



# A Guide to Develop a Cold Start Readiness Procedure, After Turnarounds & Shutdowns

An Online Continuing Education Course for Engineers

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# **A Guide to Develop a Cold Start Readiness Procedure, After Turnarounds & Shutdowns**

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## **Prologue to Cold Start Procedure Guide**

The two most high-risk events for a manufacturing plant are Start-ups and Shutdowns. This is even riskier with manufacturing plants that have Highly Hazardous Chemicals (HHCs). This course is for those in the manufacturing industry and will specifically benefit any user that has HHC; but also in the food, drug, or any other plant you can think of. Why? We will teach you how to use Process Safety Management, Environmental, and Personal Safety regulations to construct your own procedure.

This course will also guide you through some of the applicable regulations. Further, we will cover required training, planning, managing change, roles & responsibilities, procedures, and a sample Start-up checklist. The sample will be for a petroleum-chemical plant but can be modified to meet the needs of, say, a pharmaceutical plant or a food processing plant. The basics of constructing a Start-up procedure do change with the industry because the details about the manufacturing plant will be known by you, allowing you to construct your own process.

To ensure proper execution, the author chose to weave how to write a procedure in with the start-up readiness process to ensure the student could write their own. This is a delicate process, but if you have taken other courses by this author, you will know that they offer techniques outside of the core learning.

If you are not satisfied with your current Start-up plan, want to know if it covers everything, or do not even have one, then this course is for you. This course will walk you through one of the most critical, high-risk jobs as a Professional Engineer you will ever manage.

## Introduction

Being ready to start-up is something that can be required after unplanned maintenance shutdowns, emergency shutdowns, and planned shutdowns, aka turnarounds. The purpose of having a process to manage start-up is to ensure the unit or facility is in a safe condition to restart.

Industry data has shown that the rate of incidents is higher during manufacturing process changes, no matter the industry. Run-away reactions, such as at **Chernobyl** and Lock out Tag out (LoTo) misses, such as at **Phillips 66** in 1989, make us all pause to rethink how involved this process needs to be. On December 2, 1984, during a start-up, **Union Carbide** experienced a loss of containment during an equipment restart. At approximately 1:20 p.m. on March 23, 2005, the **BP, Texas City** plant suffered an explosion during start-up at its Isomerization unit. Understanding the importance of being ready to start-up needs no further justification than these incidents have shown.

The purpose of this review is to provide a basis for readiness to start-up a unit, a process, or an entire plant. It defines who needs to be a part of the review, walk-downs, functional checks, and much more. This process is also referred to as a Pre-Startup Safety Review (PSSR). A PSSR is part of the fourteen elements of process safety mandated by the Occupational Safety and Health (OSHA) agency for facilities that are required to follow 29 CFR 191.119. These are conducted on small management of changes deriving from a project. However, this course is preparing you to write your own Cold Unit Startup procedure after turnarounds.

## Procedure Basics

We normally begin these courses with regulatory compliance references, but we are going to cover regulatory compliance as we go to keep the content engaging. Our only thoughts are that some companies can be exempted from certain Occupational Safety & Health Administration (OSHA) regulations because of their size. It is this author's understanding this only applies to Process Safety (29 CFR 1910) but not the general (29 CFR 1926). We will leave the portion of the regulatory standard up to you. Your company should already know which regulations do and so not apply.

Our topic coverage will be as shown in the bulleted list below. They will be arranged to demonstrate and explain what we think you will need and provide examples. You will then be tasked with taking notes and creating your own Start-up procedures using these known elements. This is not an all-inclusive list or format. You will have to tailor the format, sequence, and form to your business model and manufacturing setup.

Here is the magic formula for writing a procedure:

- Purpose – Why do we need this procedure?
- Application-Scope – Who, when, and where does it apply?
- Regulations – Which industry regulations apply?
- Roles & Responsibility – Who is responsible for what, when, and why?
- Operations & Maintenance Policies – Which company policies apply?
- Documentation – What is the start-up, and how do you document it?
- Close Out – Approvals or consent
- Auditing – Checks to ensure the process is working and ensures that it is updated

A **procedure** is a document that describes the steps or actions needed to accomplish a task or activity. The word **procedure** is commonly used for numerous types of documents. The most common are:

- Procedure – any document that specifies the necessary steps required to complete a task and requires qualified personnel to initial each of the steps as they are completed. The step-by-step procedure's list of tasks is generally shown in a predefined order that ensures safe, reliable, and consistent operations.
- Checklist – any document that provides a list of actions required to complete a task and requires operating personnel to initial, check off or answer each of the actions as they are completed. The list of tasks included in a checklist will generally be shown in a predefined order unless otherwise stated within the checklist.
- Guideline – any document that includes information and instructions that can be referenced when completing a task but does not require operating personnel to sign off on any of the steps or actions. Guidelines can be presented in the form of training documents, reference documents, manufacturer's instructions, etc.

## Purpose

All procedures need a purpose. You need to tell the users why we are doing it. Examples seem to be clearer to a student, so here are a few that I have come across.

### Example 1:

The purpose of this procedure is to define

(a) requirements for writing an Operating Procedure that complies with the OSHA General Construction, OSHA Process Safety Management (PSM) Standard, and Enigma Corporation Standards and,

(b) to provide a consistent approach for procedure development, revision, and control that will ensure compliance with regulatory and corporate requirements.

### Example 2:

This procedure establishes minimum requirements to evaluate noise exposure in the workplace. Elements of this program include training, engineering controls to reduce noise levels, hearing protection, monitoring procedures, and testing. Certain elements of the program apply when information indicates that an employee's exposure equals or exceeds an 8-hour time-weighted average of 85 decibels.

This, like many things, has a formula that has been successful. If you follow this formula, then your Start-up procedure will be successful.

### Step 1

Create a purpose statement that gives a strong explanation of why the procedure is important to your target audience. If you are writing a Start-up procedure, link the purpose to your facility. This wording must match the parameters of your manufacturing facility.

### Step 2

A procedure is intended to describe repetitive or routine operations or maintenance at your facility. This helps the users and trainers to know whether the document is something an employee needs to learn.

### Step 3

Include only relevant information in your purpose statement. See examples above.

## Application - Scope

All procedures need to state what they apply to and their limits. This is explained in the Application or Scope—statements to the effect of, “this procedure applies to all personnel performing a Cold Startup on a process unit.” “This procedure applies to restarting the assembly line, after major maintenance or turnaround work.”

The scope will provide guardrails or limits to the start-up procedure. It may also tell what it does not cover. An example is, “this procedure applies to the start-up of the packaging assembly line, on process line A. It is not to be used on process line B due to equipment differences from recent updates on line A.”

The scope is the extent of the area or applicable subject matter that defines the relevance for its purpose. A definition for our purposes of the application is similar to that of scope. In other environments, these could be quite different; that is why we are explaining this for this course.

### **Example 1:**

The scope of this procedure is limited to our vitamin production and packaging facilities. Medical grade pharmaceuticals will use the “Pharmaceutical Production and Packaging Cold Startup procedure.”

### **Example 2:**

This procedure applies to all production facilities in the United States. Canadian and Mexican facilities are excluded from this start-up procedure. This procedure is limited to cold starts for hydrocarbon facilities.

## Regulations

Applicable regulations will need to be captured for your Cold Start-up procedure. If you are a PSM-covered facility, it will be 29 CFR 1910.119 and 40 CFR Part 68, Subpart D at a minimum.

The pharmaceutical industry operates under Title 21 of the United States Food and Drug Administration (US FDA). They possess rule-making responsibility for the “Food, Drug, and Cosmetic Act” of 1938 in the United States (US).

In the food processing industry, the following regulations may apply:

- FDA’s Good Manufacturing Practices (21 CFR Part 110 and 21 CFR Part 117 Subpart B)
- USDA’s Operating Procedures for Egg Processing (9 CFR 590.504 to 590.575)
- FDA’s HACCP for Juice and Seafood Processing (21 CFR Parts 120 & 123)
- USDA’s SSOP and HACCP for Meat and Poultry Processing (9 CFR Parts 416 & 417)
- FDA’s Food Safety Plan for all other Food Processors (21 U.S.C. 305g; 21 CFR Part 117 Subpart C)

The point of this section is to impress upon you to list the applicable regulatory rules that would apply to your start-up procedure.

## Roles and Responsibility

Progressing on with the structure and writing of your cold start-up procedure, defining the personnel and their roles is essential. In lieu of a long write-up, we will provide you with a typical R&R for an Operational Cold Startup. Just to clarify from the previous sections, ensure you are clear in purpose and application. If you intend on writing a procedure for hot restarts or emergency shutdowns, be clear in these sections in what the procedure is for.

This section should define the relevant personnel to ensure a successful start-up. Having more people complicates any process, so limit this to essential personnel. You will need to ensure you have applicable personnel from the unit and the major maintenance-turnaround group.

The final approval to start requires a face-to-face conversation. Trying to perform this online or over the phone complicates the situation; some required conversations may be missed or completed in a silo. Sending out the checklist for all applicable start-up items three days in advance is also a good idea. Lastly, ensure everyone knows that the face-to-face is to ensure you are ready to start. This meeting is not meant to develop your start-up's final punch list. If you intend on developing a ready for start-up punch list, then have a preliminary meeting three days in advance to go over the rules for the ready to start-up approval meeting. In short, you should be less than twenty-four hours from start-up when holding the cold start-up meeting.

The table below provides a snapshot of who needs to be involved in the start-up process from the following groups:

- Operations
  - Board
  - Unit
  - Area
  - Oper
- Maintenance
- Health, Environ
- Construction T
  - Inspect
  - Constr
  - Rotating Equipment Lead
  - Fixed Equipment Lead

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