AIR POLLUTION CONTROL IN PETROLEUM PRODUCTION: LEGITIMATE CONCERN OR BUREAUCRATIC BOONDOGGLE?

CHARLES G. SHORT
Texas Air Control Board

INTRODUCTION

Oil and gas drilling and production activities are currently regulated by many governmental entities. Such massive regulation inevitably leads to industry discussions concerning whether or not certain specific regulations are needed. This paper broadly outlines the impact of the Texas Clean Air Act of 1967 on petroleum drilling and production activities. The reasonableness and necessity of this act are reviewed with respect to the various petroleum-production activities.

DRILLING OPERATIONS

The nine citizens of Texas who make up the Texas Air Control Board have adopted very few regulations affecting drilling operations in the petroleum industry. The most obvious reason for this non-regulation is that the majority of wells being drilled are not significant sources of air pollution. Only when the unexpected happens and drilling control is lost, does the drilling operation become a potential, and often significant, air-pollution problem, When drilling results in pollutant emissions into the air of the State, Regulations of the Board apply.

A well blowout may cause extensive oil damage to farmland or rangeland. Outdoor burning of the oil, resulting in particulate and hydrocarbon air pollutant emissions, may appear to be the only practical means of returning the land to its original condition and protecting human and animal welfare. Although Regulation I of the Board prohibits outdoor burning within the state, exemption from the regulations under Rule 12 may provide for such burning in the event proper notification and justification are made by the drilling operator.

Lack of complete control of a gas well is always possible in this era of deep drilling for high pressure gas. Hydrocarbon, hydrogen-sulfide, and sulfur-dioxide emissions are possible during times of inadequate control. Although the Board's Regulation II concerning sulfur compounds sets specific emission limits for hydrogen sulfide and sulfur dioxide sources, Rule 12 allows the Executive Director when necessary to permit emissions in excess of those allowed by a specific regulation to deal with unavoidable instances of emissions of these pollutants. However, proper notification and justification are always required of drilling operators during these upset circumstances.

The Board has provided manpower and equipment for support of drilling operators and law enforcement officials in emergencies in which pollutant emissions reach hazardous levels. Combustible gas meters, continuous pollutant monitors, pollutant grab-samplers, fresh-air breathing apparatus, hazardous substances libraries, and technically competent field personnel are resources made available by the Board at the nearest Air Quality Contol Region office. Additional support personnel and equipment are available in the Board's Austin Office. If requested, complex calculations involving dispersion of air pollutants are performed by these support personnel.

TESTING OPERATIONS

Often, before a completed well is placed in production status, the well must be tested to determine characteristics of the producing

formation (s). This testing can result in significant air pollution emissions, although it rarely results in hazardous pollutant levels. The Board has recognized the necessity for such testing and has responded to that need by allowing testing under Exemption 76 of "Exemptions from Permit Procedures." Exemption 76 allows for testing for a maximum period of 30 days, provided that all emissions to the atmosphere, other than stock tank vapors, are flared.

PRODUCING OPERATIONS

The potential for air pollution emissions from oil and gas producing facilities is considerable. Recent incidents involving the exposure of the general public to hazardous emissions of air pollutants from producing facilities have caused both industry and regulatory entities to take a fresh look at this problem.

The Board has required permits for construction and modification of crude-oil storage facilities since April 1971. However, not all storage facilities are significant sources of air pollution. The Board has exempted certain facilities because of location, air-pollution controls, and size. This exempt status allows the facilities to be constructed and operated without a permit from the Board.

Although the general oil field practice of open burning of hydrocarbons was disallowed by the Board in 1968, Regulation I still allows for open burning of hydrocarbons from pipeline breaks and oil spills, provided proper notification and justification are made by the operator. Notification to the regional office of the Board by the operator allows the staff to properly respond to any complaints or problems that might be encountered as a result of such burning.

Although gaseous emissions resulting from combustion processes at producing facilities are usually insignificant, sulfur compound emissions from gas separators, dehydrators, and stock tanks may be quite significant. The Board's Regulation II sets allowable emission limits for sulfur dioxide and hydrogen sulfide emissions from these facilities. Field personnel from the Board's central or regional offices periodically measure emissions from select sources. Results of such measurements are available to operators on request.

Gas injection into producing formations is increasingly being used by the industry to increase oil and gas production.[1] Although emissions associated with such operations are normally small, hazardous releases of air pollutants are possible in the event of a system failure. Notification of such releases by the operator to the Board will assure proper emergency response by the Board's central and regional office personnel.

TECHNICAL ADVISORY COMMITTEE

The Executive Director of the Board has established a Technical Advisory Committee to advise the staff of the Board concerning air pollution control problems in the state. Every major industry, including petroleum production, is represented on this Committee. The Committee's recommendations on regulations and policies are solicited whenever the Board or its staff must make decisions affecting specific industries throughout the State.

REGULATIONS

This presentation has made broad references to the Regulations of the Texas Air Control Board. Specific information concerning regulations affecting oil and gas drilling and production operations may be found in Appendixes A through C to this paper.[2]

CONCLUSIONS

Petroleum drilling and production in the state sometimes result in significant air contaminant emissions. In order to safeguard the air resources of the State, the Texas Air Control Board has adopted regulations limiting air pollution emissions from these drilling and production operations. However, the Board adopts regulations only when significant air pollution problems become evident.

APPENDIX A

Definitions of terms used in the Texas Clean Air Act for the Board's Regulations affecting petroleum drilling and producing operations:

1. *Air Contaminant.* Particulate matter, dust, fumes, gas, mist, smoke, vapor or odor, or any combination thereof produced by processes other than natural.
2. *Air Pollution.* The presence in the atmosphere of one or more air contaminants or combination thereof, in such concentration and of

such duration that they are or may tend to be injurious to or adversely affect human health or welfare, animal life, vegetation or property.

3. *Downwind Level.* The concentration of air contaminants from a source or sources on a property, as measured at or beyond the property boundary.
4. *Flue.* Any duct, stack chimney, or conduit used to conduct air contaminants into the open air.
5. *Major Upset.* An unscheduled occurrence or excursion of a process or operation that results in an emission of air contaminants that contravenes the Texas Air Control Board Regulations and/or the intent of the Texas Clean Air Act and is beyond immediate control, or a release that is initiated to protect life in the immediate or adjacent areas.
6. *Modification.* Any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source into the atmosphere or which results in the emission of any air pollutant not previously emitted. Insignificant increases in the amount of any air pollutant emitted are not intended to be included, nor is maintenance or replacement of equipment components which do not increase or tend to increase the amount or change the characteristics of the air contaminants emitted to the atmosphere.
7. *Net Ground-Level Concentration.* The upwind level subtracted from the downwind level.
8. *New Source.* Any stationary source, the construction or modification of which is commenced after the date of adoption of the Regulations.
9. *Opacity.* The degree to which an emission of air contaminants obstructs the transmission of light, expressed as the percentage to which the light is obstructed as measured by an optical instrument or trained observer.
10. *Outdoor Burning.* Any fire or smoke-producing process which is not conducted in a combustion unit.
11. *Particulate Matter.* Any material, except uncombined water, that exists as a solid or liquid in the atmosphere or in a gas stream at standard conditions.
12. *Property.* All land under common control or ownership on which any source or combination of sources is located, coupled with all improvements on such land, and all fixed or movable objects on such land, or any vessel on the waters of this state which may constitute a source.
13. *Smoke.* Small gas-borne particles resulting from incomplete combustion and consisting predominantly of carbon and other combustible material and present in sufficient quantity to be visible.
14. *Sour Gas.* Any natural gas containing more than 1-1/2 grains of hydrogen sulfide per 100 cubic feet, or more than 30 grains of total sulfur per 100 cubic feet.
15. *Sour Crude.* A crude oil which emits a sour gas when in equilibrium at atmospheric pressure.
16. *Source.* A point of origin of air contaminants, whether privately or publicly owned or operated. Upon request of a source owner, the Executive Director shall determine whether multiple processes emitting air contaminants from a single point of emission will be treated as a single source or as multiple sources.
17. *Standard Conditions.* A condition at a temperature of 70^0F and a pressure of 14.7 pounds per square inch absolute. Pollutant concentrations from an incinerator will be corrected to a condition of 50-percent excess air if the incinerator is operating at greater than 50 percent excess air.
18. *Sulfur Compounds.* All inorganic or organic chemicals having an atom or atoms of sulfur in their chemical structures.
19. *Sweet Crude Oil and Gas.* Those crude petroleum hydrocarbons that are not "sour" as defined.
20. *Upwind Level.* The representative concentration of air contaminants flowing onto or across a property as measured at any point.
21. *Visible Emissions.* Particulate or gaseous matter which can be detected by the human eye. The radiant energy from an open flame shall not be considered a visible emission under this definition.

APPENDIX B

Rules of the Board affecting oil and gas drilling and producing operations:

GENERAL RULES

Rule 5. *Nuisance.* No person shall discharge from any source whatsoever one or more air contaminants or combinations thereof, in such concentration and of such duration as are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation or property, or as to interfere with the normal use and enjoyment of animal life, vegetation or property.

Rule 7. *Notification requirements for Major Upset.* The Executive Director and the appropriate local air pollution control agency shall be notified as soon as possible of any major upset condition which causes or may cause an excessive emission that contravenes the intent of the Texas Clean Air Act and or the Regulations of the Board. A list of persons to contact may be obtained from the Executive Director upon request.

Rule 12.1. Emissions occurring during major upsets may not be required to meet the allowable emission levels set by the Rules and Regulations upon proper notification as set forth in Rule 7 of these General Rules, if a determination is made by the Executive Director after consultation with appropriate local agencies and with appropriate officials of the subject source that the upset conditions were unavoidable and that a shut-down or other corrective actions were taken as soon as practicable.

RULES FOR CONTROL OF AIR POLLUTION FROM VISIBLE EMISSIONS AND PARTICULATE MATTER

Rule 101.1 No person may cause, suffer, allow or permit any outdoor burning within the State of Texas, except as provided by Rule 101.2.

Rule 101.27 Outdoor burning of hydrocarbons from pipeline breaks and oil spills may be allowed upon proper notification as set forth in Rule 7 of the General Rules, if the Executive Director determines that the burning is necessary to protect the public welfare.

Rule 103.2 No person may cause, suffer, allow or permit visible emissions from a waste gas flare for more than five minutes in any 2-hour period except as provided in Rule 12.1 of the General Rules.

RULES FOR CONTROL OF AIR POLLUTION FROM SULFUR COMPOUNDS

Rule 201.09 No person may cause, suffer, allow or permit emmissions of sulfur dioxide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.4 ppm averaged over any 30-minute period.

Rule 203.1 No person may cause, suffer, allow or permit emissions of hydrogen sulfide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.08 ppm averaged over any 30-minute period if the downwind concentration of hydrogen sulfide affects a property used for residential, business or commercial purposes.

Rule 203.2 No person may cause, suffer, allow or permit emissions of hydrogen sulfide from a source or sources operated on a property or multiple sources operated on contiguous properties to exceed a net ground level concentration of 0.12 ppm averaged over any 30-minute period if the downwind concentration of hydrogen sulfide affects only property used for other than residential, recreational, business or

commercial purposes, such as industrial property and vacant tracts and range lands not normally occupied by people.

RULES FOR CONTROL OF AIR POLLUTION BY PERMITS FOR NEW CONSTRUCTION OR MODIFICATION

Rule 601 Any person who plans to construct any new facility or to engage in the modification of any existing facility which may emit air contaminants into the air of this State must obtain a construction permit from the Texas Air Control Board before any actual work is begun on the facility. If a permit to construct is issued by the Board, the person in charge of the facility must apply for an operating permit within sixty days after the facility has begun operation, unless this sixty day period has been extended by the Executive Director.

Rule 602 The owner of the facility or the operator of the facility authorized to act for the owner is responsible for applying for and obtaining a permit to construct and operate.

APPENDIX C

Exemptions from Permit Procedures affecting oil and gas drilling and producing operations:

6. Gas fired internal combustion engines of less than 2000 hp and engine trains of less than 5000 hp total.
7. Natural-gas or LP-gas-fired combustion units with rated fuel consumption less than 10,000 standard cubic feet per hour.
71. Any petroleum production tank or tank battery processing sweet crude oil or condensate provided that:
    1. The total crude oil or condensate storage is 2500 bbl or less.
    2. The tank or tank battery is located at least 1/4 mile from any recreational area or any facility not owned and occupied by the person proposing to install the tank or tank battery.
72. Gas dehydration units in fields processing sweet crude oil.
73. Gas oil separators.
74. Natural-gas- or LP-gas-fired emulsion treaters with rated fuel consumption of less than 10,000 standard cubic feet per hour.
75. Free water knock-outs.
76. Temporary separators, tanks, meters, and other fluid-handling equipment used for a period not to exceed 30 days to test the content of a subsurface stratum believed productive of oil or gas, provided that all emissions to the atmosphere other than stock tank vapors be flared.
79. Structural changes which cannot change the quality, nature or quantity of air contaminant emissions.
80. Repairs or maintenance not involving structural changes.
81. Identical replacement in whole or in part of any article, machine or any other contrivance.
82. Gas turbines of less than 20,000 hp burning sweet natural gas.
85. Gas dehydration units outside the corporate limits of any city processing gas streams containing less than 100 grains S/100 scf at a rate less than 10 MM scfd.
93. Any petroleum production tank or tank battery processing crude oil or condensate provided that:
    (1) All carbon compound and sulfur compound vapors released from the crude oil or condensate are prevented from entering the atmosphere.
    (2) The total crude oil or condensate storage capacity is 10,000 bbl or less.
    (3) The tank or tank battery is located at least 1/4 mile from any recreational area or any facility not owned and occupied by the person proposing to install the tank or tank battery.

REFERENCES

1. Short, Charles G.: Air Pollution Problems Associated with Gas Injection Related Recovey of Oil and Gas, Texas Air Control Board Staff Report (April, 1975).
2. Rules and Regulations, Texas Air Control Board.