Control Device Requirements Charts

For Oil and Gas Handling and Production Facilities

Purpose/Scope:

The purpose of this document is to provide standardized guidance for use by the regulated community and air permit reviewers, which explains what control efficiencies can be claimed for each type of control device and what the requirements are to be able to claim the control efficiency. The control device types covered in this document are listed below. Design, operational, monitoring, recordkeeping, and testing requirements are included as applicable for the various control device types. These are the generally expected requirements for demonstrating that a control device is achieving the level of control claimed; however, there may be alternatives to these requirements which can be proposed to and evaluated by the agency. There may also be alternative control devices, which also can be proposed to and evaluated by the agency. This information applies to all oil and gas handling/production air permit authorizations.

Notes:

- Permit by Rule (PBR) registrations must be certified if a control device is relied upon.
- Records of hours of use are required for all units. On-line time must be considered when emission estimates and actual emissions inventories are calculated. Emission estimate calculations need to factor in whether or not the control device is constantly on. For example, if potential emissions are sent to a reboiler fire-box, and the reboiler burner is not constantly fired, then the control efficiency cannot be claimed continuously. If potential emissions are sent to a vapor recovery unit, which is off-line for maintenance for a certain amount of time, then the control efficiency cannot be claimed during the off-line time.

Contents:

Table 1: Flare Requirements

Acceptable Control Efficiency	Requirements

destruction efficiencies of:
 	
≤ 98% for VOCs and H_2S, and
 	
≤ 99% for compounds containing only carbon, hydrogen, and oxygen with no more than three carbon atoms
	The flare must:
	
	• meet 40 CFR §60.18 requirements for minimum heating value of waste gas and maximum flare tip velocity
	• have supplemental fuel gas added to any flared streams if needed to ensure gases are sufficiently combustible
	• be fueled by sweet gas or liquid petroleum gas except where only field gas is available and it is not sweetened at the site
	• be designed for and operated with no visible emissions, except for periods not to exceed a total of five minutes during any two consecutive hours (acid gas flares which must comply with opacity limits and records of 30 TAC §111.111(a)(4) are exempt from this)
	• be lit at all times when gas streams are present by having a continuous pilot flame or an automatic ignition system
	  • if a continuous pilot is utilized, the presence of a flame must be continuously monitored with a thermocouple or other equivalent device (such as an infrared monitor) as specified in 40 CFR §60.18
	  • if an automatic ignition system is utilized, it must ensure ignition when waste gas is present
	Notes:
	
	• the time, date, and duration of any loss of flare pilot flame, or auto-ignition must be recorded
	• monitors must be accurate to and calibrated at a frequency in accordance with manufacturer specifications
	• a temporary, portable, or backup flare used less than 480 hours per year is not required to be monitored
	• emergency/upset emissions are not authorized; the only emissions authorized from an emergency flare are the pilot emissions; the pilot is subject to monitoring as described above

Table 2: Thermal Oxidation/Vapor Combustion Control Device Requirements (for devices that are not considered a flare)

Acceptable Control Efficiency	Requirements
destruction efficiency of: ≤ 90% for VOCs and H_2S	The device must: • be designed for the variability of the waste gas streams it controls • utilize basic monitoring to indicate oxidation or combustion is occurring when waste gas is directed to the device, which consists of: • using a thermocouple or infrared monitor that indicates the device is working

destruction efficiency of:
 	
>90% and ≤ 98% for VOCs and H_2S
	The device must:
	
	• be designed for the variability of the waste gas streams it controls
	• have a partially or fully enclosed combustion region
	• meet one of the following:
	  • have a fire box or fire tube which maintains a temperature above 1,400 degrees Fahrenheit in the combustion region where waste gas has a 0.5 residence time and utilize intermediate monitoring, which consists of:
	  • continuously monitoring and recording combustion region temperature (or device exhaust temperature) to show that the 1,400 °F requirement is met any time waste gas can be directed to the device
	  OR
	  • meet the flare requirements as listed above in Table 1

Table 2: Thermal Oxidation/Vapor Combustion Control Device Requirements (for devices that are not considered a flare) (continued)

Acceptable Control Efficiency	Requirements

destruction efficiency of:
 	
>98% and ≤ 99% for VOCs and H_2S
	The device must:
	
	• be designed for the variability of the waste gas streams it controls
	• have a fire box or fire tube which maintains a temperature above 1,400 degrees Fahrenheit in the combustion region where waste gas has a 0.5 residence time
	• have ports/platforms to allow for monitoring/sampling/stack testing (monitoring and sampling ports need to be installed in the vent stream (inlet stream to the device) and the exit to the combustion chamber)
	• be able to have VOC, benzene, and H_2S sampling performed if asked by Regional office
	• utilize enhanced monitoring, which consists of:
	  • continuously monitoring and recording (at least six minute averages) combustion region temperature (or device exhaust temperature) to show that the 1,400 degrees Fahrenheit requirement is met any time waste gas can be directed to the device
	  • continuously monitoring and recording (at least six minute averages) combustion region (or device exhaust) oxygen or carbon monoxide concentration to show that the design oxygen concentration range or a CO limit of 100 ppmv or lower is met
	  • continuously monitoring and recording when waste gas is flowing to device if flow to the device can be intermittent
	
	Notes (monitoring and recordkeeping details):
	
	• the temperature and oxygen measurement devices shall reduce the temperature and oxygen concentration readings to an averaging period of six minutes or less and record it at that frequency
	• the temperature measurement device shall be installed, calibrated, and maintained according to accepted practice and the manufacturer's specifications
	(continued on next page)

Table 2: Thermal Oxidation/Vapor Combustion Control Device Requirements (for devices that are not considered a flare) (continued)

Acceptable Control Efficiency	Requirements
(continued from box on last page) destruction efficiency of: >98% and ≤ 99% for VOCs and H_2S	(continued from box on last page) • the temperature measurement device shall have an accuracy of the greater of ±0.75% of the temperature being measured expressed in degrees Celsius or ±2.5egrees Celsius • the oxygen or carbon monoxide analyzer shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in Performance Specification No. 3 or 4A, 40 CFR Part 60, Appendix B (zero and span is not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days) • the oxygen or carbon monoxide analyzer shall be quality-assured at least semiannually using cylinder gas audits (CGAs) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, §5.1.2, with the following exception: a relative accuracy test audit is not required once every four quarters (i.e., two successive semiannual CGAs may be conducted) • an equivalent quality assurance method for the oxygen or carbon monoxide analyzer approved by the TCEQ may also be used • successive semiannual audits of the oxygen or carbon monoxide analyzer shall occur no closer than four months • necessary corrective action shall be taken for all CGA exceedances of ±15 % accuracy and any continuous emissions monitoring system downtime in excess of 5% of the thermal oxidizer operating time; these occurrences and corrective actions shall be reported to the appropriate TCEQ Regional Director on a quarterly basis • supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Regional Director • quality assured or valid data of oxygen or carbon monoxide analyzer must be generated when the thermal oxidizer is operating except during the performance of a daily zero and span check; loss of valid data due to periods of monitor break down, inaccurate data, repair, maintenance, or calibration may be exempted provided it does not exceed 5% of the time (in minutes) that the oxidizer operated over the previous rolling 12 month period; the measurements missed shall be estimated using engineering judgment and the methods used recorded

Table 2: Thermal Oxidation/Vapor Combustion Control Device Requirements (for devices that are not considered a flare) (continued)

Acceptable Control Efficiency	Requirements

destruction efficiency of:
 	
>99% and ≤ 99.9% for VOCs and H_2S
	The device must:
	
	• be stack tested to confirm the destruction efficiency claimed
	  • testing must be coordinated with and approved by the regional TCEQ office
	  • the test must be done for the worst case scenario representative of the highest emission rates (a vapor stream composition and flow rate representative of the worst case composition and flow rate should be used, which includes the greatest composition of the most difficult to combust material, as is reasonable to be done; the operating conditions and ambient conditions should also be representative of the worst case, as is reasonable to be done)
	  • there must be some type of quality assurance/quality control performed
	  • manufacturer testing is acceptable for units that do not have a fully enclosed combustion chamber if the following conditions are met:
	  • both units (the tested unit and the unit at the actual site) must be the same (same manufacturer, model, and size)
	  • the vapor stream being controlled must be similar in flow rate and composition to the actual site vapor stream
	  • the test must be done under similar conditions as the conditions at the actual site
	• meet all requirements to be able to claim >98% and ≤ 99% destruction efficiency as listed above in this table (with the only exception being that modifications can be made to required parameter values as long as the device is shown through stack testing to meet the claimed destruction efficiency with the modified values)

Table 3: Process Reboiler, Heater, or Furnace Requirements (for units that are also used for control of waste gas streams)

Acceptable Control Efficiency	Requirements

destruction efficiency of:
 	
≤ 90% for VOCs and H_2S
	The unit must:
	
	• have waste gas delivered to the flame zone or combustion firebox
	• utilize basic monitoring, which consists of:
	  • continuously monitoring the presence of a flame (in order to show when the flame in the device is on or off) using a firebox temperature monitor, rising or steady process temperature monitor, carbon monoxide monitor, primary fuel flow monitor, firebox pressure monitor, or equivalent
	• meet one of the following:
	  • not be designed to cycle on and off (cycling on and off means that the burner(s) is not constantly firing)
	  OR
	  • if it is designed to cycle on and off, a device run time ≤ 50% must be claimed (which means that the destruction efficiency can only be applied for 50% of the time in emission estimate calculations)

Table 3: Process Reboiler, Heater, or Furnace Requirements (for units that are also used for control of waste gas streams)

Acceptable Control Efficiency	Requirements

destruction efficiency of:
 	
> 90% and ≤ 99% for VOCs and H_2S
	The unit must:
	
	• meet one of the following:
	  • meet the requirements to be able to claim 90% destruction efficiency as listed above in this table, and
	  • have the waste gas pre-mixed with the primary fuel gas and used as the primary fuel in the device through the primary fuel burners
	
	  OR
	
	  • utilize enhanced monitoring if the waste gas is not introduced as the primary fuel, which consists of:
	  • continuously monitoring and recording (at least six minute averages) combustion region temperature (or device exhaust temperature) to show that the temperature is high enough to combust the waste gas and (high enough for the device to run properly and perform its main function)
	  • continuously monitoring and recording (at least six minute averages) combustion region (or device exhaust) oxygen or carbon monoxide concentration to show that the design oxygen concentration range or a CO limit of 100 ppmv or lower is met
	  • continuously monitoring and recording when waste gas is flowing to the device and the device run time (the amount of time the burner(s) is firing) if the device is designed to cycle on and off and flow to the device can occur when it is not firing and greater than 50% device run time is claimed

Table 4: Mechanical Vapor Recovery Unit (mVRU) Requirements

Acceptable Control Efficiency	Requirements
control efficiency of: ≤ 95% for VOCs and H_2S	The unit must: • meet basic design/function requirements, which are that the unit is designed to capture vapor and has a sensing device to capture vapor at peak intervals (no records are required to be kept)

control efficiency of:
 	
** >95% and ≤ 99% for VOCs and H_2S
	The unit must:
	
	• meet basic and additional design/function requirements and records must be kept to demonstrate that the unit is *designed* with:
	  • basic design/function requirements, which are that the unit captures vapor and has a sensing device to capture vapor at peak intervals
	  • additional design/function requirements, *such as* (1) having additional sensing equipment, (2) a properly designed bypass system, (3) an appropriate gas blanket, (4) a compressor that is a suitable type for the application and has the ability to vary the drive speed if electrically driven
	  • **Starting at 95% control efficiency, one additional percent can be claimed for each additional design/function, up to 99% control efficiency

Table 4: Mechanical Vapor Recovery Unit (mVRU) Requirements (continued)

Acceptable Control Efficiency	Requirements

control efficiency of:
 	
>99% and ≤ 100% for VOCs and H_2S
	The unit must:
	
	• meet the requirements to be able to claim >95% and ≤ 99% control efficiency as listed above in this table
	• utilize appropriate parameter monitoring to demonstrate that the unit is capturing vapors and functioning properly on a continuous basis and records of this must be kept
	
	Notes (monitoring and recordkeeping details):
	
	• the following are some examples of good parameter monitoring to show that the unit is operating properly and as designed:
	  • if a pressure trigger is used to start a compressor to direct gases to the product line, a continuous pressure recording showing the pressure in the tank that would cause the gas to escape to the atmosphere through a pressure relief valve or hatch was never exceeded
	  • if a tank is hard piped to the product line through a compressor and the only atmospheric relief is through a pressure relief valve on the tank, a continuous monitor recording on the valve position indicating that it never opened
	  • the date and time that all tank hatches and relief valves are noted to be sealed and that they were resealed after each intentional opening
	  • the date and time that a periodic check was conducted of the controlled vessel and control device noting no holes, worn seals, or other defects are present that would allow an uncontrolled release to the atmosphere

Table 5: Liquid Vapor Recovery Unit (lVRU) Requirements

Acceptable Control Efficiency	Requirements

control efficiency of:
 	
≤ 95% for VOCs and H_2S
	The unit must:
	
	• be designed properly including being able to handle the right capacity and records must be kept to demonstrate this
	• the liquid must be replaced in order to maintain the appropriate VOC to liquid ratio and records must be kept to demonstrate this, which include calculations of the VOC to liquid ratio
	• be tested to demonstrate the efficiency and results recorded at a frequency no longer than:
	  • after 20 loads have been pulled through the lVRU, for control of vacuum truck loading vapors
	  • monthly for control of produced water tank vapors
	  • bi-monthly for control of crude oil tank vapors
	  • weekly for control of condensate tank vapors
	  • both inlet and outlet streams must be sampled and analyzed using a PID (photo ionization detector) and Method 21 or modified Method 21; the efficiency will be determined by the difference of the inlet and outlet streams using the equation:
	  • $Percent\ Control\ Efficiency = \frac{(C_{inlet} - C_{outlet})}{C_{inlet}} \times 100$
	  • Where C = the concentration of the compound(s) for which the control efficiency is being determined, such as VOCs or H_2S
	• be properly connected with all connected hatches and openings properly gasketed and sealed and all valves designed and maintained to prevent leaks
	• not be down for more than an average of 5% of the time over a rolling 12 months or 432 hours per rolling 12 months and if possible during downtime, the controlled waste streams should be redirected to another appropriate control device, unless the unit is certified for alternate operating hours

Table 5: Liquid Vapor Recovery Unit (lVRU) Requirements (continued)

Acceptable Control Efficiency	Requirements

control efficiency of:
 	
>95% and ≤ 98% for VOCs and H_2S
	The unit must:
	
	• be designed properly including being able to handle the right capacity and records must be kept to demonstrate this
	• the liquid must be replaced in order to maintain the appropriate VOC to liquid ratio and records must be kept to demonstrate this, which include calculations of the VOC to liquid ratio
	• be tested to demonstrate the efficiency and results recorded at a frequency no longer than:
	  • after 15 loads have been pulled through the lVRU, for control of vacuum truck loading vapors
	  • every three weeks for control of produced water tank vapors
	  • every 10 days for control of crude oil tank vapors
	  • every five days for control of condensate tank vapors
	  • both inlet and outlet streams must be sampled and analyzed using a PID (photo ionization detector) and Method 21 or modified Method 21; the efficiency will be determined by the difference of the inlet and outlet streams using the equation:
	  • $Percent\ Control\ Efficiency = \frac{(C_{inlet} - C_{outlet})}{C_{inlet}} \times 100$
	  • Where C = the concentration of the compound(s) for which the control efficiency is being determined, such as VOCs or H_2S
	• be properly connected with all connected hatches and openings properly gasketed and sealed and all valves designed and maintained to prevent leaks
	• not be down for more than an average of 5% of the time over a rolling 12 months or 432 hours per rolling 12 months and if possible during downtime, the controlled waste streams should be redirected to another appropriate control device, unless the unit is certified for alternate operating hours