Compliance Assistance Tool for Clean Air Act Regulations: Subpart GGG of40 CFR NESHAPS for Source Category Pharmaceutical Production

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Office of Enforcement and Compliance Assurance
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Compliance Assessment and Media Programs Division
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Chapter 6
Equipment Leaks

6.1 Overview

The rule contains requirements for controlling leaking components such as pumps, flanges, valves, pressure relief valves, and compressors by either leak detection and repair (LDAR) using "sniffing" via Method 21 or pressure testing. These requirements are based on the requirements of subpart H of part 63 with some modifications that include reduced leak monitoring frequencies for programs that result in low leak frequencies, the allowance for subgrouping of components to demonstrate leak frequencies, and the option to not individually identify all components subject to LDAR in a master log. Identification of the subject equipment does not require physical tagging (the rule does require that leakers be tagged).

6.2 Structure of the Rule

All requirements are located in §63.1255, with many references to subpart H. Sections of §63.1255 are provided below:

(a) General Leak Requirements
(b) References (to applicable portions of subpart H of part 63)
(c) Standards for pumps
(d) Standards for open-ended valves or lines
(e) Standards for valves in gas/vapor service and light liquid service
(f) Unsafe to monitor, difficult to monitor, and inaccessible equipment
(g) Recordkeeping
(h) Reporting

Chapter 6 at a Glance

6.3 Applicability

The equipment leak provisions apply to the following components if these components are **in organic HAP service 300 hours per calendar year** within a source subject to this subpart. (See Applicability Example 2 below regarding calculation of 300 hours service.) The definition of "in organic HAP service" specifies a cut-off of at least 5% total HAP concentration by weight [expected annual average concentration - See 63.180(d)].

- Pumps
- Compressors
- Agitators
- Pressure relief devices
- Sampling connection systems
- Open-ended valves or lines
- Valves
- Connectors
- Instrumentation systems
- Closed vent systems and control

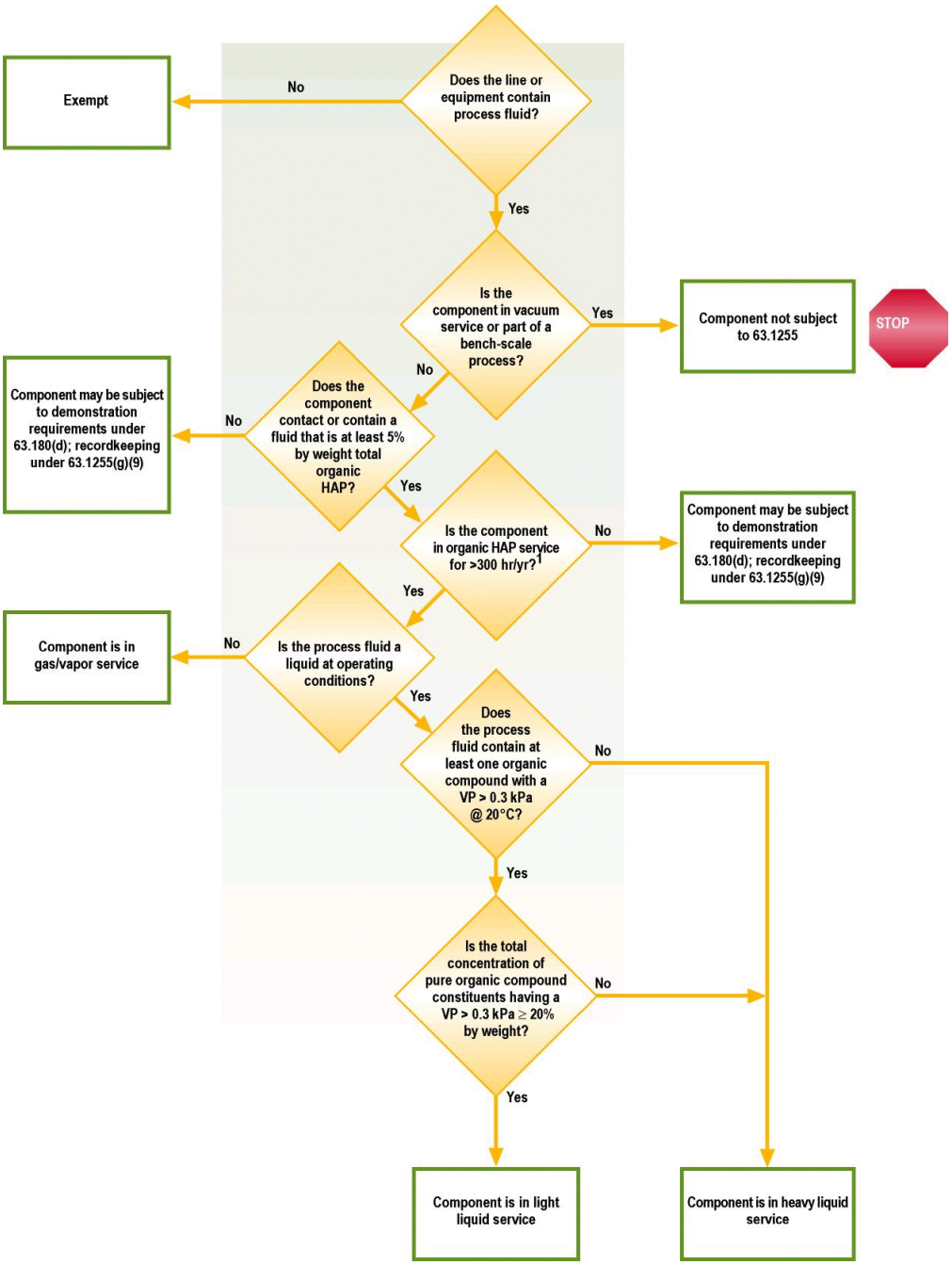
devices used to control emissions from the above components

Equipment not subject to the LDAR requirements includes:

- lines and equipment not containing process fluids. This would include utilities, and other non-process lines, such as heating and cooling systems, whose materials are not mixed with those in the process.
- bench-scale processes, even if located at the same plant site as a regulated manufacturing unit.
- equipment that is in vacuum service (equipment operating at an internal pressure which is at least 5 kPa below ambient pressure).
- equipment in organic HAP service, but that is used less than 300 hours per calendar year (these exempt units must be recorded however).

Figure 6-1 presents a logic flow diagram for applicability.

NOTE: PMPUs complying with the MACT standard through use of the Pollution Prevention option are not subject to LDAR requirements.



[1.] Only equipment that can reasonably be expected to be in organic HAP service, but is not, needs to retain records of determination. Equipment not reasonably expected to be in organic HAP service, such as non-HAP solvent supply lines, needs no records.

Figure 6-1. Logic Flow Diagram for applicability

What is the Definition of "In Organic HAP Service"?

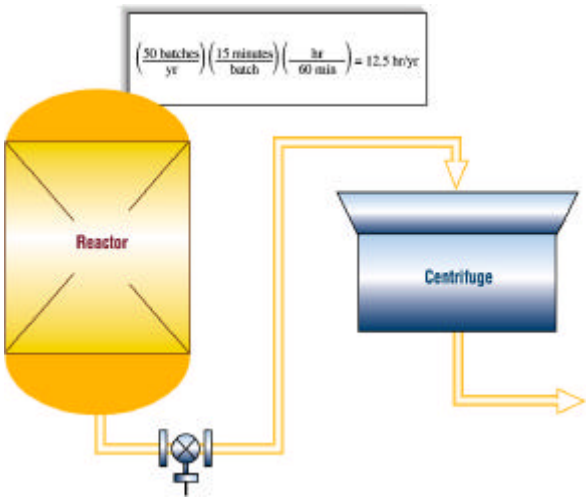
"In organic HAP service" is defined in §63.1251 and means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 5 percent by weight of total organic HAPs, as determined according to §63.180(d). Section 63.180(d) states that "each piece of equipment within a process unit that can reasonably be expected to contain equipment in organic HAP service is presumed to be in organic HAP service unless an owner or operator demonstrates that the piece of equipment is not in organic HAP service." For a piece of equipment to be considered not in organic HAP service, it must be determined that the percent organic HAP content can be reasonably expected not to exceed 5 percent by weight on an annual average basis. Section 63.180(d) allows owners or operators to use Method 18 of 40 CFR 60, appendix A (HAP concentration), or "good engineering judgment" to make the demonstration.

Applicability Example 1: Determining Whether a Component is in 5 Percent by Weight HAP Service.

An owner or operator wishes to be exempt from the provisions of §63.1255 for components in a closed vent system containing 500 ppmv methanol (a HAP) and the remainder air, as measured using Method 18. The percent by weight HAP is determined by multiplying 500 ppmv by the ratio of molecular weight of methanol (32) to the molecular weight of air (29) to yield 551 ppmw, or 0.050 percent by weight, which is well below the 5 percent by weight criteria for "organic HAP service"; therefore, the closed vent system is not subject to the provisions of §63.1255.

Applicability Example 2: Determining Whether a Component is in Service for 300 Hours Per Year.

A line from a batch reactor to a centrifuge is in contact with a process fluid during transfer of material from the reactor to the centrifuge (after each transfer, the line is purged with nitrogen to a control system to ensure that there is no fluid left in the line). The transfer operation lasts a maximum of 15 minutes each time the batch occurs, and there are a maximum of 50 batches per year anticipated. Therefore, the components in the line would be in service for a maximum of 12.5 hours per year, well below the 300 hours per year trigger for applicability. Even through the equipment is exempt, owners and operators must identify the exempted equipment per §63.1255(g)(9). If the same line is used as part of other processes as well, the portion of time it is in service for those other processes should also be added to determine the total time in service.



6.4 References to Subpart H

Since subpart GGG contains numerous references to subpart H, Table 6-1 provides a tabular cross reference of the equipment leak requirements of subpart GGG and referenced applicable sections of subpart H. The regulations in **bold print are applicable** to sources regulated under subpart GGG.

6.4.1 Consistency with Other Regulations

After the compliance date, for components subject to subpart GGG as well as 40 CFR 60 or 61, the owner or operator is required only to comply with subpart GGG (and specifically, § 63.1255 for equipment leak components).

After the compliance date, an affected source with equipment subject to subpart I of part 63 may elect to comply with either the subpart GGG leak provisions or the provisions of subpart H of the HON for all such equipment (i.e., the owner/operator cannot choose to comply with H for certain equipment and subpart GGG for other components). The O/O shall identify in the NOC under which subpart s/he will comply.

What are the General Standards in § 63.1255?

6.5 Standards

Identification of Equipment Subject to § 63.1255

Equipment subject to this subpart must be identified so that it can be readily located and distinguished from equipment not subjected to this standard. **Physical tagging is not required**; components can be identified on a plant site plan, in log entries, or by designation of process boundaries with weatherproof identifications. Updates for affected components must be made within 90 calendar days of the change(s), or by the next Periodic Report, following the end of the monitoring period for that component, whichever is later.

Identification of Leaking Equipment

When leaks are detected by visual, audible, or olfactory means, or by monitoring, a weatherproof and readily visible identification, marked with an equipment identification number or other number- or color-coded tag, should be attached to the component. With the exception of valves, this identification "tag" can be removed upon successful repair. For valves, the tag must be left on until they have been monitored using Method 21 at least once in three months after repair and are determined to be not leaking.

NOTE: Except for components in heavy liquid service, instrumentation systems, and pressure relief valves in liquid service, successful repair means that the component is shown to not leak using Method 21 immediately after repair. Otherwise, successful repair should be verified using the same method used to detect leaks.

Table 6-1. SUBPART GGG REFERENCES AND INTERFACE WITH HON

(Note: bolded references are applicable at pharmaceutical manufacturing operations)

Subpart H Section	Description	
63.160	Applicability and description of source	**63.1255(a)**
63.161	Definitions	**63.1251**
63.162	Standards: General	**63.1255(a)**
63.163	Standards: Pumps in light liquid service	**63.1255(c)**
63.164	Standards: Compressors	Direct reference to 63.164
63.165	Standards: Pressure relief devices in gas/vapor service	Direct reference to 63.165
63.166	Standards: Sampling connection systems	Direct reference to 63.166
63.167	Standards: Open-ended valves or lines	**63.1255(d)**
63.168	Standards: Valves in gas/vapor service and in light liquid service	**63.1255(e)**
63.169	Standards: Pumps, valves, connectors and agitators in heavy liquid service; instrumentation systems; and pressure relief devices in liquid service	Direct reference to 63.169
63.170	Standards: Surge control vessels and bottoms receivers	**63.1254** (these equipment are covered by the process vent standards)
63.171	Standards: Delay of repair	Reference to 63.171 with **exceptions noted in 63.1255(b)(4)(i)**
63.172	Standards: Closed vent systems and control devices	Reference to 63.172 with **exceptions noted in 63.1255(b)(4)(ii)**
63.173	Standards: Agitators in gas/vapor service and in light liquid service	**63.1255(c)**
63.174	Standards: Connectors in gas/vapor and in light liquid service.	References to 63.174, with **exception noted in 63.1255(b)(4)(iii)**
63.175	Quality improvement program for valves	No provisions in subpart GGG
	Quality improvement program for pumps	No provisions in subpart GGG

Subpart H Section	Description	
63.177	Alternative means of emission limitation: General	Direct reference to 63.177
63.178	Alternative means of emission limitation: Batch processes	Reference to 63.178, with **exceptions noted in 63.1255(b)(4)(iv)**
63.179	Alternative means of emission limitation: Enclosed-vented process units	Direct reference to 63.179
63.180	Test methods and procedures	Direct reference to 63.180, with **exceptions noted in 63.1255(b)(4)(v)**
63.181	Recordkeeping	**63.1255(g)**
	Reporting	**63.1255(h)**

Compliance Times

References to periods of time to accomplish a specific task (e.g., weekly, monthly, quarterly) refer to the standard calendar periods, unless otherwise specified in the rule.

If the initial compliance date does not coincide with the beginning of a standard calendar period, the owner/operator has some options regarding the way he/she wishes to specify time periods. The owner/operator may elect to :

- use a period beginning on the compliance date, or
- use a time period agreed upon by the owner/operator and the regulating agency,or comply before the end of the standard calendar period within which the initial compliance deadline occurs, **if there remain at least**:
  - **S** 3 days for tasks that must be performed weekly,
  - **S** 2 weeks for monthly tasks,
  - **S** 1 month for quarterly tasks, and
  - **S** 3 months for annual tasks.

In all other cases, compliance is required before the end of the first full standard calendar period after the period in which the initial compliance deadline occurs.

If the regulations require completion of a task during each of multiple successive periods, the owner/operator can conduct the task at any time during each period, as long as the intervals between completion of the tasks are reasonable. For example, for quarterly monitoring the facility may choose to monitor the first week of the first month of each quarter. It would not be reasonable to monitor the last week of March and again

the first week of April.

If a leak is detected, and the owner/operator does not try to repair the leak within the specified time period, this is a violation of the regulations. If a repair is attempted, but it does not work, this is not a violation. However, the owner/operator must take further action as required by the rule if a leak still exists.

Can Processes be Grouped Together to Facilitate Calculations of Percent Leaking Components?

The rule allows owners or operators to "group" processes together when determining percent leaking components for the purposes of selecting the appropriate monitoring frequency. For example, a processing building housing non-dedicated equipment could be designated as a "group of processes." For valves only, the rule also allows "subgrouping," in which groups of processes can be further subdivided into subgroups. The intent of the rule with respect to the subgrouping procedure is to assign components according to their propensity for leaks, allowing for reduced monitoring frequencies for some subgroups. This approach focuses the monitoring, recordkeeping, and reporting burden on those processes and types of equipment that exhibit the most significant leaks.

What are the Standards for Pumps in Light Liquid Service and Agitators in Gas/Vapor Service and in Light Liquid Service?

Figure 6-2 describes the monitoring requirements for pumps in light liquid service and agitators in gas/vapor service and in light liquid service. Once processes have been grouped, pumps and agitators must be monitored quarterly using M21 and must be visually inspected weekly for indications of liquids dripping.

Percent Leaking Pump Calculation

The calculation must be done to determine subsequent monitoring frequency unless 90 percent of the pumps in the group of processes meet the exemption criteria of § 63.1255(c)(5) and (6), which are discussed below. The percent leaking pumps ($\%P_L$) must be calculated every quarter for a 1-year rolling average. If, on the 1-year rolling average, the greater of either 10 percent of the pumps are found to leak, or at least three pumps in a group of processes (on average) per quarter leak, the monitoring frequency reverts to monthly and remains monthly for the group of processes, until the one year rolling average falls below 10% or 3 pumps. The owner or operator would conduct monthly monitoring for three months to yield a quarterly average. Then the new quarterly average and the three previous quarterly averages would be used to calculate the 1-year rolling average. Monthly monitoring would continue until the 1-year rolling average indicates less than 10% of the total or 3 pumps are leaking. Note that the percent leaking pump calculation also allows that pumps within continuous processes found to leak within 1 quarter of startup are not considered in the $\%P_L$ calculation. Also, pumps that are exempt from monitoring because of their design must be included in the total pump count. The equation used to calculate $\%P_L$ is presented below:

$$\%P_L = [(P_L - P_S) / (P_T - P_S)] \times 100$$

where:

$\%P_L$ = percent leaking pumps
P_L = number of pumps found leaking in periodic monitoring
P_T = total pumps, including those exempted
P_S = number of pumps in a continuous process leaking within 1 quarter of startup during the current monitoring period.

(See the following page for an example of calculating leaking pump percentage to determine the appropriate monitoring frequency.)

Exemptions from Monitoring

If a pump or agitator is equipped with a dual mechanical seal system that includes a barrier fluid system, the pump or agitator is exempt from periodic Method 21 monitoring if several conditions are met:

- The system must be:
  - **S** operated with a barrier fluid at a pressure that is greater than the pump/agitator stuffing box pressure OR
  - **S** equipped with a barrier fluid degassing reservoir that is connected by a closed-vent system to a control device OR
  - **S** equipped with a dual mechanical seal system with a closed-loop system that purges the barrier fluid back into a process stream

  AND
- the barrier fluid is not in light liquid service, and
- each barrier fluid system has a sensor that will detect failure of the seal system, the barrier fluid system, or both, and
- each pump/agitator is checked by visual inspections each calendar week for drips from the seal.

During the weekly inspection, if there are indications of liquids dripping, the pump or agitator seal must be monitored immediately using M21 or the owner/operator must eliminate the leak before the next weekly visual inspection. Pumps/ agitators that are located at "unmanned" plant sites are exempt from weekly visual inspections. In lieu of these weekly visual inspections, these pumps/agitators must be visually inspected at least monthly.

A pump/agitator designed with no externally actuated shaft penetrating the pump/agitator housing is exempt from monitoring. In addition, pumps/agitators equipped with a closed-vent system are exempt from monitoring.

An example of the calculation of percent leaking pumps is described below:

Quarter	No. pumps (including exempted)	No. leakers	Avg. No. leakers/ quarter
1	10	1	
2	10	0	
3	10	2	
4	10	0	
TOTAL	40	3	3 leakers/ 4 quarters = 0.75

$\%P_L$ = 3/40 = 7.5 percent (less than 10 percent); also, the number of pumps leaking per quarter (on average) is 0.75 (less than 3);

ˆ Therefore the facility can continue to monitor quarterly.

NOTE: Method 21 (as described in 63.180(b)) monitoring is required quarterly unless the percent leaker calculated over a rolling 1-year period is either 10 percent or an average of at least three pumps per quarter, in which case monthly monitoring is required.

Repair Provisions

Leaks must be repaired as soon as practicable, but no later than 15 calendar days after detection, unless repair would require a process shutdown or personnel would be exposed to an immediate danger if they attempted a repair without shutting down the process. The first attempt at repair must be made within 5 calendar days and may include measures such as tightening of packing gland nuts or ensuring that the seal flush is operating at design pressure and temperature.

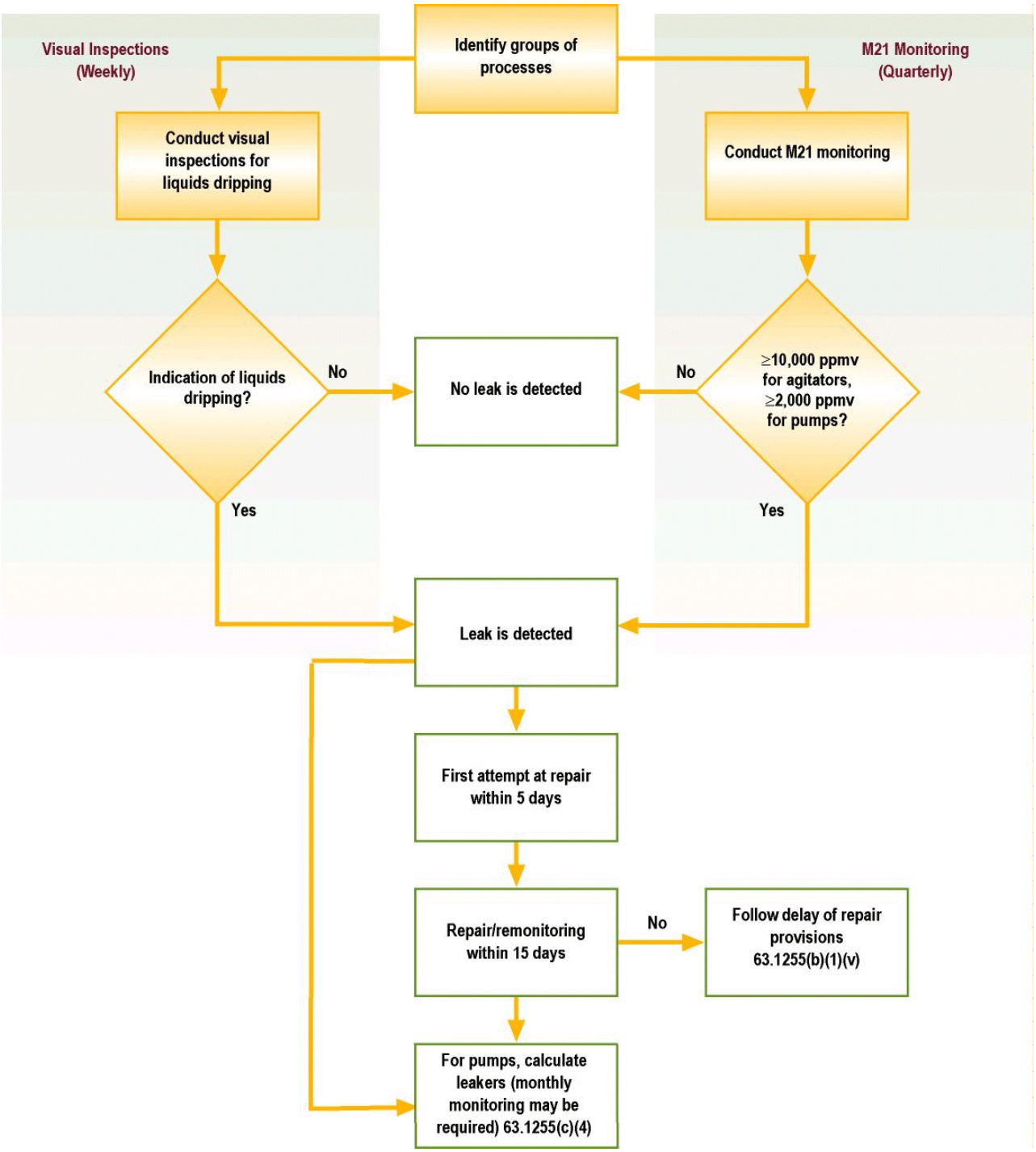


Figure 6-2. Pump/agitator monitoring in light liquid service.

What are the Standards for Open-Ended Valves or Lines?

Standards

Open-ended valves or lines must be equipped with a cap, blind flange, plug, or second valve at all times except during operations that require process fluid flow, or during maintenance or repair. Owners or operators have 1 hour after operations stop or maintenance or repair is completed, to affix caps, flanges, plugs, or double block and bleed systems. Records documenting compliance with the 1 hour standard are not required.

Other important aspects of the section:

- For open-ended valves or lines equipped with a second valve (double block and bleed), the valve on the process fluid end must be closed before the second valve is closed.
- When a double block and bleed system is used, the bleed valve or line may remain open during operations that require venting the line between the block valves only.

Exemptions

Open-ended valves or lines that meet any of the following conditions are not required to be capped, equipped with flanges, plugged, or equipped with a double block and bleed system:

- Designed to open automatically during emergency shutdown situations,
- Contain materials which would autocatalytically polymerize,
- Could cause an explosion, serious overpressure, or other safety hazard, if closed accordingly.

Example

A pipe used to convey material from a reactor to an emergency "dump pit" is not required to be capped, plugged, equipped with a flange, or equipped with a second valve because the line is designed to open automatically during an emergency shutdown situation.

What are the Standards for Valves in Gas/Vapor Service and in Light Liquid Service?

Figure 6-3 describes the monitoring requirements for valves in gas/vapor service and light liquid service for the identified groups of processes. Note that if an affected source has fewer than 250 valves, they are exempt from monthly monitoring. There are two different calculations of percent leaking valves. The first yields percent leaking valves, %VL, the value used to determine appropriate monitoring frequencies. The second calculation is for %VLO, the percent overall leaking values, which is used when the subgrouping option is chosen to determine on a semiannual basis, whether the overall percent leaking valves is less than 2 percent and the compliance strategy is still valid. Both calculations are presented below.

Percent Leaking Valves Calculation (to determine monitoring frequency)

$$\% V_L = [V_L/V_T] \times 100$$

where:

$\% V_L$ = percent leaking valves as determined through periodic monitoring

V_L = number of valves found leaking, excluding nonrepairables as provided for in 63.1255(e)(6)(iv)

V_T = total valves monitored in a monitoring period, excluding valves remonitored within 3 months after repair, per 63.1255(e)(7)(iii)

Percent Overall Leaking Valves Calculation (if subgrouping, to determine whether subgrouping is allowed)

$$\% V_{LO} = \frac{\sum_{i=1}^{n} (\% V_{Li} x V_i)}{\sum_{i=1}^{n} V_i}$$

where:

$\%V_{LO}$ = overall performance of total valves in the group of processes

$\%V_{Li}$ = percent leaking valves in subgroup i, most recent value calculated according to (e)(6)(ii) and (iii)

V_i = number of valves in subgroup i

n = number of subgroups

Option 1 - no subgrouping

Option 2 - by leakers

Option 3 - by processes

Examples of valve subgrouping

The initial round of monitoring for the group of processes in Building 1 yields the following results:

Process	Total No. Valves	No. Leaking	No. Not Leaking	$\%V_L$
A	600	10	590	1.7
B	500	2	498	0.4
C	300	0	300	0
D	200	2	198	1
Total	1600	14	1586	0.9

Option 1 - no subgrouping
Option 2 - all the 14 leaks in one group
all the non-leakers in another group
Option 3 - Process A in one subgroup
Process B, C, D in another subgroup

Option 1 - no subgrouping
Without any subgrouping, with a leak percentage of 0.9, the group of processes would require monitoring of all 1,600 valves every two quarters (twice a year).

Option 2 - all leakers in one subgroup;
all non-leakers in another group
Under subgrouping Option 2, the owner or operator could choose to subgroup all 14 leaking valves into one subgroup, provided these leakers make up 2 percent or less of the total components. The "leaker" subgroup would require monitoring every quarter and the remaining subgroup would require monitoring every 2 years.

Option 3 - Process A in one subgroup;
Processes B, C, & D in another subgroup
If this option were chosen, the facility would be required to monitor 600 valves every quarter, and monitor the remaining 1000 valves once a year, since the leak frequency would be 0.40 (less than 0.5 percent –> yearly monitoring).

Recordkeeping and Reporting Specific to Subgrouping of Valves in Light Liquid and Gas/Vapor Service

In addition to the general requirements for all equipment leaks reporting and recordkeeping, owners and operators are also required to record and report information specific to the subgrouping option, including:

- Identification of valves assigned to each subgroup
- Monitoring results and calculations made for each subgroup and each monitoring period
- Results of semiannual $\%V_{LO}$ calculation
- Which valves are reassessed and when they were reassessed.

Finally, as shown in Figure 6-3, the owner or operator must notify the implementing agency of the decision to subgroup valves at least 30 days prior to the beginning of the next monitoring period and must identify affected groups of processes and valves assigned to each subgroup.

Repair Provisions for Valves in Light Liquid and Gas/Vapor Service

The regulations provide that the leak must be repaired as soon as practicable; the owner/operator must at least **attempt** to repair the leak within 5 calendar days of its detection. First attempts to repair include measures such as tightening the bonnet bolts, replacing the bonnet bolts, tightening the packing gland nuts, and injecting lubricant into lubricated packing. The repair must be completed within 15 days of detection, unless there is a legitimate "delay

of repair" situation (discussed later in this document). After the leak is repaired and the repair is confirmed by monitoring, the valve must be monitored again at least once within the first 3 months after the repair.

NOTE: Days that the valve is not in organic HAP service do not count against the 3-month time period.

Monitoring after a Repair

The regular periodic monitoring can be done to satisfy the post-repair 3-month monitoring check IF the timing of the regular monitoring coincides with the timing required by the repair. Otherwise, the owner/operator will need to conduct some other monitoring outside the regularly-scheduled monitoring. If monitoring reveals that the leak has resumed, this valve must be counted as a leaking valve for the purposes of grouping processes IF the monitoring that detected the leak was the regular periodic monitoring. If, however, the owner/operator used some other schedule for monitoring the initial leak (after repair to see if the leak had resumed), then the valve does not have to be counted as a leaking valve IF it is repaired again, given follow-up monitoring, and shown not to be leaking by the next periodic monitoring.

What are the Standards for Equipment that is Difficult to Monitor/Inspect, Unsafe to Monitor/Inspect, or Inaccessible?

Equipment that is designated as unsafe to monitor, unsafe to inspect, difficult to monitor, difficult to inspect, or inaccessible is exempt from the monitoring and repair requirements described in Table 6-2.

However, if inaccessible equipment is observed by visual, audible, olfactory or other means to be leaking, the leak is required to be repaired as soon as practicable, but no later than 15 calendar days after detection. Please note that all equipment must be assigned to a group of processes.

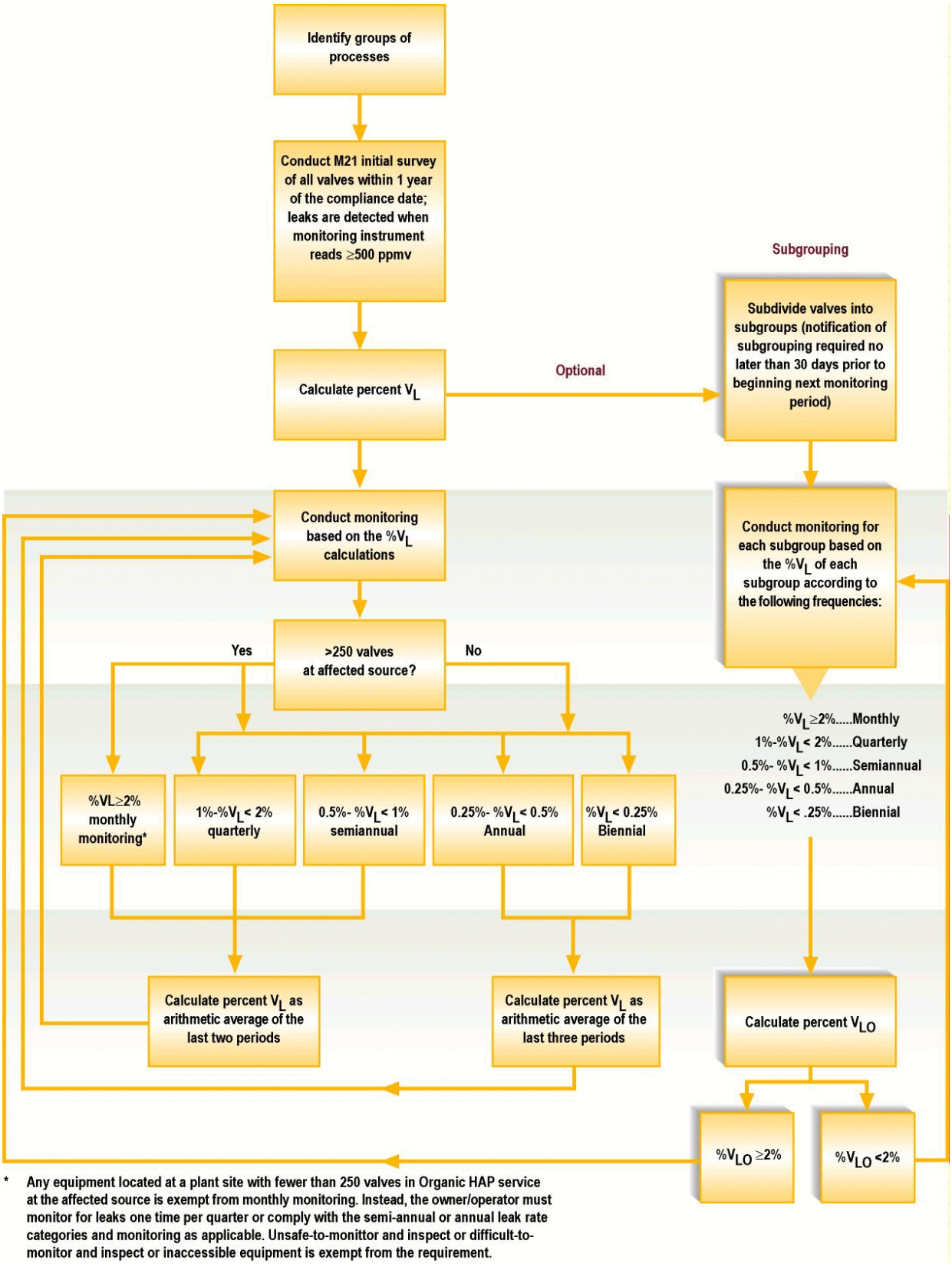


Figure 6-3. Monitoring for valves in gas/vapor service and light liquid service.

Table 6-2. EXEMPTIONS FOR DIFFICULT-TO-MONITOR/INSPECT, UNSAFE-TO-MONITOR/INSPECT, AND INACCESSIBLE EQUIPMENT

Component	Exempt requirements	Description of exemption requirements
Pumps and agitators[a]	§ 63.1255(c)(2),(c)(3),(c)(4)	Monitoring, repair, calculation of % leakers
Valves	§ 63.1255(e)(2) through (e)(7)	Monitoring, repair, calculation of % leakers
Closed-vent systems[a]	§ 63.172(f)(1) and (2) and (g); §63.1255(b)(4)(ii)(A) and (B)	Inspections and monitoring
Connectors	§ 63.174(b) through (e); §63.1255(b)(4)(iii)(A)-(F)	Monitoring and repair

[a]Pumps, valves, and closed vent systems cannot be designated as "inaccessible."

[b]Ceramic or ceramic lined connectors are subject to the same requirements as inaccessible connectors.

Valves, connectors, agitators, and pumps may be designated as unsafe to monitor if the owner or operator determines that monitoring personnel would be exposed to an immediate danger as a consequence of complying with the monitoring and repair requirements identified in Table 6-2 above. However, owners and operators designating components must have a written plan that requires their monitoring as frequently as practicable, but not more frequently than periodic monitoring would require.

Any part of a closed vent system may be designated as unsafe to inspect if the owner or operator determines that monitoring personnel would be exposed to an immediate danger as a consequence of complying with the monitoring requirements identified in Table 6-2 above. However, the owner or operator must have a written plan that requires inspection of the unsafe to inspect closed vent systems as frequently as practicable during safe to inspect times, but not more frequently than periodic monitoring would require.

A valve, agitator, or pump may be designed as difficult to monitor if the owner or operator determines that the equipment cannot be monitored without elevating the monitoring personnel more than 2 meters above a support service or it is not accessible in a safe manner when it is in organic HAP service. At a new affected source, no more than 3 percent of valves can be designated as difficult to monitor. Owners and operators must have a written plan to require monitoring of each type of component designated as difficult to monitor. The monitoring must be conducted at least once per calendar year or on the periodic monitoring schedule applicable to the group of processes in which the equipment is located, whichever is less frequent.

Any part of a closed vent system may be designated as difficult to inspect if the owner or operator determines that the equipment

cannot be inspected without elevating the monitoring personnel more than 2 meters above a support surface or it is not accessible in a safe manner when it is in organic HAP service. The owner or operator must have a written plan that requires inspection of the closed vent system at least once every 5 years.

The "inaccessible" designation may be applied to connectors that are:

- buried
- insulated in a manner that prevents access to the connector by a monitor probe
- obstructed by equipment or piping that prevents access to the connector by a monitor probe
- unable to be reached from a wheeled scissor-lift or hydraulic-type scaffold which would allow access to equipment up to 7.6 meters (25 feet) above ground, or
- unable to be accessed at any time in a safe manner per §63.1255(f)(4)(i)(E),
- unable to be accessed without elevating monitoring personnel more than 2 meters above a permanent support surface or would require the erection of a scaffold.

Ceramic or ceramic-lined connectors are subject to the same requirements as inaccessible connectors. At a new affected source, no more than 3 percent of connectors may be designated as "inaccessible".

If any inaccessible, ceramic, or ceramic-lined connector is observed by visual, audible, olfactory, or other means to be leaking, it must be repaired as soon as practicable, but no later than 15 calendar days after detection.

What are the Standards for Connectors in Gas/Vapor Service and in Light Liquid Service

Figure 6-4 describes the initial monitoring requirements for connectors in gas/vapor service and in light liquid service. Please note that the use of monitoring data from before April 22, 1994, is subject to some restrictions.

Percent Leaking Connector Calculation

The initial calculation of percent leaking connector ($\%C_L$), is calculated as:

$$\%C_L = \left[\frac{C_L}{(C_T + C_C)} \right] x\ 100\%$$

where:

$\%C_L$ = percent leaking connectors
C_L = number of connectors found leaking

C_T = number of connectors monitored in a period
C_C = optional credit for removed connectors = 0.67 x net

For subsequent monitoring frequencies, the following equation should be used:

$$\%C_L = [(C_L - C_{AN})/(C_t - C_C)] \times 100\%$$

where:

$\%C_L$ = percent leaking connectors
C_L = number of connectors found

leaking

C_{AN} = number of allowable nonrepairable connectors, not to exceed 2% of the total connector population

C_t = total number of monitored connectors

C_C = optional credit for removed connectors = 0.67 x net

Optional Credit for Removed Connectors

An owner or operator may choose to eliminate a connector subject to monitoring and receive credit for elimination of the connector if the following conditions are met:

1. Connector is welded after date of proposal (April 2, 1997) of Subpart GGG.
2. The integrity of the weld is demonstrated by monitoring or by testing using x-ray, acoustic monitoring, hydrotesting, or any other applicable method.
3. Welds created after April 2, 1997, but before the date of promulgation (September 21, 1998) of Subpart GGG are monitored or tested by 3 months after the compliance date.
4. Welds created after September 21, 1998 are monitored or tested within 3 months after being welded.
5. If an inadequate weld is found or the connector is not welded completely around the circumference, the connector is not considered a welded connector and is therefore not exempt from the provisions of Subpart GGG.

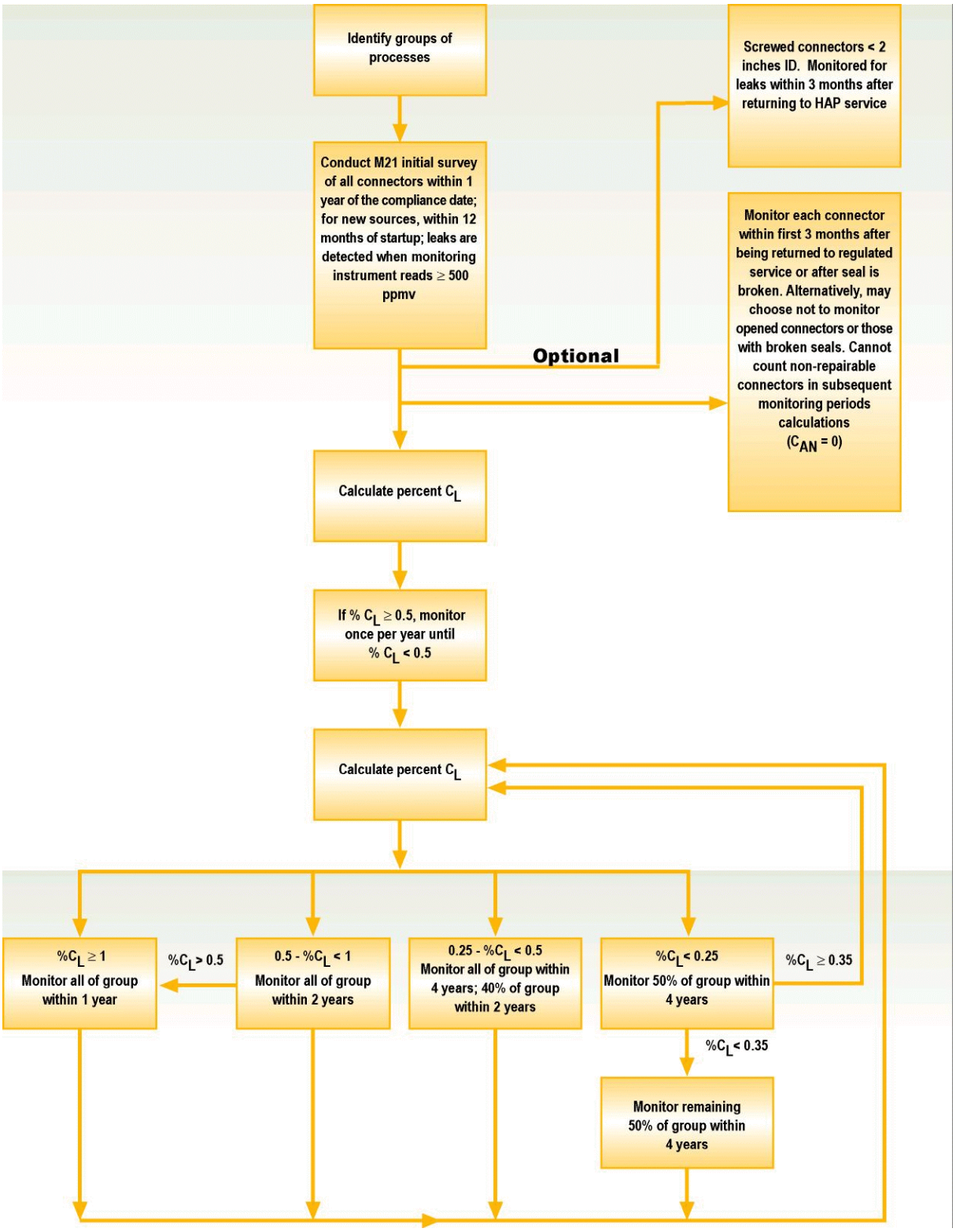


Figure 6-4. Initial Monitoring requirements for connectors in gas/vapor service and in light liquid service.

What are the Standards for Compressors?

The requirements for compressors are referenced directly to Subpart H. Compressors may comply with either an equipment design standard or a performance standard, as discussed below.

Equipment Design Standard

Compressors must be equipped with a seal system that includes a barrier fluid system that prevents leakage to the atmosphere.

Seal System with Barrier Fluid System. The regulation requires each compressor seal system to meet the following criteria:

- Each system must be:
  - Operated with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure; or
  - Equipped with a degassing system that is connected by a closed-vent system to a control device; or
  - Equipped with a system that purges the barrier fluid into a process stream with zero VOC (or volatile HAP) emissions to the atmosphere.
- The barrier fluid system is to be either in heavy liquid service or not in organic service.
- Each barrier fluid system is to be equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.
- The regulation requires the owner or operator to determine the criterion to be used to indicate failure of the seal system, the barrier fluid system or both.
- Each sensor is to be checked daily or is to be equipped with an audible alarm.
- When a leak is detected (either by visual inspection or by the sensor indicating a failure), it is to be repaired as soon as practicable, but no later than 15 days after it is detected, except as provided by the "Delay of Repair" provisions. A first attempt at repair is to take place no later than 5 days after a leak is detected.

The standards for compressors do not require weekly visual inspection for indications of a potential leak as is required for pumps in light liquid service.

Performance Standard

Owners/operators may choose to follow a performance standard for compressors instead of an equipment design standard. Compressors must be equipped with a closed-vent system designed to capture and transport leakage from the compressor driveshaft back to the process or to a control device achieving at least 95 percent control efficiency (or 20 ppmv HAP). (See following discussion on closed vent systems and combustion devices (Page 6-24)).

What are the Standards for Pressure Relief Devices in Gas/Vapor Service?

Except during pressure releases, pressure relief devices in gas/vapor service are required either to operate with no detectable emissions or to be equipped with a rupture disk or a closed-vent system and control device. Pressure relief devices complying with the no detectable emissions standard are to be returned to that condition within 5 calendar days after each pressure release, except as provided in the "Delay of Repair" provisions. The standards also require the monitoring of the pressure relief device no later than 5 calendar days after a pressure release to confirm that no detectable emissions has been achieved.

The pressure relief devices need not comply with the no detectable emissions standard if they are equipped with a rupture disk upstream of the PRV or if equipped with a closed-vent system capable of capturing and transporting leakage from the pressure relief device to a control device achieving at least 95% control efficiency or back to the process. If complying through installation of a rupture disk, the rupture disk must be installed upstream of the pressure relief device as soon as practicable, but no later than 5 days after each pressure release.

What are the Standards for Sampling Connection Systems?

Sampling connection systems are to be equipped with a closed-purge, closed loop, or a closed-vent system. Each system should do one of the following:

- Return the purged process fluid directly into the process line.
- Collect and recycle the purged process fluid.
- Capture and transport all the purged process fluid to a control device achieving at least 95% control efficiency.
- Collect, store, and transport the purged process or solid waste fluid to a waste water management unit, or to a RCRA treatment, storage or disposal facility, depending on the characteristics of the purged fluid.

Subpart H (and GGG) exempt in situ (without purge) sampling systems.

What are the Standards for Pumps, Valves, Connectors, and Agitators in Heavy Liquid Service, Instrumentation Systems, and PRV's in Liquid Service?

Pumps, agitators, and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors in heavy liquid service, and instrumentation systems are to be monitored within 5 days if evidence of a potential leak is found by visual, audible, olfactory, or any other detection method. In lieu of monitoring, a potential leak can be repaired as described below. A reading of $10,000 ppmv for agitators, 2,000 ppmv for pumps, or 500 ppmv for valves, connectors, instrumentation systems, and PRV's, indicates a leak.

Repair Provisions

If a leak is detected, a first attempt at repair

must be made within 5 days after the leak is detected and the leak must be fixed within 15 calendar days. For the leak to be considered repaired, visual, audible, or olfactory indications of leaking should be eliminated; owners and operators can do leak checks using soap solutions or pressure tests. The use of M21 is not required to certify that the repair is complete if the leak was determined to exist without M21. If M21 is used to determine the presence of a leak (for heavy liquid) then the repair must be certified by M21.

What if My Repair is Unsuccessful?

If action is taken to repair a leak within the specified time, but the repair is not successful, this is not considered a violation. However, the owner or operator is required to take further action to repair the leak.

What are the Standards for Delay of Repair?

The following circumstances under which repairs may be delayed are provided in the rule:

- Delay of repair of leaking equipment is allowed if the repair is technically infeasible without a process unit shutdown. An example of such a situation would be a leaking valve that could not be isolated from the process stream and that would require complete replacement or replacement of internal parts. When a valve cannot be physically isolated from the process stream, the process unit must be shut down to repair the valve.

- Delay of repair of leaking components is allowed if the owner or operator determines that repair personnel would be exposed to an immediate danger if attempting to repair without a process shutdown.

- Delay of repair is allowed for equipment that is isolated from the process and does not remain in organic HAP service. This typically applies to spare equipment that is out of service.

- Delay of repair for valves, connectors, and agitators is allowed if the emissions of purged material resulting from repair are greater than the fugitive emissions likely to result from the delay, and if, during repair, the purged material is collected and destroyed or recovered in a control device achieving > 95% control efficiency.

- Delay of repair for pumps is allowed if repairs require replacing the existing seal design with a new system, or a dual mechanical seal system that includes a barrier fluid system, or a pump that meets the requirements in §63.163(f), or a closed vent system and control device that meets the requirements of §63.163(g). The repair must be completed as soon as practicable, but not later than 6 months after the leak is detected.

- Delay of repair beyond a process unit shutdown is allowed for valves if the following conditions are met:
  - Valve assembly replacement is necessary during the

process unit shutdown.
  - Valve assembly supplies have been depleted.
  - Valve assembly supplies had been stocked sufficiently before the supplies were depleted.
  - Delay of repair beyond the next process unit shutdown is not allowed unless the next process unit shutdown occurs sooner than 6 months after the first process unit shutdown.

Specific recordkeeping requirements relating to delay of repair are discussed later in this chapter under Requirements for Recordkeeping.

What are the Standards for Closed-Vent Systems Used to Control Equipment Regulated Under 63.1255?

The regulations require proper operation and maintenance of a control device and vent system to control leaks. The closed-vent system provisions include inspection and monitoring requirements and requirements for specific control devices which are at 95 percent efficiency, or achieving outlet concentrations 20 ppmv HAP. Monitoring requirements of specific control devices are covered under other sections of this document (Chapter 9).

Vent System Requirements

- Initial inspection using M21; annual visual, audible, olfactory inspection if hardpiped; annual M21 inspection if duct work.
- Leak definition of 500 ppmv or visual (audible and olfactory) indication.
- First attempt to repair leak should be made within 5 calendar days of detection.
- Repair must be completed within 15 calendar days unless there is a legitimate delay of repair (i.e., requires process shutdown or emissions from immediate repair would be greater than fugitive emissions resulting from delay).

Bypass provisions

For any bypass line that could divert a vent stream away from the control device and to the atmosphere, either a flow indicator located at the inlet of the bypass line that takes a reading every 15 minutes or a lock-and-key (car seal) type configuration is required to be installed. For a lock-and-key or car seal configuration,
a visual inspection of the seal or closure mechanism is required monthly to ensure that the valves are maintained in a nondiverting position. Records are generated for the flow indicator or the inspection, as applicable, as discussed in Chapter 12 on Recordkeeping.

Exemptions from Bypass Provisions

Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and PRV's needed for safety purposes are not required to have either flow indicators or car seals.

Exemptions from Closed Vent System Provisions

Any closed-vent system operating at a pressure below atmospheric pressure is exempt from the monitoring and inspection provisions. The vent system must be equipped with a pressure measurement device that can be read from a readily accessible location to verify that negative pressure is being maintained in the closed vent system when it is operating.

Any parts of the closed-vent system that are designated as unsafe to inspect are exempt from inspection requirements if personnel inspecting would be exposed to an imminent or potential danger and the o/o has a written plan to inspect these pieces of equipment during safe-to-inspect times, not more than annually.

What are the Standards for Batch Processes/Alternative Means of Emission Limitation?

As an alternative to complying with the standards for all components (pumps, agitators, connectors, valves, pressure relief devices, sampling connection systems, open-ended valves or lines, and instrumentation systems), owners or operators may elect to comply with equipment leak standards for batch processes in two ways: through batch pressure testing, or through less frequent monitoring, depending on the percent of time that the processes are operating, as compared to continuous. Per Table 6-1, the provisions of subpart H are directly referenced, with the exception that continuous processes are also allowed to undergo batch pressure testing. Pressure testing also can be applied to supply lines between storage areas and processing areas.

The source may switch among the alternatives (pressure testing or monitoring for leaks) provided the change is documented.

Pressure Testing

The process train or supply line is required to be pressure tested each time equipment is reconfigured for production of a different product or intermediate prior to introducing the HAP into the equipment or at least once per calendar year for each process carried out in that equipment. If a leak is detected, the repair must be completed and the equipment retested before startup of the process. Pressure testing is only required for that equipment which is reconfigured (new or disturbed) and pressure testing is not required for routine seal breaks which are not part of the reconfiguration.

If a leak is detected during pressure testing, it must be repaired and retested before process start-up. If the batch process fails the retest or the second of two consecutive pressure tests and is started up, it must be repaired as soon as practicable, but no later than 30 calendar days after the second pressure test, unless there is a legitimate "delay of repair" situation: equipment supplies are depleted and supplies had been sufficiently stocked before the supplies were depleted. The repair must be made no later than 10 days after delivery of the replacement equipment.

NOTE: An exception to this requirement is if the delay of repair provisions of § 63.178(d) apply. Delay of repair applies if the reason

the leak cannot be fixed is because replacement equipment is needed to fix the leak, and this equipment is not available; provided the equipment had been in stock before supplies were depleted and provided the repair is made no later than 10 calendar days after delivery of replacement equipment. If these conditions apply, the batch process train can be put into service, provided it is fixed within 30 calendar days after the batch test failure. Therefore, owners and operators have a maximum of 30 days of operation in which the batch process equipment train can operate without having passed a pressure test.

Batch Test Methodology

1. Using Gas Pressure for Pressure or Vacuum Loss

The process equipment should be pressurized with a gas to a pressure above the operating pressure of the equipment and less than the set pressure of any safety relief device, or placed under vacuum. Once the pressure or vacuum has been established, the pressure or source vacuum should be shut off. A pressure measurement device capable of measuring ± 2.5 mmHg in the range of the test pressure or at least ±10 percent of the test pressure should be used to detect any change in pressure, in psig/hr, that can occur over the course of at least 15 minutes; if the amount of time for the pressure test is 15 minutes exactly, the corresponding change in pressure to equal a 1 psig/hr change would be 12.9 mmHg. Therefore, a leak would be detected if the pressure device indicates an increase or decrease of 12.9 mmHg. The rate of change in pressure is calculated according to the following equation:

$$\Delta \frac{P}{t} = \frac{(|P_f - P_i|)}{(t_f - t_i)}$$

where:

delta P/t = change in pressure, psig/hr
P_f = final pressure, psig
P_i = initial pressure, psig
t_f-ti = elapsed time, hours

A leak is also detected if there is evidence of a leak by visible, audible, or olfactory evidence of fluid loss.

2. Using Liquid for Indications of Liquids Dripping

A batch pressure test can also be conducted using a liquid, in which the equipment is filled with the liquid until normal operating pressure is achieved. Once this occurs, the liquid source is also shut off. This test occurs for at least 60 minutes, unless it is obvious that the test is a failure prior to 60 minutes. Once the operating pressure is achieved, each seal in the equipment being tested should be inspected for indications of liquids dripping or other indications of fluid loss. Any of these indications constitutes a leak.

Table 6-3. BATCH PROCESSES MONITORING FREQUENCIES FOR EQUIPMENT OTHER THAN CONNECTORS AND PUMPS

Operating time, % of year	Equivalent continuous process monitoring frequency time in use		
	Monthly	Quarterly	Semiannually
0 to <25	Quarterly	Annually	Annually
25 to <50	Quarterly	Semiannually	Annually
50 to <75	Bimonthly	Three times	Semiannually
75 to 100	Monthly	Quarterly	Semiannually

Batch Method 21 Monitoring

Owners and operators may also choose to monitor for leaks using Method 21. The provisions of subpart H (and subpart GGG, by reference) allow for reduced monitoring frequencies for all components, except connectors and pumps, based on the proportion of the year that the process subject to the provisions is operating, monitoring must occur at any time the equipment is operating in organic HAP service, in use with an acceptable surrogate VOC which is not a HAP or is in use with any other detected gas or vapor. For example, if a batch process and equipment are operated for one 6-week campaign per year, the percent operating time is:

$$\left(\frac{6\,\text{weeks}}{\text{campaign}}\right)\left(\frac{\text{yr}}{52\,\text{weeks}}\right)\text{x}100 = 11\%\ \text{operating time}$$

Table 6-3 presents the adjusted monitoring frequencies for batch processes; however, for pumps, the frequency is always quarterly. Monitoring is allowed any time during the specified monitoring period (e.g., monthly, quarterly, yearly) provided sufficient time between scheduled monitoring occurs. For example, it would not be acceptable to monitor Dec. 31st of one year and Jan. 1st of the subsequent year. In addition, if the equipment is not operating during the scheduled monitoring period, the monitoring can be done during the next period when the process is operating.

In addition to the scheduled monitoring that must be conducted according to the frequencies established for various components, § 63.178(c) also requires that M21 monitoring be conducted within 30 days of reconfiguration. However, this monitoring effort is separate from the scheduled monitoring. Leaks detected during this effort are not included in determining percent leaking equipment in the groups of processes.

If a leak is detected using Method 21, any leaks detected must be repaired within 15 days of detection, unless there is a legitimate "delay of repair" situation, as described in the preceding paragraph.

What are the Requirements for Enclosed-Vented Process Units?

Process units that are totally enclosed such that all emissions from equipment leaks are vented through a closed vent system to a control device are exempt from the monitoring requirements. Negative pressure must be maintained during process operation to ensure that all emissions are routed to the control device.

What are the Requirements for Recordkeeping?

NOTE: For ease of referencing, the following list uses the same numbering found in the regulations at §63.1255(g)(1)-(10).

- An owner or operator with more than one group of processes subject to the leak detection rules can keep all of the records in one recordkeeping system if it identifies the program being done (e.g. quarterly monitoring) for each <u>type</u> of equipment. The following information is required to be maintained in a manner that can be readily accessed at the plant site, either from records kept at the plant site or accessed from <u>a central location</u> by computer at the plant site.

2. General Records

<u>List of Equipment ID Numbers</u>

- List of identification numbers of all equipment, except for connectors that have been designated as inaccessible. If equipment is not individually identified, it should be identified as a group, and the number of subject items of equipment within a designated area associated with the group recorded. The list must be completed no later than the initial survey required for the component type and changes noted within 90 days or in the Periodic Report that covers the period in which the changes were made, whichever is later.
- List of identification numbers of equipment complying by being sent to a closed-vent system and control device.
- List of identification numbers of compressors designated as no detectable emissions.
- List of identification numbers for pressure relief devices subject to monitoring and those equipped with rupture disks.
- List of instrumentation systems subject to provisions (individual components need not be identified).
- List of equipment designated as difficult-to-monitor, unsafe-to-monitor, and inaccessible and a copy of the written plan for monitoring or inspecting this equipment.
- If credit for removed connectors is used, list of connectors removed from and added to process groupings

and documentation of the integrity of the weld.

- List of equipment added to batch processes since the last monitoring period that is monitored using Method 21 according to the alternative means of emission limitation for batch processes; this list must be completed within 90 days of the completion of each monitoring period, or by the next Periodic Report, following the end of the monitoring period, whichever is later. Also, if the owner or operator elects to adjust monitoring frequency by the time in use provisions in 63.175(c)(3)(iii), record the proportion of the year equipment subject to the standards was in use (63.1255(g)(2)(viii).

<u>Schedule of Monitoring</u>

- Schedule for monitoring of connectors and valves in gas/vapor service and light liquid service.

<u>Design Information</u>

- Design information on pumps with dual mechanical seal systems.
- Design information on closed-vent system and control device, if used to control emissions from LDAR components.

3. Records of Visual Inspections

    - Records of dates of visual inspection for pumps, agitators and closed-vent systems.

4. Monitoring Records (leaker logs)

When a leak is detected (either by M21 or visual, audible, or olfactory means), the following information is required to be recorded and kept for a total of 5 years (2 years onsite and an additional 3 years onsite or offsite):

- Instrument and equipment identification number and operator name, initials, or I.D. number.
- Date leak was detected and date of first attempt to repair.
- Date of successful repair.
- The maximum instrument reading measured by M21 after a leak is successfully repaired or determined to be nonrepairable.
- "Repair delayed" and reason for delay of repair, if applicable.
- If delay of repair involved, dates of process unit shutdowns that occurred while equipment was not repaired.
- If applicable, the written procedure that identifies the conditions that justify delay of repair.
- The procedures can be included as part of the startup/shutdown/malfunction plan OR can be in a separate

document that is kept at the site.

- If the delay was caused by a depletion of parts, documentation that the spare parts had been sufficiently stocked before depletion and the reason for depletion.

Also, even if leaks are not detected, the following information is required to be recorded and kept for 2 years onsite and 3 years offsite:

- Dates and results of startup or reconfiguration monitoring required by monitoring requirements for batch processes (§ 63.178(c)(3)) for equipment added to the processes since the last monitoring period and, if no leaks found, a record that the inspection was performed.
- If connectors whose seals have been broken are being monitored, identification by list, location (area or grouping), or tagging of connectors disturbed since the last monitoring period.
- Copies of periodic reports.

5. Records of Pressure Tests

Instead of the records in 2., 3., and 4. above, owners/operators using pressure testing must keep the following records:

- Identification of each product produced during the year.
- Dates of pressure tests, test pressures, and pressure drops observed during the test.
- Records of any visible, audible, or olfactory evidence of fluid loss.
- Identification of equipment subject to pressure testing. Physical tagging is not required. Equipment may be identified on a plant site plan in log entries or other appropriate methods.
- When a process equipment train does not pass two consecutive pressure tests and is put into HAP service prior to being repaired and passing a test, the following information is required and must be retained for 2 years:
  - date of each pressure test and date of each leak repair attempt.
  - repair methods applied in each attempt
  - reason for delay of repair
  - expected date for delivery of replacement equipment and actual date of delivery
  - date of successful repair.

6. Records of Compressor and Pressure Relief Device Compliance

Tests and Relief Device Compliance Tests

- Dates and result of each compliance test required for compressors designated as "no detectable emissions," including:
  - background level

measured during each compliance test
  - maximum instrument reading measured at the compressor seal
- Dates and results of the monitoring following each PRV release, including:
  - background level measured during each compliance test
  - maximum instrument reading measured at the PRV

7. Records for Closed Vent Systems (CVS)

For closed vent systems to which fugitive emissions are ducted, design specifications and performance demonstrations of the control device and piping and instrumentation diagrams should be maintained for the life of the equipment.

These include:

- detailed schematics, design specs of the control device, and piping and instrumentation diagrams
- dates and descriptions of any changes in the design specs
- the flare design (whether it is steam assisted, air assisted, or nonassisted) and the results of the compliance demonstration
- a description of the parameter(s) monitored and an explanation of why the parameter(s) were chosen.

Also, for at least 2 years, records should be maintained of:

- Dates and duration of non-operation of the systems
- Dates and duration when monitored parameters are outside ranges established in initial compliance determination.
- Dates and durations of startup/shutdown/malfunction occurrences.
- Records of inspection of CVS and results (documenting no leaks or information in (4.) above).
- Records of operations of CVS and control device.

8. Records for Components in Heavy-Liquid Service

Information used to demonstrate that a component is in heavy liquid service should be recorded.

The demonstration should show that the process fluids do not meet the criteria of "in light liquid or gas service." Information could include records of chemicals purchased for the process, analyses of process stream composition, engineering calculations, or process knowledge, or other information offered by the owner/operator.

9. Records of Exempt Components

Information used to identify and identification of equipment in organic HAP service less than 300 hours per year should be recorded. Identification may be either by list or location.

10. Records of Alternative Means of Compliance Demonstration: Enclosed-Vented Unit

Owners and operators complying by enclosing emissions through a closed vent system operating under negative pressure should maintain the following information:

- Identification of processes and the organic HAP they handle
- Schematics of the process, the enclosure, and closed-vent system
- Description of the system used to create a negative pressure in the enclosure to ensure that all emissions are routed to the control device.

What are the Reporting Requirements?

Subpart GGG requires that the following reports be submitted for equipment subject to § 63.1255:

- Notification of Compliance Status Report (NOC) (submitted within 150 days of compliance date) containing:
  - process group identification
  - numbers of each equipment type (except equipment in vacuum service)
  - method of compliance with the standard
  - products or product codes subject to processes complying by pressure testing, if available
  - planned schedule for pressure testing
  - identification of processes complying with § 63.179 (enclosure to negative pressure manifold) and a description of the system used to create negative pressure
- Periodic Reports (submitted semiannually 240 days after NOCSR). The first Periodic Report covers the 6 months beginning on the due date of the NOCSR (See section 63.1255(g)(3)(i). Owners/operators of all equipment except for that complying through pressure testing must provide the following:
  - the number of valves for which leaks were detected, the percent leakers and total number of valves monitored
  - the number of valves for which leaks were not repaired and the number of valves that are nonrepairable
  - the number of pumps for which leaks were detected, the percent leakers for pumps, and the total number of pumps monitored
  - the number of pumps and agitators for which leaks were not repaired
  - the number of compressors for which leaks were detected
  - the number of compressors for which leaks were not repaired

- the number of connectors for which leaks were detected, the percent of connectors leaking, and the total number of connectors monitored
- the number of connectors for which leaks were not repaired and the number of those determined to be nonrepairable
- the facts that explain any delay of repairs and when appropriate, why a process shutdown was technically infeasible
- the results of all monitoring of compressors designated as no detectable emissions, PRV's, and closed vent systems
- if applicable, the initiation of monthly monitoring for valves or pumps
- if applicable, a change in connector monitoring alternatives as described in § 63.174(c)(1)
- **for processes complying by pressure testing**,
  - the product process equipment train identification
  - the number of pressure tests conducted
  - the number of pressure tests where equipment train failed either the retest or two consecutive pressure tests
  - the facts that explain any delay of repairs, and
  - the results of all monitoring to determine compliance with § 63.172(f) of Subpart H.
- any revisions to items reported in the NOC, if the method of compliance has changed.