AIR POLLUTION CONTROL DISTRICT
REGULATORY COMPLIANCE DIVISION

POLICIES AND PROCEDURES

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Topic: Gas Processing

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This policy and procedures document provides guidance on the inspection of gas processing plants. Gas processing plants may perform a variety of functions, depending on the composition of the inlet gas and the desired product gas. These functions include:

1. Removing hydrocarbon condensates (Liquid Petroleum Gas/Natural Gas Liquids) - the incoming gas is fed into a pressure vessel(s) where the light ends (C1 and C2s) are flashed off and the heavier hydrocarbons (C3+) are dropped out and removed as LPG/NGLs. Hydrocarbons may be released as fugitive emissions.

2. Removing water (dehydration) - the wet gas is contacted in a tower with glycol. The glycol can be regenerated and reused after removing the absorbed water in a glycol reboiler. The reboiler is a external combustion source generally fired with natural gas or fuel oil.

3. Sweetening sour gas by removing H_2S - the most common process uses an amine absorption solution (MEA or DEA); other processes include carbonate absorption solutions and solid bed absorbent (e.g., iron-sponge process). The amine solution absorbs H_2S and can be regenerated by heating. The regenerator is an external combustion source which uses either natural gas or fuel oil.

4. Recovery of sulfur from amine absorption solutions - the H_2S released during the regeneration of the amine solution can be recovered in a Sulfur Recovery Unit (SRU). SRUs generally use the Claus Process which catalytically oxidizes H_2S to elemental sulfur and water. Among other factors, the sulfur recovery efficiency depends on the inlet feed steam composition and the number of catalytic conversion stages. Sulfur recovery efficiency increases with higher H_2S concentration in the feed steam and with a greater number of catalytic conversion stages. SRUs can be a source of odors.

5. To enhance the efficiency of the Claus Process and to meet New Source Performance Standards, removal of sulfur compounds from the Claus plant tail gas can be accomplished by any one of three general schemes:

- Extension of the Claus reaction to increase overall sulfur recovery by carrying out the Claus reaction at lower temperatures to shift equilibrium of the Claus reactions toward formation of additional sulfur. The IFP-1, BSR/Selectox, Amoco CBA and Sulfreen processes use this technique to increase the sulfur recovery efficiency up to 99 percent.

- Conversion of sulfur gases to SO_2, followed by SO_2 removal technology. The tail gas is incinerated to convert all sulfur compounds to SO_2. The SO_2 is then recovered by one of several processes, such as Wellman-Lord. In the Wellman-Lord and certain other processes, the SO_2 absorbed in the tail gas is recycled to the Claus plant to recover additional sulfur. The overall sulfur recovery efficiency (including the Claus plant) can be greater than 99 percent.

- Conversion of sulfur gases to H_2S, followed by H_2S removal technology. The tail gas is mixed with a reducing gas and passed over a reducing catalyst. The H_2S is then removed by the Stretford process (i.e., Beavon and Clean Air processes) or by an amine system (SCOT process). The Beavon and Clean Air Processes recover the H_2S as elemental sulfur and the SCOT process produces a concentrated H_2S stream which is recycled to the Claus process. The overall sulfur recovery efficiency (including the Claus plant) can be greater than 99 percent.

6. Tail gas incineration - a tail gas incinerator combusts the residual acid gas from the SRU. A scrubber and an ammonia injection system may be used to remove SO_2 and NO_x from the tail gas incinerator, respectively.

The inspection of gas processing plants depends in large part on the specific permit conditions. Consequently, this policy and procedure document may address subjects which are not applicable to all gas processing plants. The inspector should, in conjunction with the project manager, thoroughly review the permit and prepare a source-specific check list.

The following items may require inspection:

1. Inlet gas to plant (scf/hr)

2. Outlet gas from plant
   - flow rate (scf/hr)
   - H_2S content (ppm)

3. Tail gas incinerator
   - exhaust NO_x (ppm)
   - exhaust SO_x (ppm)
   - exhaust O_2 (%)
   - exhaust temperature
   - exhaust flow rate (scf/hr)

- assist gas flow rate (scf/hr)
- tail gas flow rate (scf/hr)

4. Tail gas SO_2 scrubber
   - outlet gas flow rate (scf/hr)
   - outlet H_2S (ppm)
   - outlet SO_2 (ppm)
   - outlet NO_x (ppm)
   - inlet and outlet temperature
   - scrubber solution circulation rate, density and pH

5. Tail gas NO_x scrubber
   - outlet gas flow rate (scf/hr)
   - outlet NO_x ppm
   - ammonia injection rate (lb/hr)

6. Sulfur Recovery Unit
   - sulfur production rate (ton/day)
   - acid gas feed rate (scf/hr)
   - sweet gas production rate (scf/hr)

7. Continuous Emission Monitoring - many of the emissions and process parameters listed in Items #1-6 (above) may be continuously monitored at the facility. The inspector should obtain the necessary data from these monitors. If the data are not available, a note should be made of this situation. Additionally, the following CEM logs should be checked:

   - daily and weekly preventive maintenance forms prepared and completed
   - manual calibrations performed and documented
   - record of all down time and reason (maintenance, calibration, repair, power failure)
   - record of alarms (number, date and time, cause and solution)

Other equipment at gas processing plants may include flares, boilers, compressors and internal combustion engines. Please refer to the applicable sections of the Regulatory Compliance Policy and Procedures for the inspection of these sources.

An inspection report will be prepared after the inspection has been conducted. The report should include an explanation of the reason for the inspection, the results of the inspection and recommendations. If violations of permit conditions or District rules are detected, Policy and Procedure VII.A, "Enforcement Actions - The Notice of Violation", will be followed.