from the first page (Project Abstract). This allows for easy reference during the review process. Simple tabbing of the sections of the application is also most helpful to the reviewers.

- Two copies plus the original are required. Four additional copies are requested, since a total of six copies ensures a more timely review.
- Applicants are encouraged to have someone other than the author apply the evaluation criteria and actually score the application prior to its submittal. In this way, applicants will gain a better sense of their application's quality and potential competitiveness.
- ANA suggests that applications containing proposed business development include a business plan: ownership stipulations, market potential, financing aspects, cost of production (service or product) and projected profit. The more information given a review panel on a proposed business, the better able it is to evaluate the potential for success.
- A project abstract summarizing the proposed project must be included. Detailed instructions are included in the Application Kit.
- Applicants should describe the work already accomplished toward the completion of a proposed project. This information allows the panel to more fully evaluate the feasibility of the proposed project within the budget and time schedule provided.
- ANA does not fund on the basis of need. ANA funds those projects that have the greatest potential for positively affecting a community's local governance and social and economic development.
- For purposes of planning and developing an ANA application, the expected project start date for successful applicants will be 120 days after the closing date under which the application was submitted.

Due Dates for Receipt of Applications

The closing date for applications submitted in response to this program announcement is December 12, 1985.

Receipt of Applications

Applications must be hand delivered or mailed to: Department of Health and Human Services, Office of Human Development Services, Discretionary Grants Management Branch, 2901 3rd Avenue, Seattle, WA 98121, Attention: 13612-862.

Applications mailed through the U.S. Postal Service or a commercial delivery service shall be considered as meeting the deadline if they are either:

(1) Received on or before the deadline date at the above address, or

(2) Sent on or before the deadline date. (Applicants are cautioned to request a legibly dated receipt from a commercial carrier of U.S. Postal Service. Private metered postmarks shall not be acceptable as proof of timely mailing.)

Late applications. Applications which do not meet the criteria in the above paragraph of this section are considered late applications. HDS shall notify each later applicant that its application will not be considered in the current competition.

Extension of deadlines. HDS may extend the deadline for all applicants because of acts of God such as floods, hurricanes, etc., or when there is a widespread disruption of the mail. However, if HDS does not extend the deadline for all applicants, it may not waive or extend the deadline for any applicant.

(Catalog of Federal Domestic Assistance Programs Number 13.612 Native American Progams)

Date: September 16, 1985.

William Lynn Engles,

Commissioner, Administration for Native Americans.

Approved: September 25, 1985.

Dorcas R. Hardy,

Assistant Secretary for Human Development Services.

[FR Doc. 85-23370 Filed 9-30-85; 8:45 am]

BILLING CODE 4130-01-M

federal register

Tuesday
October 1, 1985

Part V

Environmental Protection Agency

Assessment of Hexachlorocyclopentadiene as a Potentially Toxic Air Pollutant; Notice

ENVIRONMENTAL PROTECTION AGENCY

[AD-FRL-2672-2]

Assessment of Hexachlorocyclopentadiene as a Potentially Toxic Air Pollutant

AGENCY: Environmental Protection Agency.

ACTION: Notice of Intent Not to Regulate and Solicitation of Information.

SUMMARY: This notice announces the results of EPA's assessment of hexachlorocyclopentadiene (HCCPD) as a potentially toxic air pollutant. The EPA is announcing its intent not to regulate routine emissions of HCCPD under the Clean Air Act. Given that there are uncertainties in the health and exposure information incorporated in this notice and that there has been limited opportunity for public review, the Agency is soliciting comment on this notice. This determination has no effect on the regulation of HCCPD as a volatile organic compound in order to attain the national ambient air quality standards (NAAQS) for ozone. In addition, this determination does not preclude any State or local air pollution control agency from specifically regulating emission sources of HCCPD.

DATES: Written comments pertaining to this notice must be received on or before December 2, 1985.

ADDRESSES: Submit comments (duplicate copies are preferred) to: Central Docket Section (A-130), Environmental Protection Agency, Attn: Docket No. A-84-26, 401 M Street SW., Washington, DC. Docket A-84-26, which contains information relevant to this decision, is located in the Central Docket Section of the U.S. Environmental Protection Agency, West Tower Lobby Gallery I, 401 M Street SW, Washington, DC. The docket may be inspected between 8:00 a.m. and 4:30 p.m. on weekdays, and a reasonable fee may be charged for copying.

Availability of Related Information: The Health Assessment Document (HAD) for HCCPD is available through the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. Information on the availability of the HAD is available from ORD Publications, CERI-FR, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268 (Telephone: 513-684-7562 commercial/684-7562 FTS).

FOR FURTHER INFORMATION CONTACT: Robert M. Schell, Pollutant Assessment Branch (MD-12), Strategies and Air Standards Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711 (Telephone: 919-541-5645 commercial/629-5645 FTS).

SUPPLEMENTARY INFORMATION: The EPA initiated this assessment because HCCPD is a highly reactive substance that is used in the production of some pesticides that are potential human carcinogens (e.g., Kepone). Information on the sources, emissions, environmental fate, and effects of HCCPD on man and the environment were summarized in a draft HAD which was released for public review period on February 21, 1984 (49 FR 3258, January 26, 1984), and finalized in November 1984. However, the Science Advisory Board, a group of independent scientists which advises EPA, has not reviewed the HAD.

HCCPD (CAS number 77-47-4) is rarely found in the ambient air because it is manufactured and used in very low volume, and it rapidly degrades when released. HCCPD has an atmospheric residence time (time required for its initial concentration to be reduced to about 37 percent) of only about five hours. Information is not available to identify the degradation products of HCCPD or their potential effects on public health and the environment.

HCCPD is used in the manufacture of chlorinated pesticides and flame retardants (Hunt and Brooks, 1984). The principal flame retardants are chlorendic acid, chlorendic anhydride, and Dechlorane Plus. The use of HCCPD in the manufacture of flame retardants is increasing. The effect of this trend on public health is unknown. The major chlorinated pesticides currently produced from HCCPD are chlordane (2600 megagrams per year, Mg/yr, or metric tons/yr), heptachlor (590 Mg/yr), and dienochlor (250 Mg/yr). The use of HCCPD in the production of chlorinated pesticides, however, has decreased because of restrictions placed on the manufacture or use of these and other HCCPD products such as aldrin, dieldrin, mirex, and kepone.

Emissions of HCCPD result from the production and use of HCCPD, and application of its products (EPA, 1984; Hunt and Brooks, 1984). One company manufactures all the HCCPD produced in the United States at two plants. All HCCPD produced at one plant is used within that facility to produce chlordane. The other facility that produces HCCPD uses about half of the HCCPD on site for production of a pesticide and a flame retardant and sells the remainder of the HCCPD to other users.

Table 1 shows the principal sources of HCCPD emissions, production volume in 1984, and estimates of HCCPD emissions. Some residual HCCPD is present in chlordane. (The Federal Insecticide, Fungicide and Rodenticide Act regulations limit this concentration to 1 percent). The processes used in the production of other pesticides and flame retardants, however, should result in little or no residual HCCPD. Although emissions of HCCPD have not been examined in great detail, the preliminary sources assessment (Hunt and Brooks, 1984) indicates that emissions from industrial sources are relatively well controlled. Commercial chemical products containing HCCPD are, when discarded or stored for disposal, classified as hazardous wastes within the meaning of the Resource Conservation and Recovery Act (RCRA). Additionally, waste streams from production of HCCPD and some products derived from HCCPD are hazardous wastes. Such wastes must be managed in accordance with requirements adopted by EPA or States in accordance with the RCRA (see 40 CFR 260-271).

TABLE 1.—SUMMARY OF HCCPD Production AMD EMISSIONS[1]

Source category	Production (Mg/yr)	Air emissions (Mg/yr)
HCCPD production	8,300	4.3
Pesticide production	5,300	1.7
Flame retardant production	4,200	2.0
Solid waste disposal	NA	[2] 1.0
Use of products containing HCCPD	NA	2.9
Total		11.9

[1] Hunt and Brooks (1984).

[2] Air emissions from incinerators and landfills.

Available health effects information for HCCPD is reviewed in the HAD. The HAD indicates that studies are underway, but available information is not sufficient from either animal or human data to determine the carcinogenic potential of HCCPD.

The HAD also reports on several non-cancer health effects associated with HCCPD exposure. The odor recognition threshold concentration for HCCPD, which is not well established, is exceptionally low. As noted in the Agency report on odors that was submitted to Congress on February 19, 1980, Federal regulatory involvement in odor control does not appear to be warranted since local and State odor control procedures appear to be generally adequate. This report, *Regulatory Options for the Control of Odors* (EPA 450/5-80-003), was prepared pursuant to section 403(b) of the Clean Air Act.

There is evidence in the literature indicating an association between HCCPD exposure and several non-cancer health effects. Four-hour inhalation exposures to 1.6 and 3.5 ppm in male and female rats, respectively, have resulted in a death rate of 50%. Long-term exposures in rats at levels of 0.5 ppm have resulted in damage to the liver, kidneys and lungs. Less severe intoxication (e.g., ocular and respiratory irritation and headaches) has been reported in workers exposed to HCCPD at high levels. Although the actual level of exposure associated with the onset of these health effects in humans is unknown, both the animal and human evidence has prompted the American Conference of Governmental Industrial Hygienists (ACGIH) to recommend occupational exposure limits of 0.01 ppm (8-hour time weighted average) and 0.03 ppm (15-minute, short-term exposure limit) to protect workers from all non-cancer health effects.

A modeling analysis was conducted to examine the potential for short-term concentrations of HCCPD in the ambient air surrounding industrial facilities to exceed the exposure limits suggested by ACGIH. This analysis, which used plant specific data from the largest emission source, indicated that HCCPD concentrations near the modeled emission source were 0.0078 ppm (8-hour average) and 0.029 ppm (15-minute average). Although this analysis does account for the fact that the modeled facility operates only 80 percent of the year, the modeled HCCPD concentrations may be underestimated because the analysis assumes that emissions are constant throughout the operating period of each year. This analysis indicates that in the vicinity of the largest facility emitting HCCPD, ambient concentrations effectively equal the ACGIH recommended level for 15-minute exposures and are close to 8-hour exposure levels. Occupational exposure limits, however, are not designed to protect the more sensitive subgroups in the general population.

The only health effects known to occur as a result of exposure to HCCPD at these levels are irritation to the eyes, nose and throat, as well as headaches. In addition, the EPA is aware of only a limited number of sources which could emit HCCPD. Thus, given the very limited potential for human exposure to HCCPD, and the absence of information suggesting serious health effects of HCCPD at ambient concentrations, the development of regulations for HCCPD under any section of the Clean Air Act is not warranted at this time. Additional regulatory controls or other actions may, of course, be appropriate in the future under other EPA authorities to control exposures to HCCPD resulting from releases into the environment other than air emissions from the sources identified in this notice. In order to improve upon the health effects information base for HCCPD, the National Toxicology Program is testing HCCPD in animal bioassays; however, results are not expected before 1987.

The EPA is soliciting comments and additional information pertaining to this notice because: the HAD has not been reviewed by the SAB; the results of the preliminary short-term modeling effort indicate a potential for non-cancer health effects; and the uncertainties inherent in assessing the risk of non-cancer health effects in the general population. A further notice will be published, however, only if pubic comments indicate a need to revise these conclusions. In addition, if significant new information becomes available, the Agency will reconsider the need to regulate HCCPD.

This notice has no effect on the regulation of HCCPD as a volatile organic compound in order to attain the NAAQS for ozone. In addition, this notice does not preclude any State or local air pollution control agency from specifically regulating emission sources of HCCPD.

Dated: September 17, 1985.

Lee M. Thomas,

Administrator.

[FR Doc. 85-23382 Filed 9-30-85; 8:45 am]

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federal register

Tuesday
October 1, 1985

Part VI

Environmental Protection Agency

40 CFR Part 60
Standards of Performance for New Stationary Sources; Onshore Natural Gas Processing; SO_2 Emissions; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL-2865-6]

Standards of Performance for New Stationary Sources; Onshore Natural Gas Processing So$_2$ Emissions

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today's action promulgates standards of performance for atmospheric emissions of sulfur dioxide (SO_2) from new, modified, and reconstructed sweetening and sulfur recovery units in onshore natural gas processing plants. The standards were proposed in the **Federal Register** on January 20, 1984 (49 FR 2656). The standards do not regulate sulfur content in natural gas; instead, they apply only to SO_2 emissions from gas processing (sweetening and sulfur recovery) facilities.

EFFECTIVE DATE: October 1, 1985. These standards become effective upon promulgation and apply to affected facilities for which construction, reconstruction, or modification commenced after January 20, 1984.

Under section 307(b)(1) of the Clean Air Act, judicial review of the actions taken by this notice is available *only* by the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication. Under Section 307(b)(2) of the Clean Air Act, the requirements that are the subject of today's notice may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

ADDRESSES: *Background Information Documents.* The background information document (BID) for the promulgated standards may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, NC 27711, telephone number (919) 541-2777. Please refer to "SO_2 Emissions in Natural Gas Processing Industry—Background Information for Promulgated Standards" (EPA-450/3-82-023b). This BID contains (1) a summary of public comments made on the proposed standards and EPA's responses to the comments and (2) a summary of the changes made to the standards since proposal. The BID for the proposed standards includes discussions of SO_2 emission control technologies; model plants and regulatory alternatives; and the results of the economic impact analyses of the regulatory alternatives. This document may be obtained from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Please refer to "SO_2 Emissions in Natural Gas Production Industry—Background Information for Proposed Standards," (EPA-450/3-82-023a).

Docket. Docket number A-80-20A, containing information considered by EPA in the development of the standards, is available for public inspection between 8:00 a.m. and 4:00 p.m., Monday through Friday, at the EPA's Central Docket Section (LE-131), West Tower Lobby, Gallery 1, 401 M Street S.W., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: For technical information contact Mr. David Markwordt or Mr. Robert E. Rosensteel, Chemicals and Petroleum Branch, Emission Standards and Engineering Division (MD-13), U.S. EPA, Research Triangle Park, NC 27711, telephone (919) 541-5671. For information on the regulatory decisions and the promulgated standards, contact Ms. Dianne Byrne or Mr. Gilbert H. Wood, Standards Development Branch, Emission Standards and Engineering Division (MD-13), U.S. EPA, Research Triangle Park, NC 27711, telephone (919) 541-5578. For information concerning enforcement and reporting aspects, contact Mr. Richard Biondi, Stationary Source Compliance Division (EN-341), U.S. EPA, 401 M Street S.W., Washington, D.C. 20460; or, contact the appropriate Regional Office contact as listed in 40 CFR 60.4.

SUPPLEMENTARY INFORMATION:

Summary of Standards

The standards require affected facilities to reduce SO_2 emissions by recovering sulfur. The emission reduction efficiency required varies according to the sulfur feed rate and concentration of hydrogen sulfide (H_2S) in the gas entering the sulfur recovery unit. The standards apply to facilities with sulfur feed rates $\geqq 2.0$ long tons per day (LT/D).

The standards include two emission reduction efficiency requirements for each facility to take into account control system catalyst degradation over time. One requirement must be met during the initial performance test, and a less stringent requirement must be met on a continuing basis after the initial performance test. The standards include equations for determining emission reduction efficiencies. The standards also contain specific numerical limits for facilities with lean streams (i.e., low H_2S content in the acid gas relative to the size of the facility). These limits require less stringent emission reduction efficiencies based on technology capabilities and cost-effectiveness considerations.

For facilities with design capacities $\geqq 150$ LT/D, the standards require continuous monitoring of SO_2 emissions or total reduced sulfur (TRS) emissions, depending on whether the sulfur compounds are combusted prior to emission to the atmosphere. Instead of continuously measuring SO_2 emission, plants with design capacities <150 LT/D may measure inlet sulfur and recovered sulfur once every 24 hours. The standards require facilities with continous SO_2 emission monitors to either maintain a site-specific incinerator temperature or to monitor both SO_2 and TRS emissions. Reports of excess emissions are required to be submitted semiannually.

Summary of Impacts of the Standards

The impacts of the promulgated standards are not significantly different from those of the proposed standards. A change in the plant size cutoff resulted in minor difference in the impacts.

Emission Reductions. Based on a projected growth of 39 new affected facilities with sulfur feed rates of at least 2.0 LT/D, the standards would reduce SO_2 emissions by about 62,500 megagrams per year (68,750 tons per year) in the fifth year of implementation. This represents a reduction in SO_2 emissions of 76 percent from State implementation plan (SIP) levels.

Cost and Economic Impacts. To comply with the standards, the increase in fixed-capital costs over the first 5 years would be $92.4 million. The increase in annualized costs would be about $27.5 million in the fifth year. This increase in annualized costs represents about 2 percent of the revenue generated by the sale of the processed sour natural gas in the fifth year. The proposed regulations are not expected to have a significant effect on incentives to develop new sour gas fields and should not result in an increase in the price of natural gas.

Other Impacts. These standards will increase total nationwide energy usage by about 7.8×10^{14} Joules per year (25.9 megawatts) in the fifth year of implementation. The standards would not result in any adverse water pollution impacts. There would be no significant impact on solid waste disposal.

The promulgated standards, changes since proposal, EPA's responses to comments received in writing or presented at the March 7, 1984, public hearing, and the economic impacts are discussed in greater detail in the BID for the promulgated standards.

Significant Comments and Changes to the Proposed Standards

The EPA received comments from the natural gas processing industry, trade associations, State regulatory agencies, and a process engineering design firm. These comments and EPA's responses serve as the basis for the revisions that have been made to the standards between proposal and promulgation. A detailed discussion of these comments and responses can be found in the BID for the promulgated standards. Major changes made in the standards since proposal are the following:

(1) The proposed 1.0 LT/D cutoff has been changed to 2.0 LT/D. The proposed cutoff was based on an analysis of the incremental cost effectiveness of the technology included in the regulatory alternative on which the standards were based compared to the no-control baseline alternative. This analysis assumed an average capacity utilization of the affected facilities of 100 percent. Based on information received from commenters, the Agency has determined that average capacity utilization is typically closer to 75 percent. Incorporation of the 75 percent capacity utilization assumption into a revised cost-effectiveness analysis resulted in the 2.0 LT/D cutoff that is being promulgated.

(2) The costs per ton of emission reduction are higher for plants with low H_2S concentrations in the acid gas (relative to the facility's sulfur feed rate) than they are for plants with higher, more typical H_2S concentrations. To ensure that the cost effectiveness of controls at these facilities does not exceed a reasonable range, the standards have been revised to require less stringent emission reduction efficiencies for these plants.

(3) Requirements for continuous monitoring of SO_2 emissions have been revised for smaller plants. Based on the results of an analysis of the potential emission reductions and costs for a range of plant types (see Docket Entry IV–B–31), plants with sulfur feed rates <150 LT/D are no longer required to monitor emissions on a continuous basis. These plants may, instead, calculate emission reduction efficiency daily by comparing the amount of sulfur recovered to the amount of sulfur entering the sulfur recovery unit.

(4) The requirement for maintaining the incinerator combustion zone temperature at 1000± F has been deleted. Instead, a site-specific temperature requirement, determined during the performance test, will be required for those facilities with continuous emission monitors. This temperature must be sufficient to ensure that at least 98 percent of the sulfur in the stack gas will be in the form of SO_2. The standard also now allows plants the flexibility of monitoring both SO_2 and TRS in lieu of meeting the minimum temperature requirement.

(5) The proposed standards required affected facilities to determine the required emission reduction efficiency (Z) once every quarter. This required efficiency was then compared to twice-daily determinations of the actual efficiency being achieved (R) to ascertain if the sulfur recovery unit was being operated and maintained properly. Several commenters, citing potential variability in sulfur feed rate over time, indicated that a requirement to meet an efficiency level that was based on measurements made up to 3 months in the past may not remain achievable. To address this concern, the standards have been changed to require daily determinations of required efficiency (Z). These daily determinations will then be compared to the actual efficiency being achieved, which is also now measured on a daily basis. The change from twice-daily measurements to only daily measurements was made for small plants that may be unattended for up to 12 hours each day.

In response to comments on the proposed standards pertaining to the economic impact analysis, a revised analysis was conducted using a different methodology and incorporating several updated assumptions. The new analysis used a discounted cash flow model (calculating the net present value of each model plant case over the time period of the analysis). Updated assumptions included: a variable price for gas ranging from $3.88 per thousand cubic feet (MCF) in 1985 to $5.82/MCF in 1994 (instead of the constant $4.80/MCF used in the original analysis); a 12-year plant life for facilities with sulfur feed rates <20 LT/D instead of a 20-year life; and a $77/LT value for sulfur credits for plants with sulfur feed rates >5 LT/D rather than the $100/LT value assumed in the previous analysis. Baseline sweetening costs were included in the new analysis. Of approximately 1,000 cases (different combinations of sulfur feed rate, H_2S-to-CO_2 ratios in the acid gas, and H_2S content in the sour gas) analyzed, 27 could, if built, experience adverse economic impacts due to the NSPS. However, there is less than a 1 percent chance of facilities with characteristics similar to any of these cases being built in the future. Because control of these facilities would be cost effective, EPA believes that this economic impact is reasonable. The standards are not expected to adversely affect incentives to develop new sour gas fields, and they are not expected to result in an increase in the price of natural gas.

Miscellaneous

In accordance with section 117 of the Act, publication of these promulgated standards was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. This regulation will be reviewed 4 years from the date of promulgation as required by the Clean Air Act.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance promulgated under section 111(b) of the Act. An economic impact assessment was prepared and is included in the BID. Cost was carefully considered in determining the selection of the regulatory alternative that served as the basis for these standards.

Information collection requirements associated with this regulation (those included in 40 CFR Part 60, Subpart A and Subpart LLL) have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 350 et seq. and have been assigned OMB control number 2060–0120.

The resources needed by the industry to maintain records and to collect, prepare, and use the reports for the first 3 years would be about 8.4 person-years annually. The resources required by EPA and State and local agencies to process the reports and maintain records for the first 3 years would average about 0.374 person-years annually.

"Major Rule" Determination

Under Executive Order 12291, the Administrator is required to judge whether a regulation is a "major rule" and, therefore, subject to certain requirements of the Order. The Administrator has determined that this regulation would result in none of the adverse economic effects set forth in Section 1 of the Order as grounds for finding a regulation to be a "major rule." Fifth-year annualized costs of the standards would be about $27.5 million for the projected 39 newly constructed, modified, and reconstructed natural gas processing facilities that could be affected by the standards during the first 5 years. The standards result in no adverse impact on the profitability of these projected facilities and would have no adverse impact on capital availability for construction of sour natural gas processing plants. The Administrator has concluded that this rule is not "major" under any of the criteria established in the Executive Order.

This regulation was submitted to the Office of Management and Budget (OMB) for review as required in Executive Order 12291. Any written comments from OMB to EPA and any EPA responses to those comments are available for public inspection in Docket No. A–80–20A, Central Docket Section.

Regulatory Flexibility Analysis Certification

The Regulatory Flexibility Act (RFA) of 1980 requires that adverse effects of all Federal regulations upon small businesses be identified. According to current Small Business Administration (SBA) guidelines, a small business in the SIC category 1311, "Crude Petroleum and Natural Gas" is one that has 500 employees or less. This is the criterion to qualify for SBA loans or for the purpose of Government procurement. The average employment in onshore natural gas sulfur recovery companies is approximately 26,000. Therefore, it is estimated that employment in a typical company operating sulfur recovery unit will average well over 500. Thus, it is unlikely that any such company would be considered a small entity. The Agency was not able to obtain sufficient information on natural gas processing companies that operate only sweetening facilities to determine if there is a substantial number of small entities in this segment of the industry. However, the Agency evaluated the economic impacts of the standards on all entities covered by the standards. The results of the Agency's impact analysis indicate that there will be no adverse economic impacts on any plants expected to be built in the near future. Because these standards would not have a significant adverse economic impact on a substantial number of small entities, a Regulatory Flexibility Analysis was not necessary.

Pursuant to the provisions of 5 U.S.C. § 605(b), I hereby certify that this rule will not have a significant economic impact on a substantial number of small entities.

List of Subjects in 40 CFR Part 60.

Air pollution control, Incorporation by reference, Onshore natural gas processing, Reporting and recordkeeping requirements, Intergovernmental relations.

Dated: September 11, 1985.

Lee M. Thomas,

Administrator.

PART 60—[AMENDED]

For reasons set out in the preamble, 40 CFR Part 60 is amended as follows:

1. The authority citation for Part 60 continues to read as follows:

Authority: 42 U.S.C. 7411, 7414, and 7601(a).

2. By adding a new Subpart LLL as follows:

Subpart LLL—Standards of Performance for Onshore Natural Gas Processing; SO_2 Emissions

Sec.

Subpart LLL—Standards of Performance for Onshore Natural Gas Processing: SO_2 Emissions

§ 60.640 Applicability and designation of affected facilities.

(a) The provisions of this subpart are applicable to the following affected facilities that process natural gas: each sweetening unit, and each sweetening unit followed by a sulfur recovery unit.

(b) Facilities that have a design capacity less than 2 long tons per day (LT/D) of hydrogen sulfide (H_2S) in the acid gas (expressed as sulfur) are required to comply with § 60.647(c) but are not required to comply with § 60.642 through § 60.646.

(c) The provisions of this subpart are applicable to facilities located on land and include facilities located onshore which process natural gas produced from either onshore or offshore wells.

(d) The provisions of this subpart apply to each affected facility identified in paragraph (a) of this section which commences construction or modification after January 20, 1984.

(e) The provisions of this subpart do not apply to sweetening facilities producing acid gas that is completely reinjected into oil-or-gas-bearing geologic strata or that is otherwise not released to the atmosphere.

§ 60.641 Definitions.

All terms used in this subpart not defined below are given the meaning in the Act and in Subpart A of this part.

"Acid gas" means a gas stream of hydrogen sulfide (H_2S) and carbon dioxide (CO_2) that has been separated from sour natural gas by a sweetening unit.

"Natural gas" means a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in geologic formations beneath the earth's surface. The principal hydrocarbon constituent is methane.

"Onshore" means all facilities except those that are located in the territorial seas or on the outercontinental shelf.

"Reduced sulfur compounds" means H_2S, carbonyl sulfide (COS), and carbon disulfide (CS_2).

"Sulfur production rate" means the rate of liquid sulfur accumulation from the sulfur recovery unit.

"Sulfur recovery unit" means a process device that recovers element sulfur from acid gas.

"Sweetening unit" means a process device that separates the H_2S and CO_2 contents from the sour natural gas stream.

"Total SO_2 equivalents" means the sum of volumetric or mass concentrations of the sulfur compounds obtained by adding the quantity existing as SO_2 to the quantity of SO_2 that would be obtained if all reduced sulfur compounds were converted to SO_2 (ppmv or kg/DSCM).

"E" = the sulfur emission rate expressed as elemental sulfur, kilograms per hour (kg/hr) rounded to one decimal place.

"R" = the sulfur emission reduction efficiency achieved in percent, carried to one decimal place.

"S" = the sulfur production rate in kilograms per hour (kg/hr) rounded to one decimal place.

"X" = the sulfur feed rate, i.e., the H_2S in the acid gas (expressed as sulfur) from the sweetening unit, expressed in long tons per day (LT/D) of sulfur rounded to one decimal place.

"Y" = the sulfur content of the acid gas from the sweetening unit, expressed as mole percent H_2S (dry basis) rounded to one decimal place.

"Z" = the minimum required sulfur dioxide (SO_2) emission reduction efficiency, expressed as percent carried to one decimal place. Z_i refers to the reduction efficiency required at the initial performance test. Z_c refers to the reduction efficiency required on a continuous basis after compliance with Z_i has been demonstrated.

§ 60.642 Standards for sulfur dioxide.

(a) During the initial performance test required by § 60.8(b), each owner or operator shall achieve at a minimum, an SO_2 emission reduction efficiency (Z_i) to be determined from Table 1 based on the sulfur feed rate (X) and the sulfur content of the acid gas (Y) of the affected facility.

(b) After demonstrating compliance with the provisions of paragraph (a) of this section, the owner or operator shall achieve at a minimum, an SO_2 emission reduction efficiency (Z_c) to be determined from Table 2 based on the sulfur feed rate (X) and the sulfur content of the acid gas (Y) of the affected facility.

§ 60.643 Compliance provisions.

(a)(1) To determine compliance with the standards for sulfur dioxide specified in § 60.642(a), during the initial performance test as required by § 60.8, the minimum required sulfur dioxide emission reduction efficiency (Z) is compared to the emission reduction efficiency (R) achieved by the sulfur recovery technology.

(i) If $R \geqq Z_i$, the affected facility is in compliance.

(ii) If $R < Z_i$, the affected facility is not in compliance.

(2) Following the initial determination of compliance as required by § 60.8, any subsequent compliance determinations that may be required by the Administrator would compare R to Z_c.

(b) The emission reduction efficiency (R) achieved by the sulfur recovery technology is calculated by using the equation:

$$R = \frac{S}{S+E} \times 100$$

"S" and "E" are determined using the procedures and test methods specified in § 60.644 and § 60.645.

BILLING CODE 6560-50-M

Table 1. REQUIRED MINIMUM INITIAL SO_2 EMISSION REDUCTION EFFICIENCY (Z_i)

H_2S content of acid gas (Y), %	Sulfur feed rate (X), LT/D			
	$2.0 \leq X \leq 5.0$	$5.0 < X \leq 15.0$	$15.0 < X \leq 300.0$	$X > 300.0$
$Y \geq 50$	79.0	. . . . $88.51X^{0.0101}Y^{0.0125}$ . . . . . . or 99.8, whichever is smaller		
$20 \leq Y < 50$	79.0	. . . . $88.51X^{0.0101}Y^{0.0125}$ . . . or 97.9, whichever is smaller		97.9
$10 \leq Y < 20$	79.0	$88.51X^{0.0101}Y^{0.0125}$ or 93.5, whichever is smaller	93.5	93.5
$Y < 10$	79.0	79.0	79.0	79.0

Table 2. REQUIRED MINIMUM SO_2 EMISSION REDUCTION EFFICIENCY (Z_c)

H_2S content of acid gas (Y), %	Sulfur feed rate (X), LT/D			
	$2.0 \leq X \leq 5.0$	$5.0 < X \leq 15.0$	$15.0 < X \leq 300.0$	$X > 300.0$
$Y \geq 50$	74.0	. . . . $85.35X^{0.0144}Y^{0.0128}$ . . . . . . or 99.8, whichever is smaller		
$20 \leq Y < 50$	74.0	. . . . $85.35X^{0.0144}Y^{0.0128}$ . . . or 97.5, whichever is smaller		97.5
$10 \leq Y < 20$	74.0	$85.35X^{0.0144}Y^{0.0128}$ or 90.8, whichever is smaller	90.8	90.8
$Y < 10$	74.0	74.0	74.0	74.0

§ 60.644 Performance test procedures.

(a) During a performance test required by § 60.8, the minimum required sulfur dioxide emission reduction efficiency (Z_i) required by § 60.642(a) and the minimum required SO_2 emission reduction efficiency (Z_c) required by § 60.642(b) are determined as follows:

(1) Collect and analyze at least one sample per hour (at equally spaced intervals during the performance test) of the acid gas from the sweetening unit using the method specified in § 60.645(a)(8). The units of the result from the Tutwiler procedure can be converted to volume percent using the following equation:

$$Y=(1.62\times10^{-3})\times(\text{grains}/100\ \text{scf})$$

where:

$Y=H_2S$ concentration, volume percent;

1.62×10^{-3}=volume percent per grains/100 scf; and grains/100 scf=Tutwiler result basis.

(2) Calculate the arithmetic mean of all samples to determine the average H_2S concentration (Y) in mole percent (dry basis) in the acid gas.

(3) Determine the average volumetric flow rate of the acid gas from the sweetening unit by continuous measurements made with the process flow meter. Express the results as dry standard cubic feet per day (dscf/day).

(4) Calculate the average sulfur feed rate (X) in long tons per day of elemental sulfur from the average volumetric flow rate and the average H_2S content (from § 60.644(a)) by the equation:

$$X=\frac{(\text{average volumetric acid gas flow, dscf/day})\ (Y/100)\ (32\ \text{lb/lb mole})}{(385.36\ \text{standard cubic feet/lb mole})\ (2{,}240\ \text{lbs/long ton})}$$

(5) Determine the minimum required SO_2 removal efficiency (Z_i or Z_c) in accordance with the provisions of the standards in § 60.642 (a) or (b) as appropriate.

(b) The actual sulfur emission reduction efficiency (R) achieved by the control technology during the performance test is determined as follows:

(1) Measure the liquid sulfur accumulation rate in the product storage tanks using level indicators or manual soundings. Record the level reading at the beginning and end of each test run. Convert the level readings to mass (kilograms) of sulfur in the storage tanks, using the tank geometry and the sulfur density at the temperature of storage. Divide the change in mass by the test duration (hours and fractions of hours) to determine the sulfur production rate in kilograms per hour for each run.

(2) Calculate the arithmetic mean of the rate for each run to determine the average sulfur production rate (S) to use in § 60.643(b).

(3) Measure the concentrations of sulfur dioxide and total reduced sulfur compounds in the incinerator (or other final processing unit) exhaust gas using the methods specified in § 60.645(a) (5) through (7). The minimum sampling time for each run shall be 4 hours. For each run the SO_2 and TRS concentrations shall be combined to calculate the total SO_2 equivalent concentration as follows:

Total SO_2 equivalent, (kg/dscm)
=0.001 (SO_2 concentration mg/dscm from Method 6)
−2.704×10^{-6} (SO_2 equivalents in ppmv, dry from Method 15 or from Method 16A)

(4) Measure the incinerator (or other final processing unit) exhaust gas velocity, molecular weight, and moisture content using the methods specified in § 60.645(a) (1) through (4). Calculate the volumetric flow rate of the exhaust gas at dry standard conditions using equation 2–10 in Method 2.

(5) Calculate the equivalent sulfur emission rate as elemental sulfur for each run as follows:

Sulfur emission rate
=(total SO_2 equivalent kg/dscm) gas flow rate, dscm/hr) (0.50)

Calculate the arithmetic mean of the sulfur emission rate for each run to determine the average sulfur emission rate (E) to use in § 60.643(b).

§ 60.645 Performance test methods.

(a) For the purpose of determining compliance with § 60.642 (a) or (b), the following reference methods shall be used:

(1) Method 1 for velocity traverse points selection.

(2) Method 2 for determination of stack gas velocity and calculation of the volumetric flow rate.

(3) Method 3 for determination of stack gas molecular weight.

(4) Method 4 for determination of the stack gas moisture content.

(5) Method 6 for determination of SO_2 concentration.

(6) Method 15 for determination of the TRS concentration from reduction-type devices or where the oxygen content of the stack gas is less than 1.0 percent by volume.

(7) Method 16A for determination of the TRS concentration from oxidation-type devices or where the oxygen content of the stack gas is greater than 1.0 percent by volume.

(8) The Tutwiler procedure in § 60.648 or a chromatographic procedure following ASTM E–260, which is incorporated by reference (see § 60.17), for determination of the H_2S concentration in the acid gas feed from the sweetening unit.

(b) The sampling location for Methods 3, 4, 6, 15, and 16A shall be the same as that used for velocity measurement by Method 2. The sampling point in the duct shall be at the centroid of the cross-section if the area is less than 5 m² (54 ft²) or at a point no closer to the walls than 1 m (39 inches) if the cross-sectional area is 5 m² or more, and the centroid is more than one meter from the wall. For Methods 3, 4, 6 and 16A, the sample shall be extracted at a rate proportional to the gas velocity at the sampling point. For Method 15, the minimum sampling rate shall be 3 liters/minute (0.1 ft³/minute) to insure minimum residence time in the sample line.

(c) For Methods 6 and 16A the minimum sampling time for each run shall be 4 hours. Either one sample or a number of separate samples may be collected for each run so long as the total sample time is 4 hours. Where more than one sample is collected per run, the average result for the run is calculated by:

$$C_s=\sum_{i=1}^{n}(C_{si})\left(\frac{t_{si}}{T}\right)$$

Where:

C_s=time-weighted average SO_2 or TRS concentration for the run, (mg/dscm or ppmv, dry)
n=number of samples collected during the run
C_{si}=SO_2 or TRS concentration for sample i, (mg/dscm or ppmv, dry)
t_{si}=sampling time for sample i, (minutes)
T=total sampling time for all samples in the run (minutes)

(d) For Method 15, each run shall consist of 16 samples taken over a minimum of 4 hours. The equivalent SO_2 concentration for each run shall be calculated as the arithmetic average of the SO_2 equivalent concentration for each sample.

(e) For Method 2, a velocity traverse shall be conducted at the beginning and end of each run. The arithmetic average of the two measurements shall be used to calculate the volumetric flow rate for each run.

(f) For Method 3, a single sample may be integrated over the 4-hour run interval and analysis, or grab samples at 1-hour intervals may be collected, analyzed, and averaged to determine the stack gas composition.

(g) For Method 4, each run shall consist of 2 samples; one collected at the beginning of the 4-hour test period, and one near the end of the period. For each sample the minimum sample volume shall be 0.1 dscm (0.35 dscf) and the minimum sample time shall be 10 minutes.

§ 60.646 Monitoring of emissions and operations.

(a) The owner or operator subject to the provisions of § 60.642(a) or (b) shall install, calibrate, maintain, and operate monitoring devices or perform measurements to determine the following operations information on a daily basis:

(1) The accumulation of sulfur product over each 24-hour period: The monitoring method may incorporate the use of an instrument to measure and record the liquid sulfur production rate, or may be a procedure for measuring and recording the sulfur liquid levels in the storage tanks with a level indicator or by manual soundings, with subsequent calculation of the sulfur production rate based on the tank geometry, stored sulfur density, and elapsed time between readings. The method shall be designed to be accurate within ±2 percent of the 24-hour sulfur accumulation.

(2) The H_2S concentration in the acid gas from the sweetening unit for each 24-hour period: At least one sample per 24-hour period shall be collected and analyzed using the method specified in § 60.645(a)(8). The Administrator may require the owner or operator to demonstrate that the H_2S concentration obtained from one or more samples over a 24-hour period is within ±20 percent of the average of 12 samples collected at equally spaced intervals during the 24-hour period. In instances where the H_2S concentration of a single sample is not within ±20 percent of the average of the 12 equally spaced samples, the Administrator may require a more frequent sampling schedule.

(3) The average acid gas flow rate from the sweetening unit: The owner or operator shall install and operate a monitoring device to continuously measure the flow rate of acid gas. The monitoring device reading shall be recorded at least once per hour during each 24-hour period. The average acid gas flow rate shall be computed from the individual readings.

(4) The sulfur feed rate (X): For each 24-hour period, X shall be computed using the equation in § 60.644(a)(4).

(5) The required sulfur dioxide emission reduction efficiency for the 24-hour period: The sulfur feed rate and the H_2S concentration in the acid gas for the 24-hour period as applicable, shall be used to determine the required reduction efficiency in accordance with the provisions of § 60.642(b).

(b) Where compliance is achieved through the use of an oxidation control system or a reduction control system followed by a continually operated incineration device, the owner or operator shall install, calibrate, maintain, and operate monitoring devices and continuous emission monitors as follows:

(1) A continuous monitoring system to measure the total sulfur emission rate (E) of SO_2 in the gases discharged to the atmosphere. The SO_2 emission rate shall be expressed in terms of equivalent sulfur mass flow rates (kg/hr). The span of this monitoring system shall be set so that the equivalent emission limit of § 60.642(b) will be between 30 percent and 70 percent of the measurement range of the instrument system.

(2) Except as provided in subparagraph (3) of this paragraph: A monitoring device to measure the temperature of the gas leaving the combustion zone of the incinerator, if compliance with § 60.642(a) is achieved through the use of an oxidation control system or a reduction control system followed by a continually operated incineration device. The monitoring device shall be certified by the manufacturer to be accurate to within ±1 percent of the temperature being measured.

When performance tests are conducted under the provision of § 60.8 to demonstrate compliance with the standards under § 60.642, the temperature of the gas leaving the incinerator combustion zone shall be determined using the monitoring device. If the volumetric ratio of sulfur dioxide to sulfur dioxide plus total reduced sulfur (expressed as SO_2) in the gas leaving the incinerator is $\geqq 0.98$, then temperature monitoring may be used to demonstrate that sulfur dioxide emission monitoring is sufficient to determine total sulfur emissions. At all times during the operation of the facility, the owner or operator shall maintain the average temperature of the gas leaving the combustion zone of the incinerator at or above the appropriate level determined during the most recent performance test to ensure the sulfur compound oxidation criteria are met. Operation at lower average temperatures may be considered by the Administrator to be unacceptable operation and maintenance of the affected facility. The owner or operator may request that the minimum incinerator temperature be reestablished by conducting new performance tests under § 60.8.

(3) Upon promulgation of a performance specification of continuous monitoring systems for total reduced sulfur compounds at sulfur recovery plants, the owner or operator may, as an alternative to subparagraph (2) of this paragraph, install, calibrate, maintain, and operate a continuous emission monitoring system for total reduced sulfur compounds as required in paragraph (d) of this section in addition to a sulfur dioxide emission monitoring system. The sum of the equivalent sulfur mass emission rates from the two monitoring systems shall be used to compute the total sulfur emission rate (E).

(c) Where compliance is achieved through the use of a reduction control system not followed by a continually operated incineration device, the owner or operator shall install, calibrate, maintain, and operate a continuous monitoring system to measure the emission rate of reduced sulfur compounds as SO_2 equivalent in the gases discharged to the atmosphere. The SO_2 equivalent compound emission rate shall be expressed in terms of equivalent sulfur mass flow rates (kg/hr). The span of this monitoring system shall be set so that the equivalent emission limit of § 60.642(b) will be between 30 and 70 percent of the measurement range of the system. This requirement becomes effective upon promulgation of a performance specification for continuous monitoring systems for total reduced sulfur compounds at sulfur recovery plants.

(d) For those sources required to comply with paragraph (b) or (c) of this section, the average sulfur emission reduction efficiency achieved (R) shall be calculated for each 24-hour clock internal. The 24-hour interval may begin and end at any selected clock time, but must be consistent. The 24-hour average reduction efficiency (R) shall be computed based on the 24-hour average sulfur production rate (S) and sulfur emission rate (E), using the equation in § 60.643(b).

(1) Data obtained from the sulfur production rate monitoring device specified in paragraph (a) of this section shall be used to determine S.

(2) Data obtained from the sulfur emission rate monitoring systems specified in paragraphs (b) or (c) of this section shall be used to calculate a 24-hour average for the sulfur emission rate (E). The monitoring system must provide at least one data point in each successive 15-minute interval. At least two data points must be used to

calculate each 1-hour average. A minimum of 18 1-hour averages must be used to compute each 24-hour average.

(e) In lieu of complying with (b) or (c) of this section, those sources with a design capacity of less than 150 LT/D of H_2S expressed as sulfur may calculate the sulfur emission reduction efficiency achieved for each 24-hour period by:

$$R = \frac{0.0236\ S}{X}\ (100\ \text{percent})$$

where:

R = the sulfur dioxide removal efficiency achieved during the 24-hour period, percent;

S = the sulfur production rate during the 24-hour period, kg/hr;

X = the sulfur feed rate in the acid gas, LT/D; and 0.0236 = conversion factor, LT/D per kg/hr.

(f) The monitoring devices required in § 60.646(b)(1), (b)(3) and (c) shall be calibrated at least annually according to the manufacturer's specifications, as required by § 60.13(b).

(g) The continuous emission monitoring systems required in § 60.646(b)(1), (b)(3), and (c) shall be subject to the emission monitoring requirements of § 60.13 of the General Provisions. For conducting the continuous emission monitoring system performance evaluation required by § 60.13(c), Performance Specification 2 shall apply, and Method 6 shall be used for systems required by § 60.646(b).

§ 60.647 Recordkeeping and reporting requirements.

(a) Records of the calculations and measurements required in § 60.642 (a) and (b) and § 60.646 (a) through (g) must be retained for at least 2 years following the date of the measurements by owners and operators subject to this subpart. This requirement is included under § 60.7(d) of the General Provisions.

(b) Each owner or operator shall submit a written report of excess emissions to the Administrator semiannually. For the purpose of these reports, excess emissions are defined as:

(1) Any 24-hour period (at consistent intervals) during which the average sulfur emission reduction efficiency (R) is less than the minimum required efficiency (Z).

(2) For any affected facility electing to comply with the provisions of § 60.646(b)(2), any 24-hour period during which the average temperature of the gases leaving the combustion zone of an incinerator is less than the appropriate operating temperature as determined during the most recent performance test in accordance with the provisions of § 60.646(b)(2). Each 24-hour period must consist of at least 96 temperature measurements equally spaced over the 24 hours.

(c) To certify that a facility is exempt from the control requirements of these standards, each owner or operator of a facility with a design capacity less that 2 LT/D of H_2S in the acid gas (expresssed as sulfur) shall keep, for the life of the facility, an analysis demonstrating that the facility's design capacity is less than 2 LT/D of H_2S expressed as sulfur.

(d) Each owner or operator who elects to comply with § 60.646(e) shall keep, for the life of the facility, a record demonstrating that the facility's design capacity is less than 150 LT/D of H_2S expressed as sulfur.

(e) The requirements of paragraph (b) of this section remain in force until and unless EPA, in delegating enforcement authority to a State under Section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of obligation to comply with paragraph (b) of this section, provided that they comply with the requirements established by the State.

[Approved by the office of Management and Budget under control number 2060–0120]

§ 60.648 Optional procedure for measuring hydrogen sulfide in acid gas—Tutwiler Procedure.[1]

(a) When an instantaneous sample is desired and H_2S concentration is ten grains per 1000 cubic foot or more, a 100 ml Tutwiler burette is used. For concentrations less than ten grains, a 500 ml Tutwiler burette and more dilute solutions are used. In principle, this method consists of titrating hydrogen sulfide in a gas sample directly with a standard solution of iodine.

(b) *Apparatus.* (See Figure 1.) A 100 or 500 ml capacity Tutwiler burette, with two-way glass stopcock at bottom and three-way stopcock at top which connect either with inlet tubulature or glass-stoppered cylinder, 10 ml capacity, graduated in 0.1 ml subdivision; rubber tubing connecting burette with leveling bottle.

(c) *Reagents.* (1) Iodine Stock Solution, 0.1N. Weight 12.7 g iodine, and 20 to 25 g cp potassium iodide for each liter of solution. Dissolve KI in as little water as necessary; dissolve iodine in concentrated KI solution, make up to proper volume, and store in glass-stoppered brown glass bottle.

(2) Standard Iodine Solution, 1 ml = 0.001771 g I. Transfer 33.7 ml of above 0.1N stock solution into a 250 ml volumetric flask; add water to mark and mix well. Then, for 100 ml sample of gas, 1 ml of standard iodine solution is equivalent to 100 grains H_2S per cubic feet of gas.

(3) Starch Solution. Rub into a thin paste about one teaspoonful of wheat starch with a little water; pour into about a pint of boiling water; stir; let cool and decant off clear solution. Make fresh solution every few days.

(d) *Procedure.* Fill leveling bulb with starch solution. Raise (L), open cock (G), open (F) to (A), and close (F) when solutions starts to run out of gas inlet. Close (G). Purge gas sampling line and connect with (A). Lower (L) and open (F) and (G). When liquid level is several ml past the 100 ml mark, close (G) and (F), and disconnect sampling tube. Open (G) and bring starch solution to 100 ml mark by raising (L); then close (G). Open (F) momentarily, to bring gas in burette to atmospheric pressure, and close (F). Open (G), bring liquid level down to 10 ml mark by lowering (L). Close (G), clamp rubber tubing near (E) and disconnect it from burette. Rinse graduated cylinder with a standard iodine solution (0.00171 g I per ml); fill cylinder and record reading. Introduce successive small amounts of iodine thru (F); shake well after each addition; continue until a faint permanent blue color is obtained. Record reading; subtract from previous reading, and call difference D.

(e) With every fresh stock of starch solution perform a blank test as follows: introduce fresh starch solution into burette up to 100 ml mark. Close (F) and (G). Lower (L) and open (G). When liquid level reaches the 10 ml mark, close (G). With air in burette, titrate as during a test and up to same end point. Call ml of iodine used C. Then,

Grains H_2S per 100 cubic foot of gas = 100 (D—C)

(f) Greater sensitivity can be attained if a 500 ml capacity Tutwiler burette is used with a more dilute (0.001N) iodine solution. Concentrations less than 1.0 grains per 100 cubic foot can be determined in this way. Usually, the starch-iodine end point is much less distinct, and a blank determination of end point, with H_2S-free gas or air, is required.

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[1] Gas Engineers Handbook, Fuel Gas Engineering Practices, The Industrial Press, 93 Worth Street, New York, New York, 1966, First Edition, Second Printing, page 6/25 (Docket A-80-20-A, Entry II-I-67).

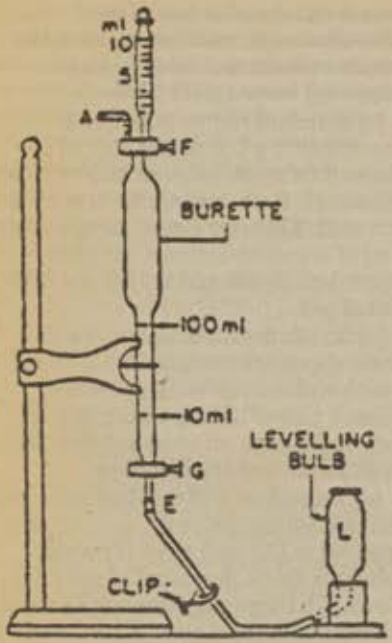

Figure 1. Tutwiler burette (lettered items mentioned in text).

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