean Steam is defined to be steam that does not contain any additives (e.g., boiler additives), [1] is used where the steam and/or condensate have direct contact with product, and the steam condensate meets USP/EP WFI requirements. In addition, clean steam that is used for sterilization applications of "porous loads" for international manufacturing also should meet the requirements of European Standard EN 285. The USP states that "Pure Steam [Clean] is prepared from suitably pre-treated source water analogously to either the pre-treatment used for Purified Water or Water for Injection".

This document does not cover the additional commissioning and qualification activities associated with other aspects of system validation (e.g., drawing development, system equipment/component installation/testing activities, cleaning/passivation, monitoring equipment, etc.). Ongoing operations (i.e. routine monitoring) after qualification activities are also outside of the scope of this document.

Recommendations & Rationale
The results of the commissioning and qualification demonstrate the equipment, personnel, and operating procedures are capable of consistently providing Clean Steam meeting the necessary steam quality requirements.

Regarding the quality of water feeding the clean steam generator, consider the requirements for Bacterial Endotoxin Testing (BET) validation studies in order to assure that there is no Bacterial Endotoxin being carried over in the steam during generation for those applications that have an endotoxin specification.

For example, clean steam that is strictly used for the production of ophthalmic products or non-sterile products would typically not have defined bacterial endotoxin specification requirements.

may be deferred and documented within appropriate validation documentation until such time that an autoclave installation and subsequent validation is planned and connected to the clean steam system.

Risk Based Approach

A risk based approach to commissioning and qualification may be utilized to develop the sampling strategy. For example, impact assessments may be used to determine what components, equipment, or process functions of the Clean Steam System are considered critical.

A Clean Steam quality attribute may be defined as critical based upon the need to meet specific quality requirements where the quality is not enhanced further by additional downstream operating steps. For example, conductivity is a critical attribute that is measured at the outlet of a Clean Steam Generation System (e.g., condensate outlet of the clean steam generator) for verifying the results meet necessary steam quality requirements. Sampling the conductivity at this point would occur both during commissioning and qualification activities. For details regarding the design of a condensate collection apparatus for testing, refer to European Standard EN 285 – Sterilization-Steam Sterilizers – Large Sterilizers.

Appendix:

