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STANDARD OPERATING PROCEDURES (SOPs) DATA FORM – DETERMINATION OF REQUIRED PROCEDURES

The intent of this data form is to assist the facility with determining the applicable operating phases that must be addressed in procedure.

Facility:	**Process:**	**Date:**

A note about the **Number of operating procedures**	Regulation requires that written operating procedures be developed to provide clear instruction for *safely conducting a process* and that the procedures address each operating phase. The list of operating phases provided in regulation is not meant to exclude any other procedures that are necessary for safely conducting a process. It is the facility's responsibility to identify all necessary procedures. How the procedures are structured is discretionary. They may be segregated by operating phase, combined into a fewer number of procedures or integrated into one procedure. For example, in a batch plant operation, a range of operating phases is implemented during one batch cycle. One, continuous procedure is often used to cover that range. The intent of this data form is to assist the facility with determining the applicable operating phases that must be addressed in procedure. The facility is expected to thoroughly evaluate their operation to ensure that all operational procedures are identified and documented. Whether or not they are organized as titled below is irrelevant. Ensuring that the appropriate phase is addressed is what is relevant.

A note about developing **Procedures for process components**	Frequently, process equipment is spared or can be bypassed while keeping the process operational. If equipment can be placed on and off-line while the process is operating, the activity must be described in a procedure. At a minimum, there are likely draining, depressurizing and purging steps for shutdown and the reverse for start-up. The procedure may be operational or maintenance-related, but consider that if taking the equipment off-line impacts process operating conditions, the operating procedures will likely need to reflect the activity.

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A note about **Utilizing procedures in the field**	Regulation requires that written operating procedures be developed and *implemented*. There are no prescriptive requirements for implementation. The facility is obligated to ensure that the procedures are implemented in the field as written. Program auditors (whether internal or regulatory) must be able to determine that the procedures are implemented as written. Several steps can help ensure proper implementation: 1. Comprehensive training (which is not a part of this program element). 2. Adequate operator access to current versions of procedures. 3. Use of checklists. Many operational phases such as start-up and shutdown can be lengthy and involve multiple personnel. Use of a checklist that accompanies the procedure can be used to track progress, ensure that steps are followed and provide a record. 4. Use of monitoring logs. Documentation of various process and mechanical parameters would indicate that personnel are monitoring the process. The logs would also be informative for subsequent shifts and maintenance staff.

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A note about **Operating limits**	Regulation requires the inclusion of operating limits in procedures. There is no prescriptive requirement with regard to number of limits, nor their placement. The intent of this requirement is to make the operator aware of the boundaries of the variables within which the operation must occur. These limits must always occur within the safe limits (design limits) of the process. Upon exceeding the operating limits, the procedure must clearly define the consequence of exceeding the limit and the steps to correct the deviation. In numerous cases, the cause of the deviation may be variable, hence there is no one prescriptive step to correct the deviation. In these cases, the step to correct the deviation may take on the appearance of a trouble-shooting chart. A potential starting point for defining the operating limits could be the alarms noted on the P&IDs. One level of alarm, typically low or high, may indicate a deviation from an operating limit. Another level of alarm, typically low low or high high, may indicate an even larger deviation from the operating limit and interlock with system controls to prompt some automatic control action. Consequences of deviation and steps to correct deviation could be documented in each of these cases. Other operating limits may be operating phase-specific (and may not be alarmed). For example, there may be a requirement to increase temperature at a defined rate during start-up. The start-up procedure may include an operating limit on the rate of temperature increase, the consequence of exceeding that limit and the steps to correct the deviation from that limit. Regarding placement of the limits, the Normal Operating Procedure could contain a comprehensive operating limit table, as many of the deviations may be expected to occur during the monitoring of steady-state operations. However, it must be noted that whenever there is a concern that an operating limit may be exceeded during any other procedure, it would be prudent to emphasize that limit even if the same limit is mentioned in several procedures.

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Operating Phase	Determination	Yes	No
Initial Start-Up/Commissioning For a newly-constructed plant or process or a newly-installed skid or piece of equipment, there are usually unique activities associated with the initial startup that will not be performed again on subsequent startups. These unique activities are performed in advance of, or incorporated into the startup procedure that is performed the first time. As these instructions are needed for operator training and use during startup and for evaluation under the PHA/MOC process, this one-time procedure must be documented. After initial startup, this procedure is no longer applicable. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Is this the first start-up of this process or this equipment?*		
	Does this start-up require a Pre-Startup Safety Review?		
	Does the new process or modified process require cleaning (chemical, detergent/water washing, steam, etc.) prior to startup?		
	Does the new process or modified process require drying prior to startup?		
	Does the new process or modified process require line flushing prior to startup?		
	Does the new process or modified process require passivation prior to startup?		
	Does the new process or modified process require loop checks prior to startup?		
	Does the new process or modified process require process lineups unique to the initial startup?		
	Are there other unique activities for the first startup only?		

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Operating Phase	Determination	Yes	No
Start-Up after a Turnaround For a plant, process, skid-mounted unit or piece of equipment, start-up may occur under several different circumstances. Start-up after a turnaround is one such circumstance. A turnaround indicates an activity which includes shutdown, draining, depressurizing, purging and isolating to enable the opening of equipment and piping. The purpose of which is typically maintenance, repair or inspection. Start-up after such an activity will involve more than process start-up steps and usually include steps related to isolation blind removal, tightness checking and purging. If a plant, process, skid-mounted unit or piece of equipment will be started after a turnaround, a dedicated procedure is required. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process require a tightness check prior to start-up?*		
	Does the process require purging prior to start-up?		
	Does the process require isolation blind removal prior to start-up?		
	Does the process require replacement of caps and/or plugs prior to start-up?		
	Does the process require replacement of gaskets prior to start-up?		
	Does the process require removal of Lockout/Tagout prior to start-up?		
	Does the process require introduction of substance at a lower pressure that normal operating pressure initially prior to start-up?		
	Does the process require substance heating or cooling initially to normal operating temperature prior to start-up?		
	Does the process require diversion of product streams from final tankage until product specifications are met?		
	Are there other unique activities for startup following a turnaround?		

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Start-Up after an Emergency Shutdown (ESD) For a plant, process, skid-mounted unit or piece of equipment, start-up may occur under several different circumstances. Start-up after an ESD is one such circumstance. Identification and remediation of the cause of the ESD prior to restart is unique to this type of start-up procedure. Hence, this circumstance merits its own procedure(s). The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process require trouble-shooting to determine the reason for the ESD?*		
	Does the process require verification of valve positions following an ESD?		
	Does the process require clearing of alarm status that may have resulted in the ESD?		
	Does the process require resetting instruments, valves or other controls prior to restarting?		
	Does the process require verification of instrumentation readings following an ESD?		
	Does the process require diversion of product streams from final tankage until product specifications are met?		
	Are there other start-up activities following an ESD that are unique to this start-up phase?		

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Start-Up after a Warm Shut-Down (a system put in standby mode) For a plant, process, skid-mounted unit or piece of equipment, start-up may occur under several different circumstances Start-up after a warm shutdown is one such circumstance. A warm shutdown generally indicates a process state in which the operation has been stopped in a controlled manner, but the fluids have not been evacuated. Start-up from this state is unique to the start-up in other circumstances. Hence, this circumstance merits its own procedure(s). The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Can a process be shut down and placed in a standby mode?*		
	Does the process require verification of valve positions prior to start-up?		
	Does the process require verification of instrumentation readings prior to start-up?		
	Does the process require re-establishment of normal operating pressure or temperature?		
	Does the process require diversion of product streams from final tankage until product specifications are met?		
	Are there other start-up activities following a warm shutdown that are unique to this start-up phase?		

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Normal Operating Procedures For a continuous, steady-state process, the operational requirements occurring between the start-up phase and shutdown phase are intended to be covered under normal operating procedures. Typical activities during this phase may include process monitoring and sampling. This would be an ideal procedure in which to locate a comprehensive list of operating limits, consequences of deviation from those limits and the steps to correct deviation, as these types of correction are often required while monitoring normal operation. Additionally, this procedure is often accompanied by monitoring logs that require operator interaction. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process have a steady-state mode of operation between start-up and shutdown?*		
	Does the process require process variable monitoring during normal operations?		
	Does the process require sampling during normal operations?		
	Does the process require completion of checklist or other forms during normal operation?		
	Does the process require adjustments to be made to process controls during normal operations based upon deviation from operating limits?		
	Does the process require adjustments to be made to process controls during normal operations based upon calculations performed by the operator?		
	Does the process require adjustments to be made to process controls during normal operations based upon sampling results?		
	Are there other unique activities related to performing normal operations?		

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Operating Phase	Determination	Yes	No
Temporary Operating Procedures Some procedures occur routinely during process operation, but are not part of the normal operation, nor are they of long duration. The temporary operating procedure is used to ensure that procedure is conducted correctly and to ensure that the process is placed back to normal operation once the temporary operation is complete. It is conceivable that some processes may not have temporary operations. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process require operating in manual control rather than automatic control during maintenance or calibration activities?*		
	Does the process require operating with select pieces of equipment out of service during maintenance activities?		
	Does the process require operating with some portions of the system isolated for limited periods of time?		
	Does the process contain control valve bypasses that the operator is required to manually actuate under select circumstances?		
	Does the process require manual transfer of product from within process equipment and vessels?		
	Does the process require temporary connections to be made to process equipment or piping?		
	Are there other unique activities related to performing temporary operations?		

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Emergency Operating Procedures An abnormal operation that requires action either in lieu of, or in addition to an emergency shutdown could be defined in an emergency operating procedure. Developing this type of procedure in advance enables the facility to confirm that appropriate action can be taken and prepares the operator for such circumstances. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process require continued operation or a unique shutdown procedure when key pieces of equipment fail, such as a pump?*		
	Does the process require continued operation or a unique shutdown procedure when a critical utility fails, such as cooling water or instrument air?		
	Does the process require continued operation or a unique shutdown procedure when power is lost (is the process shutdown or reduced based on backup power availability)?		
	Does the process require continued operation or a unique shutdown procedure when critical instrumentation fails?		
	Does the process require the operator to take steps to remediate process upsets and or equipment failures that release hazardous materials to secondary containments?		
	Does the process require the operator to take steps in the event of a PRV or rupture disk activation?		
	Are there other unique activities related to performing emergency operations?		

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Emergency Shut-Down (ESD) A procedure is required that addresses process shutdown in a manner that is usually more rapid than under normal, controlled circumstances. The intent is to place the process in a relatively safe mode, ideally with minimal operator interface. The operator should then be able to evacuate or perform other actions as dictated by the circumstance. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Does the process shutdown automatically when a high or low process alarm limit is exceeded?*		
	Is there a need for an operator to shutdown a process prior to an emergency plant evacuation?		
	Is there a need for an operator to be able to initiate a process shutdown based upon a perceived emergency circumstance?		
	Is there a need for an operator to be able to initiate a process shutdown and evacuate the plant before the actual process shutdown is complete?		
	Does the process shutdown automatically when a field gas sensor or flame detector indicates an alarm condition?		
	Is the operator given the discretion to shutdown the process manually when an external event occurs, such as fire, lightening, high winds, etc., that may impact the process?		
	Are there other unique activities related to performing an emergency shutdown?		

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Normal Shut-Down for Turnaround A process can be shutdown in a controlled manner for different reasons. Shutting a process down for a turnaround is one such reason. A turnaround indicates an activity which includes shutdown, draining, depressurizing, purging and isolating to enable the opening of equipment and piping. The purpose of which is typically maintenance, repair or inspection. The steps may be considerably more involved than other types of shutdown procedures. The questions on the right are intended to assist the operator in determining if this type of procedure is necessary. *While not comprehensive, if any of the questions are answered affirmatively, this type of procedure is likely necessary.*	*Is the process ever shutdown and equipment and piping opened to the atmosphere for inspection and maintenance?*		
	Are individual components ever shutdown and opened to the atmosphere for inspection and maintenance?		
	Are Lockout/Tagout procedures ever utilized for the process?		
	Are process equipment opening and line breaking procedures ever utilized for the process?		
	Are there other unique activities related to performing a normal shutdown for turnaround?		

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Normal Shut-Down for Standby Mode A process can be shut down in a controlled manner for different reasons. Each circumstance may require procedures that are unique to a particular type of shutdown. Shutting a process down to place it in standby is one such reason. In this shutdown scenario, the process fluids are kept in place with the intent of restarting the process in the near future. This procedure would not encompass the same scope as a shutdown for turnaround, hence a unique procedure is required.	*Can the process be left in a state with no flow, but without draining or purging; the intent being to restart operation from this state?*		
	Can the process be left in a state with no heat input, but without draining or purging; the intent being to restart operation from this state?		
	Can the process be left in a state with no chemical reaction occurring, but without draining or purging; the intent being to restart operation from this state?		
	Are there other unique activities related to performing a normal shutdown for standby mode?		

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STANDARD OPERATING PROCEDURES (SOPs) DATA FORM – REVIEW TABLE

Facility:	Process:	Date:

SOP ID #	Title/Description	Last Revision Date/#	# Pgs	Note which Operating Phase Addressed (see legend at end of table)													
				Startup				Operating			Shutdown			Safety			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
Are there procedures developed to address the applicable operating phases (Y, N, NA, U, or P)?																	

Operating Phase Legend:

1 Initial Start-Up Procedure [NAC Reference: 459.95416(2a1)]
2 Start-Up After Turnaround [NAC Reference: 459.95416(2a7)]
3 Start-Up After ESD [NAC Reference: 459.95416(2a7)]
4 Start-Up After Warm Shut-Down [NAC Reference: 459.95416(2a7)]
5 Normal Operating Procedures [NAC Reference: 459.95416(2a2)]
6 Temporary Operating Procedures [NAC Reference: 459.95416(2a3)]
7 Emergency Operating Procedures [NAC Reference: 459.95416(2a5)]
8 Emergency Shut-Down (ESD) [NAC Reference: 459.95416(2a4)]
9 Normal Shut-Down for Turnaround [NAC Reference: 459.95416(2a6)]
10 Normal Shut-Down for Standby Mode [NAC Reference: 459.95416(2a6)]
11 Operating Limits [NAC Reference: 459.95416(2b)]
12 Safety & Health [NAC Reference: 459.95416(2c)]
13 Safety System Description [NAC Reference: 459.95416(2d)]
14 Safe Work Practices (SWPs) [NAC Reference: 459.95416(3d) & 459.95]

Y = Yes, N = No, NA = Not Applicable, U = Undetermined, P = Partially Satisfied