



## **Technical Report No. 90**

# Contamination Control Strategy Development in Pharmaceutical Manufacturing

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## Contamination Control Strategy Development in Pharmaceutical Manufacturing Team

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### Authors and Contributors

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**Cheryl Essex**, Sanofi (Co-Chair)

**Biswarup Gupta**, Vertex Pharmaceuticals, Inc.  
(Co-Chair)

**Frederic Ayers**, Eli Lilly and Company

**Reyes Candau-Chacon**, PhD, U.S. Food and  
Drug Administration

**Adam Caruso**, Merck & Co., Inc.

**Joseph Frantz**, PhD, Sanofi (retired)

**Andrew D. Hopkins**, Abbvie, Inc.

**David Keen**, Ecolab Life Sciences

**Jeanne Mateffy**, Amgen, Inc.

**Maureen Mueller**, Curium Pharmaceuticals

**Chris Murdock**, PhD, Bristol Myers Squibb

**Patrick Nieuwenhuizen**, PharmaLex Ireland  
Limited

**Dona Reber**, Pfizer (retired)

**Christine Sherman**, Takeda

**Donald Singer**, Ecolab Life Sciences

**Joseph Sondej**, Bristol Myers Squibb

**Edward Tidswell**, PhD, Merck & Co., Inc.

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# 1.0 Introduction

Drug manufacturers have employed contamination control measures for decades as a core element of good manufacturing practices. Commonly, these are a collection of practices that were developed separately and applied without clear consideration for their interdependence.

The ongoing evolution of contamination control principles that this document addresses is a shift to a holistic approach, where the practices are designed to work together to achieve proactive contamination control and are evaluated for their collective effectiveness. The holistic approach also demands that contamination control measures be tailored to the specific risks around each individual process.

Many GMP practices are part of a company's contamination control strategy (CCS) including, for example, how processes and facilities are designed (including cleaning and disinfection), how raw materials and consumables are selected and managed, and how personnel are trained and developed. The CCS is also intended to drive continuous improvement and/or remediation. The success of any one CCS element is intrinsically linked to the others, and the success of the CCS depends upon how well the individual elements work together to reduce the contamination hazards for a specific process (see **Figure 3.0-1**).

All drug manufacturers have a CCS that includes a multitude of GMP practices documented across numerous operational procedures and programs. The rationales for those practices are often captured in risk assessments, validations, and technical documents. A CCS document creates an umbrella document that brings the relevant information together so it can be understood and evaluated holistically. All CCS documents should summarize the contamination control practices, along with the underlying rationales, and reference the supportive procedures and reports. This technical report outlines how to implement an effective CCS using a holistic approach, highlights a selection of best practices, and identifies outdated practices and mindsets. The document opens with a conceptual discussion of the various CCS elements (**Section 3.0**) with the understanding that all drug manufacturing firms will have these elements in various forms and levels of maturity. The many existing guidances and standards for specific CCS elements, for example, critical utility control, gowning practices, and process hold times, are referenced in **Section 1.1.0**. This technical report does not replace or reiterate those detailed documents; rather it acts as a roadmap. Appendices are also included that provide valuable case studies and practical examples as well as a template for creating a CCS document (see **Section 18.0**).

## 1.1 Purpose

PDA Technical Report No. 90: *Contamination Control Strategy Development in Pharmaceutical Manufacturing* provides guidance on how to establish an effective CCS for either a new or existing drug manufacturing facility or process.

## 1.2 Scope

This document focuses on contamination control practices against microbial and other adventitious agents, pyrogens such as endotoxin, and foreign particulate matter in the manufacture of sterile drugs, low bioburden drug substances, and nonsterile drugs that are vulnerable to contamination. Yet, the principles presented in this technical report can be applied more widely to any drug manufacturing or compounding process.

Secondary and tertiary packaging considerations, chemical contaminants including product cross-contamination, and inherent particulate matter are out of the scope of this technical report.