

**19. THE GAS UTILITY INDUSTRY LAW
OF JAPAN**

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THE GAS UTILITY INDUSTRY LAW

— Translated into English —

Law No. 51 Mar: 31, 1954

as amended by Laws No. 113, 1960, Nos. 140 and 161, 1962,
No. 98, 1966 and Nos. 18 and 134, 1970, Nos. 27 and 85, 1978,
and No. 33, 1979.

CHAPTER I. GENERAL PROVISIONS

(Purpose)

Article 1. The purpose of this law shall be to protect the benefits of consumers of gas and to contrive the sound development of gas utility industry by controlling its management and also to secure public safety and to prevent public nuisance by regulating its work of installing, constructing, maintaining and operating its gas facilities as well as the manufacture and sale of gas equipment and appliances.

(Definitions)

Article 2. The term "general gas utility industry" as used in this law shall mean an undertaking of supply of gas by means of pipes to meet the demand of the general public, excluding the undertaking that generates gas with such gas generating facilities as prescribed in Paragraph 3 of this article and supplies it by means of pipes.

2. The term "general gas undertaker" as used in this law shall mean a person who has been granted the permission prescribed in the following article.

3. The term "simple gas utility industry" as used in this law shall mean an undertaking that generates gas with such simple gas generating facilities as specified in the government ordinance (hereinafter referred to as special gas generating facilities) and supplies it by means of pipes to meet the demand of the general public and that has more than 70 gas supplying points in a housing area.

4. The term "simple gas undertaker" as used in this law shall mean a person who has been granted the permission prescribed in Article 37-2.

5. The term "gas utility industry" as used in this law shall mean both the general gas utility industry and the simple gas utility industry.

6. The term "gas undertaker" as used in this law shall mean both the general gas undertaker and the simple gas undertaker.

7. The term "gas facilities" as used in this law shall mean such gas generators, gas holders, gas purification plants, exhausters, feeding compressors, governors, pipes, electric charging apparatus, etc. and their accessories as are used for the supply of gas in the gas utility industry.

8. In case the general gas undertaker operates the business of the simple gas utility industry in his service territory, such an undertaking shall be regarded as the general gas utility industry.

CHAPTER II. GENERAL GAS UTILITY INDUSTRY

Section 1. Permission for Business

(Permission for business)

Article 3. Any person who intends to operate a gas utility industry shall obtain permission from the Minister of International Trade and Industry.

(Application for permission)

Article 4. Any person who intends to obtain the permission mentioned in the preceding article shall submit to the Minister of International Trade and Industry a written application stating the following particulars:

- (1) The applicant's name or title and address; in case of a juristic person, the name of the person who represents it;
- (2) The applicant's service territory as well as the supply points and their number in each of supply point groups (which means overall supply points in a housing area supplied with gas generated by special gas generating facilities); and
- (3) Particulars stated below concerning the gas facilities:
 - (a) Regarding the gas generators and holders, the number of the places where they are installed, their kind and capacity;
 - (b) Regarding the pipe prescribed in the International Trade and Industry Ministry ordinance, the place where it is installed, its inner diameter and the pressure of gas in it.

2. The written application specified in the preceding paragraph shall be accompanied by the drawings of service territory and supply points and such other documents as are prescribed in the International Trade and Industry Ministry ordinance.

(Standards of permission)

Article 5. The Minister of International Trade and Industry shall not grant the permission mentioned in Article 3, unless he recognizes that the substance of the application for the permission mentioned in Article 3 conforms to each item of the requirements stated below:

- (1) That the commencement of the general gas utility industry shall meet the demand of the general public;
- (2) That the capacity of gas facilities of the general gas undertaking can meet the demand of gas in the service territory or at the supply point;
- (3) That by the commencement of the general gas utility industry, gas facilities shall not become excessive in the whole or part of the service territory or at the supply point;
- (4) That the person shall have a sound financial foundation and ample technological ability enough to carry on the general gas utility industry properly;
- (5) That the program of the general gas utility industry shall be carried out with certainty;

- (6) That concerning special gas generating facilities, there shall be a possibility of the smooth supply of gas with said special gas generating facilities and in addition, there shall be a solid plan of supplying gas immediately for the supply point with other gas facilities in place of the special gas generating facilities;
- (7) And that the commencement of the general gas utility industry shall be needed and apposite from the point of the public interest.

(Certificate of permission)

Article 6. The Minister of International Trade and Industry shall grant a certificate of permission when he gives the permission prescribed in Article 3.

2. In the certificate the following items shall be written:

- (1) Date and number of permission;
- (2) Name or title and address;
- (3) The applicant's service territory as well as the supply points and their number in each of the supply point groups;
- (4) Particulars concerning the gas facilities stated below:
 - (a) Regarding the gas generators and holders, the number of the place where they are installed, their kind and capacity; and
 - (b) Regarding the pipe prescribed in the International Trade and Industry Ministry ordinance under Paragraph 1-3 of Article 4, the place where it is installed, its inner diameter and the pressure of gas in it.

(Obligations concerning installation of gas facilities and commencement of business)

Article 7. A general gas undertaker shall install the gas facilities prescribed in Paragraph 2-4 of the previous article and start the business in a period specified by the Minister of International Trade and Industry not longer than 3 years, (or in a period specified by the Minister of International Trade and Industry when installing the gas facilities of Paragraph 2-4 of the preceding article in accordance with the enforcement of development of new residential areas by the New Residential Area Development Act (1963 Law No. 134), if it is approved that especially longer period is needed for its installation).

2. The Minister of International Trade and Industry may designate as prescribed under the previous paragraph, classifying the gas service territory, the supply points or the gas facilities prescribed in the Paragraph 2-4 of the preceding article, when he recognizes it especially necessary.

3. The Minister of International Trade and Industry may prolong the term designated in Paragraph 1 in case he considers there is a proper reason for it upon receipt of an application by a general gas undertaker.

4. A general gas undertaker shall report to the Minister of International Trade and Industry without delay, when he has installed the gas facilities prescribed in the Paragraph 2-4 of the preceding article, or when he has started the business.

(Change of service territory, etc.)

Article 8. In case the general gas undertaker intends to change the particulars of Paragraph 2-4 of Article 6, he shall obtain permission for such changes from the Minister of International Trade and Industry; provided, however, that this shall not apply in the case where such minor changes as are prescribed by the International Trade and Industry Ministry ordinance are to be effected.

2. In case the general gas undertaker effects such changes as are prescribed by the International Trade and Industry Ministry ordinance mentioned in the proviso of the preceding paragraph, he shall without delay submit to the Minister of International Trade and Industry a report to that effect.

3. The provisions of Article 5 shall apply mutatis mutandis in the case of obtaining the permission mentioned in Paragraph 1 of this article.

4. The provisions of the preceding article shall apply mutatis mutandis in the case of Paragraph 1 (excluding the case of reducing the extent of the service territory or reducing the number of gas supply points).

(Change of names, etc.)

Article 9. A general gas undertaker shall report to the Minister of International Trade and Industry without delay in case there is a change in the Paragraph 2-2 of Article 6.

(Transfer or receipt of business and amalgamation of juristic persons)

Article 10. Transfer or receipt of the whole or a part of a general gas utility industry shall be invalid without the approval of the Minister of International Trade and Industry.

2. The amalgamation of juristic persons who are general gas undertakers shall be invalid without the approval of the Minister of International Trade and Industry.

3. The provisions of Article 5 shall apply mutatis mutandis to the approval prescribed in the preceding two paragraphs.

(Succession to the business)

Article 11. When the transfer of the whole of a general gas utility industry takes place, or the succession to or a merger of general gas undertakers occurs, a person who has been transferred the whole of the general gas utility industry or a successor, a juristic person existing after the merger, or a juristic person who has been established by merger shall succeed to the status of general gas undertaker.

2. The successor to a general gas utility industry as prescribed by the previous paragraph shall report to the Minister of International Trade and Industry of its succession without delay.

(Industry other than general gas utility industry)

Article 12. The general gas undertaker shall not intend to undertake any industry other than the general gas utility industry without permission of the Minister of International Trade and Industry; provided, however, that this shall not apply to the industry specified in the International Trade and Industry Ministry ordinance.

2. The Minister of International Trade and Industry shall not grant the permission mentioned in the preceding paragraph unless he recognizes that business other than gas utility industry engaged by said general gas undertaker does not hinder the apposite and infallible execution of the business of the general gas utility industry.

(Suspension or abolition of business and dissolution of a juristic person)

Article 13. A general gas undertaker shall not suspend or abandon the whole or a part of the general gas utility industry without the approval of the Minister of International Trade and Industry.

2. Resolution or unananimous agreement of all the members concerned for dissolution of a juristic person or a general gas utility industry shall not become valid without the approval of the Minister of International Trade and Industry.

3. The Minister of International Trade and Industry shall not grant permission stated in Paragraph 1 of this article or approval stipulated in the preceding paragraph unless he considers that the public interest shall not be hampered by suspension or abandonment of a general gas utility industry or by dissolution of a juristic person.

(Revocation of permission for the business)

Article 14. The Minister of International Trade and Industry may cancel the permission stated in Article 3 if a general gas undertaker concerned does not install facilities stated in Paragraph 2-4 of Article 6, or does not start his business within the term specified by Paragraph 1 of Article 7 (or within the prolonged period if approved by Paragraph 3 of this article. The same shall also apply hereinafter).

2. Besides the cases prescribed in the preceding paragraph, the Minister of International Trade and Industry may cancel the permission given in accordance with Article 3 if he recognizes that public interest is hindered when a general gas undertaker violates the provisions of this law, the order given under this law or other actions taken under such law and order.

3. If the Minister of International Trade and Industry cancels the permission prescribed in the preceding two paragraphs, he shall notify the reason in writing to the general gas undertaker concerned.

Article 15. The Minister of International Trade and Industry may revoke his permission in case a general gas undertaker granted a permission for making a change in the matters stated in Paragraph 2-3 and 2-4 of Article 6 as stipulated in Paragraph 1 of Article 8 does not start his business in the additional service territory or supply point within the term specified in accordance with Paragraph 1 of Article 7, which is applied mutatis mutandis to Paragraph 4 of Article 8, or fails to alter the matters set forth in Paragraph 2-4 of Article 6 within the term specified.

2. In case a general gas undertaker suspends distribution of gas in a part of his service territory or a supply point, the Minister of International Trade and Industry may remove said part or supply point from his service territory, if considered that it violates public interest.

3. The provisions of Paragraph 3 of the preceding article shall also apply mutatis mutandis to the cases in the preceding two paragraphs.

Section 2. Business

(Obligation to supply)

Article 16. No general gas undertaker shall without due reason refuse to supply gas to anybody within his service territory or at his supply points.

2. No general gas undertaker shall supply gas by means of pipes in meeting the demand of the general public in any territory other than his service territory or at any point other than his supply point in his service territory unless he is granted permission under the provisions of this law or other laws and does so in accordance with this permission.

(Gas supply rules)

Article 17. The general gas undertaker shall establish his supply rules in which are set forth the gas rates and other related supply conditions and shall apply to the Minister of International Trade and Industry for approval. The same shall apply in the case of amending the supply rules.

2. The Minister of International Trade and Industry shall give the approval mentioned in the preceding paragraph in case he recognizes that said application for the approval mentioned in the preceding paragraph satisfies each item of requirements stated below:

- (1) That the gas rate shall be the sum of the fair and proper cost of gas and the fair and proper profits under efficient management;
- (2) That the gas rate shall be definitely established either at the fixed rate or at the fixed amount;
- (3) That the matters concerning responsibilities to be assumed and the amount and the method of bearing expenses concerning gas pipes, meters, and other facilities by the general gas undertaker and the gas consumer shall be properly and definitely established; and
- (4) That no specific person shall not be discriminated improperly.

(Order and disposition concerning gas supply rules)

Article 18. The Minister of International Trade and Industry may, if he recognizes that in consequence of changes in the social and/or economic situations the rate and/or the conditions for the supply of gas have become considerably unfair and improper to such an extent that the advancement of public interests is thereby impeded, order the general gas undertaker, specifying the appropriate time limit, to submit an application for the change of the gas supply rules.

2. In case where the Minister of International Trade and Industry has issued the order prescribed in the preceding paragraph and where said application has not been submitted within the fixed date limit prescribed in the preceding paragraph, he may change said rules.

(Obligation of publicizing the gas supply rules)

Article 19. When the general gas undertaker has obtained the approval of his supply rules under the provisions of Paragraph 1 of Article 17 or when said rules have been changed under the provisions of Paragraph 2 of the preceding article, he shall put up said rules or changes at noticeable places in his main, branch and other offices, beginning at 10 days before the day of enforcing said rules.

(Obligation regarding conditions for the supply of gas)

Article 20. No general gas undertaker shall supply gas under any supply conditions other than the supply rules approved under Paragraph 1 of Article 17 (the changed or altered supply rules in the case of change or alteration under the provisions of Paragraph 2 of Article 18); provided, however, that this shall not apply in the case of special circumstances if approved by the Minister of International Trade and Industry.

(Obligation of measuring of calorific value, etc.)

Article 21. A general gas undertaker shall measure the calorific value, pressure and combustibility (hereinafter they are called "calorific value, etc.") of supply gas in accordance with the procedure stipulated by the International Trade and Industry Ministry ordinance and shall keep a record of the measurement.

(Supply contract)

Article 22. The general gas undertaker shall, when he intends to enter a contract with other general gas undertaker for receiving or supplying gas, obtain an approval of the Minister of International Trade and Industry.

2. The Minister of International Trade and Industry shall not grant the permission mentioned in the preceding paragraph unless he recognizes that the application for approval mentioned in the preceding paragraph conforms to each item of the requirements stated below:

- (1) That the contract is not likely to prevent the proper execution of the general gas business of the general gas undertaker who supplies gas; and
- (2) That the contract shall make appropriate the gas rates and other supply conditions of the general gas undertaker who receives gas supply.

(Specific supply of gas)

Article 23. The general gas undertaker shall, when he intends to supply gas by means of pipes to a certain area outside his own service territory, obtain a permission of the Minister of International Trade and Industry excluding the case where gas is supplied at the demand of the general public or under the contract subject to the approval prescribed in Paragraph 1 of the preceding article.

2. The Minister of International Trade and Industry shall not grant the permission mentioned in the preceding paragraph unless he recognizes that the application mentioned in the preceding paragraph conforms to each item of the requirements stated below:

- (1) That the permission is not likely to prevent the proper execution of

the general gas undertaking; and

- (2) That in case such supply of gas is to be undertaken in a service territory of other general gas undertaker, it is not easy and proper for said general gas undertaker to supply gas.

(Supply by wholesale gas supplier)

Article 24. A person who is other than the general gas undertaker and undertakes the business of supplying gas to the general gas undertaker by pipeline (hereinafter referred to as a wholesale gas supplier) shall not supply gas unless it conforms to the gas rates and other supply conditions which have been approved by the Minister of International Trade and Industry; provided, however, that this shall not apply in the case where the amount of gas supply to the general gas undertaker is less than that prescribed in the International Trade and Industry Ministry ordinance.

2. The Minister of International Trade and Industry shall, when an application for obtaining the approval mentioned in the preceding paragraph has been filed and he recognizes that the proposed gas rates and other supply conditions would prove to make fair and proper the gas rates and other supply conditions of the general gas undertaker, give the approval mentioned in the preceding paragraph.

(Supply by a person other than the gas undertaker)

Article 25. A person who is other than the gas undertaker and undertakes the business of supplying gas shall, when he intends to supply gas by means of pipes in the service territory of the general gas undertaker, excluding the case where gas is supplied at the demand of the general public or at the gas rates and other supply conditions subject to the approval prescribed in Paragraph 1 of the preceding article, report on the party to be supplied of gas as well as the gas rates and other supply conditions to the Minister of International Trade and Industry in advance.

(Plans for gas supply)

Article 25-2. The general gas undertaker shall prepare each fiscal year annual plans for the gas supply for the period starting the concerned fiscal year as prescribed by the International Trade and Industry Ministry ordinance, and shall submit a report on the said plans to the Minister of International Trade and Industry prior to the concerned fiscal year.

2. The general gas undertaker shall, when he has changed the annual plans for the gas supply, report without delay on the said changes to the Minister of International Trade and Industry.

3. The general gas undertaker shall, when he has submitted the report mentioned in Paragraph 1 of this article, put up without delay, out of the annual plans for the gas supply the matters prescribed in the International Trade and Industry Ministry ordinance at noticeable places in his main, branch and other offices. The same shall apply in the case of submitting the report mentioned in the preceding paragraph.

4. The Minister of International Trade and Industry may, when he recognizes it necessary especially for the advancement of public interests to change

the annual plans for the gas supply, advise the general gas undertaker to change the said plans.

5. The Minister of International Trade and Industry may, when he recognizes that the general gas undertaker has not executed its annual plans for the gas supply and that the advancement of public interests is thereby impeded, advise the said general gas undertaker to execute accurately its plans.

(Order concerning betterment of service procedures)

Article 25-3. The Minister of International Trade and Industry may order the general gas undertaker to better the service procedures of supply when the supply of gas is being impeded by an accident, and if the general gas undertaker fails to promptly make necessary repair or take other action to remove such impediment; if the general gas undertaker fails to carry out the inquiry prescribed in Paragraph 2 of Article 40-2, or the notification prescribed in Paragraph 3 of the same article, or if the inquiry or notification procedure is not appropriate; or if the Minister considers that the interests of the gas consumer are being impaired because the service procedures of gas supply are not appropriate.

(Recommendation concerning coordination of supply territories, etc.)

Article 25-4. The Minister of International Trade and Industry may so recommend if he considers it particularly necessary and also appropriate for the promotion of the public interests that two or more general gas undertakers should coordinate their supply territories or manage their operations on an integrated basis.

Section 3. Financial Accounts

(Systematization of accounting)

Article 26. A general gas undertaker, in accordance with the International Trade and Industry Ministry ordinance, shall set up the fiscal year and establish the forms for titles of accounts, balance sheets, statements of profit and loss and other financial tables to keep the accounts in order.

(Depreciation)

Article 27. The Minister of International Trade and Industry, if he deems necessary for the proper operation of a general gas undertaker, may order the general gas undertaker to conduct depreciation of their fixed assets owned for the use of the general gas undertaking at the determined method and amount.

Section 4. Gas Facilities

Sub-Section 1. Work Plan and Inspections

(Work plan)

Article 27-2. In case the general gas undertaker intends to undertake work that consists of installing or altering gas facilities for the use of the general gas utility industry and that is provided for by the International Trade and Industry Ministry ordinance, he shall obtain the approval of the Minister of Inter-

national Trade and Industry as to the plan for such work; provided, however, that this shall not apply in case such work is done as an inevitable temporary work when the gas facilities have been lost or destroyed, or in the event of disaster or other emergencies.

2. In case the general gas undertaker intends to change the work plan for which he has obtained the approval mentioned in the preceding paragraph, he shall obtain the approval of the Minister of International Trade and Industry; provided, however, that this shall not apply in case said change is a minor one prescribed by the International Trade and Industry Ministry ordinance.

3. In case the Minister of International Trade and Industry considers that the work plan for which an application has been filed for the approval mentioned in the preceding two paragraphs meets each of the following items, he shall grant the approval mentioned in the preceding two paragraphs:

- (1) It shall be as approved under Article 3 or under Paragraph 1 of Article 8 (including, however, cases involving minor changes prescribed by the International Trade and Industry Ministry ordinance as mentioned in the proviso to said paragraph);
- (2) The gas facilities shall not be incompatible with the technological standards prescribed by the International Trade and Industry Ministry ordinance as mentioned in Paragraph 1 of Article 28; and
- (3) The gas facilities shall be technologically appropriate to assure the smooth supply of gas.

4. The general gas undertaker shall, in case of the proviso to Paragraph 1, so report to the Minister of International Trade and Industry without delay after the commencement of the work.

5. The general gas undertaker shall, in case of the proviso to Paragraph 2, report the changed work plan to the Minister of International Trade and Industry without delay after having changed the work plan; provided, however, that this shall not apply if otherwise prescribed by the International Trade and Industry Ministry ordinance.

Article 27-3. In case the general gas undertaker intends to undertake work that consists of installing or altering gas facilities for the use of the general gas utility industry and that is other than prescribed by the International Trade and Industry Ministry ordinance as mentioned in Paragraph 1 of the preceding article, he shall, unless otherwise prescribed by the International Trade and Industry Ministry ordinance, report the plan for such work to the Minister of International Trade and Industry not later than thirty (30) days before the commencement of work. The same shall apply in case he intends to change (except minor changes prescribed by the International Trade and Industry Ministry ordinance) the plan for such work.

2. In case the Minister of International Trade and Industry considers that the work plan which has been reported as prescribed by the preceding paragraph does not meet the requirements of each of the items given in Paragraph 3 of the preceding article, he may order the general gas undertaker, only before the commencement of work, to change or abolish the work plan.

(Inspection before use)

Article 27-4. The gas facilities subjected to any work of installation or change under the approval prescribed in Paragraph 1 or Paragraph 2 of Article 27-2 shall not be used until after undergoing and passing the inspection conducted by the Minister of International Trade and Industry for each work process which the International Trade and Industry Ministry ordinance prescribes as to the work; provided, however, that this shall not apply if otherwise prescribed by the International Trade and Industry Ministry ordinance.

2. In the inspection mentioned in the preceding paragraph, the gas facilities shall be approved if they comply with the following requirements:

- (1) The work shall have been carried out in accordance with the work plan (including those subjected to minor changes prescribed by the International Trade and Industry Ministry ordinance as mentioned in the proviso to Paragraph 1 or Paragraph 2 of Article 27-2) approved under Paragraph 1 or Paragraph 2 of Article 27-2; and
- (2) The work shall not be incompatible with the technological standards prescribed by the International Trade and Industry Ministry ordinance as mentioned in Paragraph 1 of Article 28.

Article 27-5. In case the Minister of International Trade and Industry finds it inevitably necessary upon the inspection, mentioned in Paragraph 1 of the preceding article, of the gas facilities prescribed in said paragraph, he may temporarily approve such facilities prescribing the period and method of use.

2. The gas facilities temporarily approved under the provision of the preceding paragraph may be used, notwithstanding the provision of Paragraph 1 of the preceding article, within the period prescribed under the provision of the preceding paragraph, by the method prescribed thereunder.

(Periodic inspection)

Article 27-6. The general gas undertaker shall have the gas facilities for the use of the general gas utility industry and prescribed by the International Trade and Industry Ministry ordinance inspected by the Minister of International Trade and Industry, at such intervals as may be prescribed by the International Trade and Industry Ministry ordinance.

Sub-Section 2. Safety

(Maintenance of gas facilities, etc.)

Article 28. A general gas undertaker shall maintain gas facilities for the use of the general gas utility industry so as to meet the requirements of the technical standard prescribed by the International Trade and Industry Ministry ordinance.

2. The Minister of International Trade and Industry, if he considers that the gas facilities for the use of the general gas utility industry do not meet the technical standard prescribed by the International Trade and Industry Ministry ordinance of the preceding paragraph, may order the general gas undertaker concerned to repair, reconstruct or remove the facilities in order to suspend or to restrict their use.

3. The Minister of International Trade and Industry may, in case he admits it urgently necessary for the maintenance of the public safety or for the prevention of the outbreak of an accident, order the general gas undertaker to move the gas facilities or to suspend, or to restrict their use or to remove gas within the gas facilities.

(Obligation of inspection of gas composition)

Article 29. A general gas undertaker shall, by the procedure stipulated by the government ordinance, examine the composition of the supply gas if the amount of harmful ingredient to a human body or a property may not exceed that determined by the government ordinance, and shall keep the record thereof.

(Safety rule)

Article 30. A general gas undertaker shall, for security of the safety in regard to installing, constructing, maintaining and operating the gas facilities for the use of the general gas utility industry, establish the safety regulation as stipulated by the International Trade and Industry Ministry ordinance and shall report it to the Minister of International Trade and Industry before starting the business.

2. A general gas undertaker shall, when he has changed the safety regulations, report the changed items to the Minister of International Trade and Industry without delay.

3. The Minister of International Trade and Industry may, in case he admits that it is necessary to secure the safety regarding installing, constructing, maintaining and operating gas facilities for the use of general gas utility industry, order the general gas undertaker to change the safety regulation.

4. A general gas undertaker and their employees shall obey the safety regulations.

(Chief gas technician)

Article 31. The general gas undertaker shall, in accordance with the International Trade and Industry Ministry ordinance, appoint a chief gas technician out of the chief gas technician certificate holders, to supervise safety in installing, constructing, maintaining and operating the gas facilities for the use of general gas utility industry.

2. The general gas undertaker shall notify the Minister of International Trade and Industry without delay in case of the appointment of a new chief technician in accordance with the provision of the preceding paragraph. In case of a release the same shall apply.

(Certificate of the chief gas technician)

Article 32. The certificates for chief gas technicians shall be classified into A, B, and C Chief Gas Technician Certificates.

2. The sphere of the supervisory work for a person having a certificate of chief gas technician in the safety in installing, constructing, maintaining and operating gas facilities shall be defined by the International Trade and Industry Ministry ordinance in accordance with the certificates of chief gas technicians stipulated in the preceding paragraph.

3. The certificates of chief gas technicians shall be granted only to those falling under either one of the following:

- (1) A person who has passed the national examination for chief gas technicians, hereinafter called the national examination, and has had practical experiences as stipulated by the International Trade and Industry Ministry ordinance; or
- (2) A person who is acknowledged by the Ministry of International Trade and Industry as having equal or more knowledge and ability than the one mentioned in the preceding paragraph.

4. The Minister of International Trade and Industry may refuse to grant a chief gas technician certificate to the one who falls under either one of the following:

- (1) A person who has been ordered to return the certificate of chief gas technician as provided for in the following article and one year has not elapsed; or
- (2) A person who violated the provisions of the law, the orders issued in accordance with the law, or punishment based on them and punished with heavier penalties than fine, and completed the execution, or two years have not elapsed since the completion of the execution or the date of the release of the execution.

5. The procedure pertaining to granting a certificate for the chief gas technician shall be defined by the International Trade and Industry Ministry ordinance.

Article 33. The Minister of International Trade and Industry may order the return of the certificate of the chief gas technician when a holder of the certificate violates the provisions of the law, the orders issued in accordance with the law, or the punishments based on them.

(National examination for qualification)

Article 34. The national examination shall be given on the knowledge and the technique required for the safety in installing, constructing, maintaining and operating gas facilities.

2. The national examination shall be carried out once a year by the Minister of International Trade and Industry on each class of certificates for chief gas technicians.

3. Subjects of examination, procedures for application for the examination, and other matters pertaining to the national examination shall be provided for by the International Trade and Industry Ministry ordinance.

(Commissioners of the national examination)

Article 35. Commissioners of the national examination for chief gas technicians shall be set up in the Ministry of International Trade and Industry to administer affairs regarding the national examination.

2. Commissioners of the national examination for chief gas technicians shall be appointed by the Minister of International Trade and Industry from among the officials of the relevant administrative body and the men of learn-

ing and experience in the safety in installing, constructing, maintaining and operating gas facilities.

3. Any necessary matters other than those stipulated in the preceding two paragraphs regarding the commissioners of the national examination for chief gas technicians shall be provided by the government ordinance.

(Duty of the chief gas technician)

Article 36. The chief gas technician shall faithfully carry out the work entrusted him.

2. A person who is engaged in installing, constructing, maintaining and operating gas facilities for the use of gas utility industry shall obey the instruction for safety given by the chief gas technician.

(Order concerning release of the chief gas technician)

Article 37. The Minister of International Trade and Industry may order the general gas undertaker concerned to release the chief gas technician from office when the chief gas technician concerned violates this law or the orders based on this law or violates the proceedings based on the same, or when the Minister considers that to keep him in the office shall hamper safety in installing, constructing, maintaining and operating gas facilities for the use of general gas utility industry.

CHAPTER III. SIMPLE GAS UTILITY INDUSTRY

(Permission for undertaking the simple gas utility industry)

Article 37-2. Any person who intends to operate a simple gas utility industry shall obtain permission for each of supply point groups from the Minister of International Trade and Industry.

(Application for permission)

Article 37-3. Any person who intends to obtain the permission mentioned in the preceding article shall submit to the Minister of International Trade and Industry a written application stating the following particulars:

- (1) The applicant's name or title and address; in case of a juristic person, the name of the person who represents it;
- (2) Supply points and their number; and
- (3) The place, structure and number by capacity of the gas facilities such as the special gas generating equipment and its accessories specified in the International Trade and Industry Ministry ordinance (hereinafter referred to as special gas facilities).

2. The written application specified in the preceding paragraph shall be accompanied by the drawings of supply points and such other documents as are prescribed in the International Trade and Industry Ministry ordinance.

(Standard of permission)

Article 37-4. The Director of International Trade and Industry Bureau shall not grant the permission mentioned in Article 37-2 unless he recognizes that the

substance of the application for the permission mentioned in the said article conforms to each of the requirements stated below:

- (1) The commencement of the simple gas utility industry shall meet the demand of the general public;
- (2) The capacity of the special gas generating equipment of the simple gas utility industry shall meet the demand for gas supply at the supply points;
- (3) In case the proposed supply points fall within the service territory of the general gas undertaker, and in the area where the operations of the general gas undertaker may be impeded by the commencement of the simple gas utility industry and where the appropriate and stable supply plan of gas by the general gas undertaker exists, the benefits which gas consumers in the area should receive by the enforcement of such supply plan shall not be hampered by the commencement of the simple gas utility industry;
- (4) The gas facilities shall not be excessive at the supply point as a result of the commencement of the simple gas utility industry;
- (5) There shall be a sound financial foundation and ample technological ability enough for appositely carrying on the business of the simple gas utility industry;
- (6) The special gas facilities of the simple gas utility industry shall conform to such technological standard of the International Trade and Industry Ministry ordinance as prescribed in Paragraph 1 of Article 28 which applies mutatis mutandis to Paragraph 1 of Article 37;
- (7) The execution of the plan of the simple gas utility industry shall be certain and infallible; and
- (8) The commencement of the simple gas utility industry shall be necessary and apposite for the public interest.

2. The Director of International Trade and Industry Bureau shall, when he intends to effect the disposition prescribed in Article 37-2 concerning the service territory of the general gas undertaker, consult the opinion of local gas utility industry coordinating council, for the application of Item 3 or 4 of the previous paragraph. (The provision of the foregoing item should be applied only in the case when the adjustment of the business activities between the general gas utility industry and the simple gas utility industry is necessary.)

(Permit)

Article 37-5. In case the Director of International Trade and Industry Bureau has granted permission for the simple gas utility industry, he shall issue a permit.

2. The permit shall state the following items:

- (1) The date and number of permission;
- (2) The name of a person or a company, and address thereof;
- (3) Supply points, and their total number; and
- (4) The location, structure, and number by capacity of specific gas facilities.

(Obligation to supply)

Article 37-6. No simple gas undertaker shall without due reason refuse to supply gas to anybody at his supply point.

2. No simple gas undertaker shall supply gas by means of pipes in meeting the demand of the general public at any point other than his supply point unless in accordance with the purport of the permission prescribed in the provisions of this law or other law.

(Application mutatis mutandis)

Article 37-7. The provisions of Articles 7 to 11, Articles 13 to 15, Articles 17 to 21, Article 25-3, Article 26, Article 28, Article 31, and Article 37 shall apply mutatis mutandis to the simple gas undertaker. In that case, the "Minister of International Trade and Industry" as referred to in these provisions shall read as the "Director of International Trade and Industry Bureau," and "Article 5" as referred to in Paragraph 3 of Article 8, and Paragraph 3 of Article 10, as "Article 37-4."

2. The provisions of Article 27-4 shall apply mutatis mutandis to the specific gas facilities that are put to use for the simple gas utility industry. In that case, the "Minister of International Trade and Industry" as referred to in Paragraph 1 of same article, shall read as the "Director of International Trade and Industry Bureau," and the "work plan (including those subjected to minor changes prescribed by the International Trade and Industry Ministry ordinance as mentioned in the proviso to Paragraph 1 or 2 of Article 27-2) approved under same paragraph" as referred to in Item 1, Paragraph 2 of same article, shall read as the "permission as granted under Paragraph 1 of Article 8 as applied mutatis mutandis to Article 37-2 or to Paragraph 1 of Article 37-7, (including those subjected to minor changes prescribed by the International Trade and Industry Ministry ordinance mentioned in the proviso to Paragraph 1 of Article 8 as applied mutatis mutandis to Paragraph 1 of Article 37-7)."

3. The provisions of Article 30 and Paragraph 2 of Article 36 shall apply mutatis mutandis to the simple gas utility industry. In that case, the "Minister of International Trade and Industry" as referred to in Article 30 shall read as the "Director of International Trade and Industry Bureau."

CHAPTER IV. BUSINESS OF GAS SUPPLY, ETC. OTHER THAN BY GAS UTILITY INDUSTRY

(Application mutatis mutandis)

Article 38. The provisions of Paragraph 3 of Article 27, Paragraphs 1 and 2 of Article 28, Article 31, Paragraph 2 of Article 36 and Article 3 shall, in accordance with the government ordinance, also be applied mutatis mutandis to those who engage in the supply of gas (other than the gas undertaker) or consume gas produced by themselves (hereinafter, they are called mutatis mutandis undertaker). (If those businesses are applied by the Mining Safety Law ((1945, Law No. 70)), the High Pressure Gas Control Law ((1947, Law No. 204)) or law concerning the maintenance of safety and justification of business of liquefied petroleum gas ((1967, Law No. 149, hereinafter called the

“Liquefied Petroleum Gas Law”)), those which fall under the application of these laws shall be exempted.)

In that case “those other than the one provided by the International Trade and Industry Ministry ordinance of the Paragraph 1 of the previous article” in the Paragraph 1 of Article 27-3 shall read as “those provided by the International Trade and Industry Ministry ordinance” and “each item of Paragraph 3 of the previous article” in the Paragraph 2 of the same article shall read as “Item 2, Paragraph 3 of Article 27-2.”

(Report of the commencement, etc. of gas utility industry)

Article 39. Mutatis mutandis undertakers shall notify the Minister of International Trade and Industry to that effect without delay when they start or terminate their business.

CHAPTER V. GAS EQUIPMENT AND APPLIANCES

Section 1. Official approval, etc.

(Definitions)

Article 39-2. The term “gas equipment and appliances” as used in this law shall mean the apparatus, appliances, or materials (excluding the apparatus, appliances, or materials prescribed in Paragraph 7 of Article 2 of the Liquefied Petroleum Gas Law) that are used mainly by the general consumer, etc., (which means the general consumer, etc., as prescribed in Paragraph 2 of Article 2 of said law) in the consumption of gas, and that are provided for by the government ordinance.

(Official approval, etc.)

Article 39-3. A person who undertakes the business of selling gas equipment and appliances shall not sell or display for sale the gas equipment and appliances unless these have undergone the examination conducted by the Minister of International Trade and Industry or by a person designated by him (hereinafter referred to as the “designated approval agency”) and are marked as approved by the provisions of Article 39-5 or are marked under the provisions of Article 39-12; provided, however, that this shall not apply in case the person has obtained the approval of the Minister of International Trade and Industry in selling or displaying for sale the gas equipment and appliances intended for export trade or other specific purposes, or in case the person sells or displays for sale the gas equipment and appliances as approved under the proviso to Paragraph 1 of Article 39-11.

(Application for official approval)

Article 39-4. A person who intends to get an official approval as provided in the preceding article in respect to the gas equipment and appliances (hereinafter referred to simply as “the official approval”) shall file an application prescribed by the Minister of International Trade and Industry or the designated approval agency.

(Approval and marking)

Article 39-5. The Minister of International Trade and Industry or the designated approval agency shall examine by the method provided by the International Trade and Industry Ministry ordinance the gas equipment and appliances applied as mentioned in the preceding article, and in case they meet the technological standards provided by the International Trade and Industry Ministry ordinance, shall qualify them as approved by the examination and shall so mark as provided by the International Trade and Industry Ministry ordinance.

(Limitation on markings)

Article 39-6. Nobody shall, except when applying the markings under the provisions of the preceding article or of Article 39-12, apply to the gas equipment and appliances such markings or markings confusable therewith.

Section 2. Registration of Manufacturers, Type of
Gas Equipment and Appliances, etc.

(Registration)

Article 39-7. A person who undertakes the business of manufacturing gas equipment and appliances shall be entitled to registration by the Minister of International Trade and Industry in accordance with the categories of business of manufacture of gas equipment and appliances as provided for by the International Trade and Industry Ministry ordinance.

(Recognition of type of gas equipment and appliances)

Article 39-8. A person registered under the provision of the preceding paragraph (hereinafter called "a registered manufacturer") can get an approval of the Minister of International Trade and Industry on the types of the gas equipment and appliances which he intends to manufacture, according to the categories of the types as provided for by the International Trade and Industry Ministry ordinance.

2. The Minister of International Trade and Industry shall notify in the official gazett to that effect, when he approves the preceding paragraph.

(Test by designated approval agency)

Article 39-9. A registerd manufacturer shall be entitled to receive the test conducted by a designated approval agency as to the type of gas equipment and appliances prescribed by the International Trade and Industry Ministry ordinance.

(Effective period of approval)

Article 39-10. The approval mentioned in Paragraph 1 of Article 39-8 shall, unless renewed at intervals prescribed by the government ordinance within a period of three to seven years, lose its effect with the passing of said period.

2. The formalities required in relation to the application for the renewal of approval mentioned in the preceding paragraph shall be prescribed by the International Trade and Industry Ministry ordinance.

(Obligation to meet standards, etc.)

Article 39-11. In case a registered manufacturer who has received the approval under Paragraph 1 of Article 39-8 manufactures gas equipment and appliances of the type covered by said approval, he shall see to it that the equipment and appliances meet the technological standards established by the International Trade and Industry Ministry ordinance mentioned in Article 39-5; provided, however, that this shall not apply in case he has obtained the approval of the Minister of International Trade and Industry in manufacturing the gas equipment and appliances intended for export trade or other specific purposes or in case he manufactures said equipment and appliances for purposes of test.

2. The registered manufacturer mentioned in the preceding paragraph shall make an inspection, as established by the International Trade and Industry Ministry ordinance, of the gas equipment and appliances (excluding those manufactured subject to the proviso to said paragraph) manufactured by him and mentioned in said paragraph, prepare an inspection record thereof, and keep it.

(Markings)

Article 39-12. In case a registered manufacturer who obtained the approval mentioned in Paragraph 1 of Article 39-8 has manufactured gas equipment and appliances of the type or types covered by said approval, may apply markings thereon as established by the International Trade and Industry Ministry ordinance.

(Prohibition of markings)

Article 39-13. In case the gas equipment and appliances manufactured by a registered manufacturer who has obtained the approval mentioned in Paragraph 1 of Article 39-8, and which are covered by said approval (excluding those manufactured subject to the proviso to Paragraph 1 of Article 39-11), do not meet the technological standards established by the International Trade and Industry Ministry ordinance as mentioned in Article 39-5, the Minister of International Trade and Industry may prohibit said registered manufacturer for a period not exceeding one year from applying the markings as prescribed in the preceding article if he finds it particularly necessary in order to prevent disasters.

(Application mutatis mutandis, etc.)

Article 39-14. The provisions of Paragraphs 2 and 3 of Article 43, Articles 44 to 47, Article 53, Article 55, and Article 57 of the Liquefied Petroleum Gas Law shall apply mutatis mutandis to the registration of gas equipment and appliances manufacturers. In that case, the "preceding article" as referred to in Paragraph 2 of Article 43 of said law, "Paragraph 1 of the preceding article" as referred to in Article 44 of said law, and "Paragraph 1 of Article 43" as referred to in Article 45 and Paragraph 1 of Article 47 of said law shall read as "Article 39-7 of the Gas Utility Industry Law," and "this law" as referred to in Item 1 of Article 44 of said law shall read as the "Gas Utility Industry Law."

2. The provisions of Articles 48 to 52, Article 54, Article 56, Paragraphs 2 and 3 of Article 60 and Article 65 of the Liquefied Petroleum Gas Law, shall apply mutatis mutandis to registered manufacturers. In that case, "Paragraph 1 of Article 43" as referred to in Paragraph 1 of Article 48 and Item 4 of Article 54 of said law shall read as "Article 39-7 of the Gas Utility Industry Law"; "Article 39" and "Article 42" as referred to in Item 1 of said article shall read as "Article 39-3 and 39-6 of the Gas Utility Industry Law," respectively; "Article 64" as referred to in Item 3 of said article shall read as "Article 39-13 of the Gas Utility Industry Law"; the "preceding paragraph" as referred to in Paragraph 2 of Article 60 of said law, and "Paragraph 1" as referred to in Paragraph 3 of said article shall read as "Article 39-9 of the Gas Utility Industry Law"; "Article 41" as referred to in said paragraph shall read as "Article 39-5 of the Gas Utility Industry Law"; and "Paragraph 1 of Article 62" as referred to in Item 2 of Article 65 of said law shall read as "Paragraph 1 of Article 39-11 of the Gas Utility Industry Law."

3. The provisions of Paragraph 2 and 3 of Article 58, Article 59, Article 66, and Article 67 of the Liquefied Petroleum Gas Law shall apply mutatis mutandis to the approval of types of gas equipment and appliances. In that case, the "preceding paragraph" as referred to in Paragraph 2 of Article 58 of said law, "Paragraph 1" as referred to in Paragraph 3 of said article, the "Paragraph 1 of preceding article" as referred to in Article 59 of said law, and "Paragraph 1 of Article 58" as referred to in Articles 66 and 67 of said law shall read as "Paragraph 1 of Article 39-8 of the Gas Utility Industry Law"; "Paragraph 1 of Article 60" as referred to in Paragraph 3 of Article 58 of said law, and "Paragraph 1 of the next article" as referred to in Article 59 of said law shall read as "Article 39-9 of the Gas Utility Industry Law"; "Article 41" as referred to in Item 1 of said article shall read as "Article 39-5 of the Gas Utility Industry Law"; "Paragraph 1 of Article 43" as referred to in Item 2 of said article shall read as "Article 39-7 of the Gas Utility Industry Law"; "Paragraph 2 of Article 62" as referred to in Item 1 of Article 67 of said law, shall read as "Paragraph 2 of Article 39-11 of the Gas Utility Industry Law"; "Article 64" as referred to in Item 2 of said article shall read as "Article 39-13 of the Gas Utility Industry Law"; and "Paragraph 1 of Article 84" as referred to in Item 3 of said article shall read as "Paragraph 1 of Article 40 of the Gas Utility Industry Law."

4. In one of the following cases, the Minister of International Trade and Industry shall give official notice thereof in the official gazette:

- (1) If he has ascertained that approval has lost its effect under the provisions of Article 66 of the Liquefied Petroleum Gas Law as applied mutatis mutandis to the preceding paragraph; or
- (2) If he cancelled approval under the provisions of Article 67 of the Liquefied Petroleum Gas Law as applied mutatis mutandis to the preceding paragraph.

Section 3. Designated Approval Agency

(Designation)

Article 39-15. The designation mentioned in Article 39-3 shall be made for each of the classifications established by the International Trade and Industry Ministry ordinance upon application from a person who intends to give an approval or undertake a test mentioned in Article 39-9 (hereinafter referred to as "approval, etc.").

2. In case the Minister of International Trade and Industry has made the designation mentioned in Article 39-3, he shall give official notice thereof in the official gazette.

(Application mutatis mutandis)

Article 39-16. The provisions of Articles 69 to 75, Article 79, Article 80, and Paragraph 2 of Article 81 of the Liquefied Petroleum Gas Law shall apply mutatis mutandis to designated approval agencies. In that case, "Article 39" as referred to in Article 69, Article 70, and Item 6 of Article 80 of said law shall read as "Article 39-3 of the Gas Utility Industry Law," and "this law" as referred to in Item 1 of Article 69 of said law shall read as the "Gas Utility Industry Law."

2. The provisions of Articles 76 to 78 of the Liquefied Petroleum Gas Law shall apply mutatis mutandis to the officers or employees of designated approval agencies. In that case, "this law" as referred to in Article 77 of said law shall read as the "Gas Utility Industry Law."

3. The Minister of International Trade and Industry shall, in one of the following cases, give official notice thereof in the official gazette:

- (1) When a report has been submitted under the provisions of Article 72 of the Liquefied Petroleum Gas Law as applied mutatis mutandis to Paragraph 1;
- (2) When permission has been granted under Article 74 of the Liquefied Petroleum Gas Law as applied mutatis mutandis to Paragraph 1; or
- (3) When designation has been cancelled or the suspension of business such as approval, etc., has been ordered under the provisions of Article 80 of the Liquefied Petroleum Gas Law as applied mutatis mutandis to Paragraph 1.

CHAPTER VI. MISCELLANEOUS PROVISIONS

(Conditions for permission, etc.)

Article 40. Conditions may be attached to the permission, approval or recognition; such conditions may be changed.

2. The conditions mentioned in the preceding paragraph shall promote the benefit of the general public or shall be the minimum which is indispensable for the infallible execution of matters subject to the permission, approval or recognition.

(Information and investigation about gas consuming equipment or appliances)

Article 40-2. The gas undertaker shall let the users of equipment or appliances (including their accessories) employed in the consumption of gas (hereinafter referred to as "gas consuming equipment or appliances") know the matters that are required for preventing the occurrence of risks in using gas and that are prescribed by the International Trade and Industry Ministry ordinance.

2. The gas undertaker shall investigate, as provided for by the International Trade and Industry Ministry ordinance, whether the gas consuming equipment or appliances fueled by the gas supplied by him meets the technological standards established by the International Trade and Industry Ministry ordinance; provided, however, that this shall not apply in case the consent of the owner or occupier of such gas consuming equipment or appliances is unobtainable for operator access to such equipment or appliances upon its installation or use.

3. In case the gas undertaker finds the gas consuming equipment or appliances, upon the investigation prescribed in the preceding paragraph, not meeting the technological standards established by the International Trade and Industry Ministry ordinance, he shall without delay notify to the owner or occupier thereof the steps to be taken for conforming to such technological standards and the consequences to occur upon failure to take such steps.

4. In case the gas undertaker is informed of and requested by a user of the gas supplied by him to take action on the fact that a disaster due to the gas supplied by him has occurred or is likely to occur, he shall promptly take such action. The same shall apply in case he himself has learned such a fact.

5. The gas undertaker shall keep the books prescribed by the International Trade and Industry Ministry ordinance, enter therein the matters prescribed by the International Trade and Industry Ministry ordinance with respect to the business concerning the investigation prescribed in Paragraph 2 and the notification prescribed in Paragraph 3, and preserve such books.

(Order to comply with the standards)

Article 40-3. In case the Minister of International Trade and Industry finds the gas consuming equipment or appliances not conforming to the technological standards established by the International Trade and Industry Ministry ordinance as approved under Paragraph 2 of the preceding article, he may order the owner or occupier thereof to repair, remodel, or relocate such gas consuming equipment or appliances for conforming to such technological standards.

(Obligation to comply with the standards)

Article 40-4. In case of the installation of the gas consuming equipment or appliances or the change thereof, the said equipment or appliances shall meet the technological standards prescribed by the International Trade and Industry Ministry ordinance as provided under Paragraph 2 of Article 40-2.

(The Local Gas Utility Industry Coordination Council)

Article 40-5. There shall be instituted the Local Gas Utility Industry Coordination Council in the International Trade and Industry Bureau.

2. The Local Gas Utility Industry Coordination Council (hereinafter referred to as the "Council") shall investigate and debate the matters assigned to its authority under this law; in addition to which, the Council shall, in response to inquiries from the Director of International Trade and Industry Bureau, investigate and debate the disposition of disputes concerned with the commencement of the gas utility industry and important matters relating to the coordination of business activities by gas undertakers, and shall advise such matters as deemed necessary in connection therewith to the Director of International Trade and Industry Bureau.

Article 40-6. The Council shall be composed of not more than seven members.

2. The Council may have temporary members if necessary to investigate and debate special matters.

3. The members and temporary members shall be appointed from among learned and experienced persons by the Director of International Trade and Industry Bureau.

4. The members shall serve for a term of two years; provided, however, that a member filling any vacancy shall serve for the remainder of his predecessor's term.

5. A temporary member shall be discharged upon termination of investigation and debate on the special matter concerned.

6. Matters required in connection with the Council, in addition to those prescribed in this law, shall be provided by the International Trade and Industry Ministry ordinance.

(Fees)

Article 41. Each of the persons listed herein shall pay a fee determined by the government ordinance within the sum listed in the right hand column:

	Fee (in yen)
i) An applicant for the inspection prescribed under Paragraph 1 of Article 27-4;	170,000
ii) An applicant for the inspection prescribed under Article 27-6;	21,000
iii) A candidate for the national examination;	1,000
iv) An applicant for a chief gas technician's certificate;	800
v) An applicant for the regrant of a chief gas technician's certificate;	600
vi) An applicant for the approval prescribed under Paragraph 2 of Article 32-3;	1,000
vii) An applicant for the inspection prescribed under Paragraph 1 of Article 27-4, as applied mutatis mutandis to Paragraph 2 of Article 37-7;	20,000
viii) An applicant for the registration prescribed under Article 39-7;	15,000

ix)	An applicant for the approval prescribed under Paragraph 1 of Article 39-8, or the renewal thereof prescribed under Paragraph 1 of Article 39-10 (excluding a person who applies for the approval of the type of gas equipment and appliances passed the designated approval agency's test), or the renewal thereof;	300,000
x)	An applicant for a test to be carried by the designated approval agency;	300,000
xi)	An applicant for the correction of a registration certificate prescribed under Article 50 of the Liquefied Petroleum Gas Law applied mutatis mutandis to Paragraph 2 of Article 39-14, or the re-issuance thereof prescribed under Article 52 of said law applied mutatis mutandis to Paragraph 2 of Article 39-14;	800
xii)	An applicant for the issuance of a copy of the register prescribed under Article 57 of said law applied mutatis mutandis to Paragraph 1 of Article 39-14; and	200
xiii)	An applicant for the perusal of the register as prescribed under Article 57 of said law applied mutatis mutandis to Paragraph 1 of Article 39-14.	120

2. An applicant for the approval of gas equipment and appliances must pay handling fees as determined by the government ordinance.

(Use of public land)

Article 42. The gas undertaker or wholesaler (hereinafter called "gas undertaker") may, if he deems it necessary, for the use of his business, to lay pipelines on the surface or under the ground of public land such as roads, bridges, ditches, rivers, river-banks, etc., use same with a permission of the supervisor thereof, to such an extent as not to hamper the effect thereof.

2. In the case of the preceding paragraph, the gas undertaker shall pay the concession fee as settled by the supervisor.

3. When the supervisor refuses to grant permission provided for in Paragraph 1 without justifiable reasons or when the concession fee is not adequate, the competent Minister may, at the request of the gas undertaker, permit the use of the land or settle the amount of the concession fee.

4. The provisions of the preceding three paragraphs shall not apply to the road prescribed under the Road Law (Law No. 180, 1952), the land inside the area of the road determined by the provision of Paragraph 1 of Article 18 of said law, and anything that is installed on the said land and belongs to it.

5. The competent Minister shall confer beforehand with the Minister of International Trade and Industry in the following cases:

- (1) When he permits the use or settles the amount of the concession fee as provided for by Paragraph 3; and

- (2) In the case where the gas undertaker, for the purpose of laying pipelines, exclusively uses the road, the land inside the area which would be the road, or anything that is installed on the said land and belongs to it and when the competent Minister gives a judgment or decision to the request for the investigation of, or grievance against, the decision made by the road supervisor on the concession fee as prescribed under Paragraph 1 of Article 39 of the Road Law (including the case applied mutatis mutandis to Paragraph 2 of Article 91 of said law), or an action of attaching conditions to the permission or approval as provided for by Paragraph 1 of Article 87 (including the case applied mutatis mutandis to Paragraph 2 of Article 91 of said law).

(Admittance to the estate)

Article 43. The gas undertaker may, when necessary for the purpose of measurement, field-inspection or construction work in relation to the installation of gas facilities, enter another person's estate with the permission of the prefectural governor.

2. The prefectural governor shall, when an application for permission as provided for by the preceding paragraph is filed, notify to that effect the proprietor or occupant of the land of the application and give him a chance to submit his opinion on the matter in writing.

3. A person who has obtained the permission provided for in Paragraph 1 shall give an advance notification to the land owner when he steps into the latter's estate.

4. A person who has obtained the permission of Paragraph 1 shall take the permit of the prefectural governor and show it to the person concerned when he enters other person's estate.

(Cutting down of vegetation, etc.)

Article 44. The gas undertaker may, when he deems it necessary for the purpose of laying or maintaining pipelines, cut down or transplant hindering vegetation.

2. In the preceding case, the gas undertaker shall confer with the owner of the vegetation. In case the parties concerned do not arrive at an agreement or are unable to confer, the prefectural governor shall make a decision.

(Indemnity)

Article 45. The gas undertaker shall compensate for the damage actually given to the owner of the land or vegetation as a result of entering his land, or cutting down or transplanting the vegetation in accordance with the provisions of the preceding two articles.

2. In case the parties concerned do not reach an agreement or are unable to confer on the indemnity of the preceding paragraph, the prefectural governor shall make a decision.

3. The person who is dissatisfied with the amount of indemnity may appeal to the court for the change of the amount within three months from the day of the decision.

4. In the lawsuit of the preceding case, the gas undertaker, the owner of the land or vegetation or other persons concerned shall be the defendants.

(Gas facility inspectors)

Article 45-2. There shall be gas facility inspectors in the Ministry of International Trade and Industry.

2. The gas facility inspectors shall engage in the business related to the inspection mentioned in Article 27-4 (including cases applied mutatis mutandis to Paragraph 2 of Article 37-7, or Article 27-6.)

3. Matters required in connection with the qualifications of the gas facility inspections shall be prescribed by the government ordinance.

(Audit)

Article 45-3. The Minister of International Trade and Industry shall audit the business of general gas undertakers every year.

(Collection of reports)

Article 46. The Minister of International Trade and Industry or the Director of International Trade and Industry Bureau may, to such an extent as required for the enforcement of this law, order the gas undertaker, the gas undertaker applied mutatis mutandis, or the manufacturer or dealer of gas equipment and appliances, to submit a report of his business as prescribed by the government ordinance.

2. The Minister of International Trade and Industry may, to such an extent as required for the enforcement of this law, order the designated approval agency to submit a report of its business.

(Inspection by entering)

Article 47. The Minister of International Trade and Industry or the Director of International Trade and Industry Bureau may have his staff, to such an extent as required for the enforcement of this law, enter the main, branch and other offices of the gas undertaker, the gas undertaker applied mutatis mutandis, or a person who manufactures or deals gas equipment and appliances as prescribed by the government ordinance, and inspect the books, documents and other articles.

2. The Minister of International Trade and Industry may, to such an extent as necessary for the enforcement of this law, have his staff enter the main or branch office of the designated approval agency and inspect books, documents and other materials.

3. The staff entering for inspection under the provisions of the preceding two paragraphs shall carry a certificate which shows his identity and present it to the person concerned.

4. The right to enter for inspection under the provision of Paragraph 1 or 2 shall not be interpreted as recognized for the purpose of a criminal investigation.

(Exemption from the High Pressure Gas Control Law)

Article 47-2. Those provisions of the High Pressure Gas Control Law which relate to the business of manufacturing or selling high pressure gas and the facilities for manufacturing or selling high pressure gas shall not apply to the gas utility industry and gas facilities.

(Reporting, etc.)

Article 47-3. In case the Director of International Trade and Industry Bureau has granted the permission mentioned in Article 37-2, or the permission mentioned in Paragraph 1 of Article 13, as applied mutatis mutandis to Paragraph 1 of Article 37-7, or has cancelled the permission under the provision of Paragraph 1 or 2 of Article 14, as applied mutatis mutandis to Paragraph 1 of Article 37-7, he shall report that to the Director General of the Fire Defense Board.

2. In case the Minister of International Trade and Industry intends to establish, amend, or abolish the International Trade and Industry Ministry ordinance mentioned in Paragraph 1 of Article 28, as applied mutatis mutandis to Paragraph 1 of Article 37-7, he shall consult the Director General of the Fire Defense Board.

(Public hearings)

Article 48. The Minister of International Trade and Industry shall, when he intends to effect the disposition prescribed in Article 3, Paragraph 1 of Article 17 or Paragraph 2 of Article 39-2, hold public hearings and ask for the opinions and suggestions of the general public.

(Hearings)

Article 49. The Minister of International Trade and Industry or the Director of International Trade and Industry Bureau shall, when he takes action as prescribed under Article 54 of the Liquefied Petroleum Gas Law, as applied mutatis mutandis to Paragraph 1 or 2 of Article 14, Paragraph 1 or 2 of Article 15, Article 39-13, Paragraph 2 of Article 39-14; Article 67 of same law as applied mutatis mutandis to Paragraph 3 of Article 39-14; Article 80 of same law as applied mutatis mutandis to Paragraph 1 of Article 39-16; or Paragraph 1 or 2 of Article 14, or Paragraph 1 or 2 of Article 15 as applied mutatis mutandis to Paragraph 1 of Article 37-7, hold public hearings after a considerable time upon notification of this action to the person concerned.

2. In the case of the advance notification of the preceding paragraph, the date, place, and contents of the hearings shall be given.

3. At the hearings, the person concerned with this action and the interested person shall be given chances to produce proofs and opinions of their own.

(Request for inquiry about the disposition by designated approval agency)

Article 49-2. A person dissatisfied with the disposition by designated approval agency under the provisions of Article 39-5 may file a request for inquiry under the Administrative Dissatisfaction Inquiry Law (Law No. 160, 1962) with the Minister of International Trade and Industry.

(Public hearings in the procedure of filing the objection)

Article 50. Any judgment or decision to the request for inquiry or the formal objection concerning the disposition under the provisions of this law shall be made after public hearings as illustrated in Article 49.

(Filing of grievances)

Article 51. A person who has a grievance against the supply of gas by the gas undertaker may file a grievance with the Minister of International Trade and Industry or the Director of International Trade and Industry Bureau by submitting a written document stating reasons.

2. The Minister of International Trade and Industry or the Director of International Trade and Industry Bureau shall, when such a grievance is filed, solve the case with sincerity and notify the claimant of the result.

(Transitory measures)

Article 51-2. In case the government ordinance or the International Trade and Industry Ministry ordinance is established, amended, or abolished pursuant to the provisions of this law, required transitory measures may be prescribed by the government ordinance or the International Trade and Industry Ministry ordinance in consequence of such establishment, amendment, or abolishment as far as judged reasonably necessary.

(Mandate of authority)

Article 52. Matters belonging to the power of the Minister of International Trade and Industry may be carried out by the Director of International Trade and Industry Bureau or the prefectural governor as prescribed by the government ordinance.

CHAPTER VII. PENAL CLAUSES

Article 53. A person who gives damage to gas facilities or obstructs the supply of gas by disordering the function of gas facilities shall be given a penal servitude of less than five years, or punished with a fine less than ¥100,000.

2. A person who operates gas facilities without permission and thereby disturbs the supply of gas shall be given a penal servitude of less than two years or punished with a fine less than ¥50,000.

3. The same shall apply to any employee of the gas utility industry who neglects, without justifiable reasons, to maintain gas facilities or to operate gas supply business, thereby obstructing a smooth supply of gas.

4. Any attempt of the offence provided for in Paragraphs 1 and 2 shall be punished.

Article 54. A person who makes change in gas facilities without permission of the gas undertaker shall be punished with a fine less than ¥50,000.

Article 55. A person who operates the gas utility industry without permission provided for in Article 3 or Article 37-2 shall be given a penal servitude of less than three years or punished with a fine less than ¥300,000, or both.

Article 56. A person who falls under any of the following categories shall be given a penal servitude of less than two years or punished with a fine less than ¥200,000, or both:

- (1) A person who suspends or abolishes the whole or a part of the gas utility industry without permission provided for in Paragraph 1 of Article 13 (including the case applied mutatis mutandis to Paragraph 1 of Article 7);
- (2) A person who declines the supply of gas in violation of Paragraph 1 of Article 16 or Paragraph 1 of Article 37-6; and
- (3) A person who supplies gas in violation of the provision of Paragraph 2 of Article 16 or Paragraph 2 of Article 37-6.

Article 56-2. In the case of a violation of the order for suspension of business under the provisions of the Liquefied Petroleum Gas Law as applied mutatis mutandis to Paragraph 1 of Article 39-16, the officers or employees of the designated approval agency that has committed said violation shall be liable to a servitude not exceeding one year or a fine not exceeding ¥30,000.

Article 57. A person who falls under any of the following categories shall be punished with a fine less than ¥300,000:

- (1) A person who makes a change in gas facilities in violation of the provision of Paragraph 1 of Article 8 (including the case where this applies mutatis mutandis to Paragraph 1 of Article 37-7);
- (2) A person who engages in any other business than that of the general gas utility industry in violation of the provision of Paragraph 1 of Article 12;
- (3) A person who supplies gas in violation of the provision of Article 20 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7);
- (4) A person who gets the supply of gas or supplies gas without the contract which is given approval under Paragraph 2 of Article 22;
- (5) A person who supplies gas without the approval provided for in Paragraph 1 of Article 23;
- (6) A person who supplies gas in violation of the provision of Paragraph 1 of Article 24;
- (7) A person who violates the order stipulated by the provision of Article 25-3 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7);
- (8) A person who carries construction work of installing or changing gas facilities in violation of the provision prescribed under Paragraph 1 of Article 27-2;

- (9) A person who violates the order or action prescribed under Paragraph 3 of Article 28 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7); and
- (10) A person who fails to appoint a chief gas technician prescribed under Paragraph 1 of Article 31 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7 or in accordance with the provision of Article 38).

Article 58. A person who falls under any one of the following categories shall be punished with a fine less than ¥100,000:

- (1) A person who fails to keep record as provided for in Article 21 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7) or Article 29, or a person who makes a false record;
- (2) A person who carries construction work of installing or changing gas facilities in violation of the provision under Paragraph 2 of Article 27-3 (including the case applied mutatis mutandis to Article 38);
- (3) A person who uses gas facilities in violation of the provision of Paragraph 1 of Article 27-4 (including the case applied mutatis mutandis to Paragraph 2 of Article 37-7);
- (4) A person who violates order or action provided for in Paragraph 2 of Article 28 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7, or in accordance with the provision of Article 38); and
- (5) A person who violates the provision of Article 40-4 (obligation to comply with the standards).

Article 58-2. A person who, in violation of the provision of Article 39-3, sells gas equipment and appliances or displays same for sale shall be punished with a fine less than ¥50,000.

Article 59. A person who falls under any one of the following categories shall be punished with a fine less than ¥30,000:

- (1) A person who fails to submit a report prescribed under Paragraph 4 of Article 7 (including the case applied mutatis mutandis to Paragraph 4 of Article 8 ((including the case applied mutatis mutandis to Paragraph 1 of Article 37-7)) and Paragraph 1 of Article 37-7), Paragraph 2 of Article 11 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7), and Paragraph 1 or 2 of Article 25-2, Paragraph 4 or 5 of Article 27-2, Paragraph 1 or 2 of Article 30 (including the case applied mutatis mutandis to Paragraph 3 of Article 37-7), Paragraph 2 of Article 31 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7 or in accordance with the provisions of Article 38), or Article 39, or who submits a false report;
- (2) A person who fails to put up a notice in violation of the provision of Article 19 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7) or Paragraph 3 of Article 25-2;
- (3) A person who supplies gas without notification provided for by Article 25;

- (4) A person who carries construction work of installing or changing gas facilities in violation of the provision of Paragraph 1 of Article 27-3 (including the case applied mutatis mutandis in accordance with the provision of Article 38);
- (5) A person who refuses, hinders or evades inspection provided for in Article 27-6 or Paragraph 1 or 2 of Article 47;
- (6) A person who violates the order prescribed under Paragraph 3 of Article 30 (including the case applied mutatis mutandis to Paragraph 3 of Article 37-7), Article 37 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7, or in accordance with the provision of Article 38) or Article 40-3;
- (7) A person who applies a marking in violation of the provision of Article 39-6;
- (8) A person who fails to make an inspection, an inspection record, or makes a false record thereof, or fails to keep record in violation of the provision of Paragraph 2 of Article 39-11;
- (9) A person who violates the prohibition clause prescribed under Article 39-13;
- (10) A person who, in violation of the provision of Paragraph 5 of Article 40-2, fails to keep a record prescribed under said paragraph, keeps a false record, or fails to keep the book; and
- (11) A person who fails to submit a report prescribed under Article 46 or makes a false report.

Article 59-2. In the case of a violation falling under one of the following items, the officers or employees of the designated approval agency that has committed said violation shall be liable to a fine not exceeding ¥10,000:

- (1) When the agency has abandoned all of the business such as approval, etc., without obtaining the permission mentioned in Article 74 of the Liquefied Petroleum Gas Law applied mutatis mutandis to Paragraph 1 of Article 39-16; or
- (2) When the agency has, in violation of the provisions of Paragraph 2 of Article 81 of the Liquefied Petroleum Gas Law applied mutatis mutandis to Paragraph 1 of Article 39-16, failed to enter the matters prescribed in said paragraph, or made false entries, or failed to preserve the books.

Article 60. When the representative of a judicial person, the agent of a judicial person or a person, or an employee or other worker commits the acts of violation provided for in Articles 55-59 inclusive in relation to the business of the judicial person or a person concerned, not only the offender but also the judicial person or a person concerned shall be punished with a fine prescribed in each of said articles.

Article 61. A person who falls under one of the following categories shall be fined less than ¥10,000:

- (1) A person who fails to submit a report as provided for in Paragraph 2 of Article 8 or Article 9 (including cases where those clauses apply mutatis mutandis to Paragraph 1 of Article 37-7), or in Paragraph 2 of Article 48, Article 49, or Article 51 of the Liquefied Petroleum Law applied mutatis mutandis to Paragraph 2 of Article 39-14, or submits a false report;
- (2) A person who violates the provision of Article 26 (including the case applied mutatis mutandis to Paragraph 1 of Article 37-7);
- (3) A person who violates the order provided for in Article 27; or
- (4) A person who fails to return his registration certificate in violation of the provision of Article 56 of the Liquefied Petroleum Law applied mutatis mutandis to Paragraph 2 of Article 39-14.

**20. STRESS ANALYSIS OF CARRIER PIPE
AND CASING PIPE FOR
THE KLANG VALLEY CITY GAS
DISTRIBUTION**

STRESS ANALYSIS
OF
CARRIER PIPE AND CASING PIPE
FOR
THE KLANG VALLEY CITY GAS DISTRIBUTION

1. GENERAL

This report is to discuss the safety of carrier pipe and casing pipe installed under paved roads or crossings with highways/railways. The stress analysis was made in accordance with the following codes and standards.

- ANSI B31.8 "GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS"
- API RP1102 "RECOMMENDED PRACTICE FOR LIQUID (attached) PETROLEUM PIPELINES CROSSING RAILROADS AND HIGHWAYS"

The following typical three cases are included in this analysis.

<u>Case</u>	<u>Installation</u>	<u>Loads</u>
I	Uncased pipe installation (24") under paved roads	Internal pressure plus external loads
II	Casing pipe (28") at highway crossings	External loads
III	Casing pipe (28") at railway crossings	External loads

In all the cases, pipe circumferential stresses were less than allowable stresses as summarized in the attached Table-I.

2. CALCULATION CONDITIONS

2.1 Case I; Uncased installation under paved road.

- | | |
|---------------------------------|---------------------|
| 1) Material | API 5L Gr. B |
| 2) SMYS of pipe | S = 35,000 psi |
| 3) Outside diameter of the pipe | D = 24 in. |
| 4) Wall thickness of the pipe | T = 0.250 in. |
| 5) Soil cover | H = 3.3 ft. (1.0 m) |
| 6) Internal pressure | P = 150 psig |

*NOTE: SMYS = Specified Minimum Yield Strength

2.2 Case II; Cased highway crossing

- | | |
|--|---------------------|
| 1) Material | API 5L Gr. B |
| 2) SMYS of pipe | S = 35,000 psi |
| 3) Outside diameter of the casing pipe | D = 28 in. |
| 4) Wall thickness of the casing pipe | T = 0.250 in. |
| 5) Soil cover | H = 4.0 ft. (1.2 m) |

2.3 Case III; Cased railway crossing

- | | |
|--|----------------------|
| 1) Material | API 5L Gr. B |
| 2) SMYS of pipe | S = 35,000 psi |
| 3) Outside diameter of the casing pipe | D = 28 in. |
| 4) Wall thickness of the casing pipe | T = 0.438 in. |
| 5) Soil Cover | H = 4.5 ft. (1.35 m) |

2.4 Allowable stress

- 1) Allowable circumferential stress of carrier pipe due to internal pressure for location class 3.

$$S_a = 0.5 \times \text{SMYS}$$

- 2) Allowable combined circumferential stress of carrier pipe due to internal pressure and external load.

$$S_a = 0.72 \times \text{SMYS}$$

- 3) Allowable circumferential stress of casing pipe

$$S_a = 1.0 \times \text{SMYS}$$

3. STRESS CALCULATION

- 3.1 Circumferential stress due to internal pressure is obtained by the following formula (ANSI B31.8)

$$S_i = \frac{PD}{2T}$$

S_i : Circumferential stress due to internal pressure, psi

P: internal pressure, psi

D: outside diameter, inches

T: wall thickness, inches

The results of calculation are shown in Table I.

3.2 Circumferential stress due to external loads is obtained by the following formula (API RP1102)

$$S_e = \frac{6K_b W E R T}{E T^3 + 24 K_z P R^3}$$

S_e : circumferential stress due to external loads, psi

P : internal pressure, psi

R : outside radius, inches

T : wall thickness, inches

K_b : bending parameter (0.138 for normal ground)

K_z : deflection parameter (0.089 for normal ground)

E : modulus of elasticity of metal (30×10^6)

W : total vertical load (dead, live, and impact),
Lb/Lin. inch, determined by Graph I or II of API
RP1102.

Table I Results of Calculations

	Case I (Carrier Pipe)	Case II (Casing Pipe)	Case III (Casing Pipe)
D (in)	24	28	28
T (in.)	0.250	0.250	0.438
P (psi)	150	-	-
R (in.)	12	14	14
H (ft.)	3.3	4.0	4.5
W (Lb/Lin. inch)	185	185	565
Si (psi)	7,200 < 17,500*1	-	-
Se (psi)	13,480	34,310	34,140
Si + Se (psi)	20,680	34,310	34,140
Allowable Stress (psi)	25,200 *2	35,000 *3	35,000 *3

NOTE: *1 0.5 x SMYS
*2 0.72 x SMYS
*3 1.0 x SMYS

As shown in this table, combined circumferential stresses, Si + Se, do not exceed the allowable stresses.

APPENDIX I

NOMOGRAPHS FOR DETERMINING CIRCUMFERENTIAL STRESS IN CARRIER PIPE WITH INTERNAL PRESSURE DUE TO EXTERNAL LOADS (DEAD, LIVE AND IMPACT) AT HIGHWAY AND RAILROAD CROSSINGS. THESE GRAPHS ARE NOT TO BE USED FOR DETERMINING CASING THICKNESS (USE TABLES 1 & 2 IN 4.11).

FORMULA

$$S = \frac{6K_b WERT}{ET^3 + 24K_z PR^3}$$

S = Circumferential Stress due to external loads, psi

P = Internal Pressure, psi

R = Outside Radius, inches

T = Wall Thickness, inches

K_b = Bending Parameter (.138 for bored hole)

K_z = Deflection Parameter (.089 for bored hole)

E = Modulus of elasticity of Metal (30×10^6)

W = Total Vertical Load (dead, live, and impact), Lb./Lin. inch using Cooper's E-72 Loading for Railroads and 15,000 pounds single wheel loading for Highways. Impact of 1.75 for Railroads and 1.50 for Highways was used, each decreasing .03/ft below 5 feet of cover.

GRAPHS

- I Determine "W" for Highway Crossings
- II Determine "W" for Railroad Crossings
- III Determine "D" \times "T"
- IV Determine Circumferential Stress, Pipe Sizes 2" through 6"
- V Determine Circumferential Stress, Pipe Sizes 8" through 20"
- VI Determine Circumferential Stress, Pipe Sizes 22" through 60"

INSTRUCTIONS

Given: P = Internal Pressure, psi
 D = Outside Diameter of Pipe, inches
 T = Wall Thickness of Pipe, inches
 H = Depth of Cover from top of pipe to highway surface or base of rail, feet

First, Determine "W" from Graph I or II for given "D" and "H."

Second, Multiply "D" \times "T," or find "D" \times "T" from Graph III.

Third, Based on "D," use Graph IV, V, or VI, as appropriate, and perform the following steps to find "S."

Step 1, From "W" draw a straight line through "D" \times "T" to intersect Reference Line A.

Step 2, From "D" draw a straight line through "P" to intersect Reference Line B.

Step 3, From the intersection of Reference Line B in Step 2, draw a straight line to "T" intersecting Reference Line C.

Step 4, From the intersection of Reference Line C in Step 3, draw a straight line to Reference Line A, where it was intersected by the line drawn in Step 1, read "S" for answer.

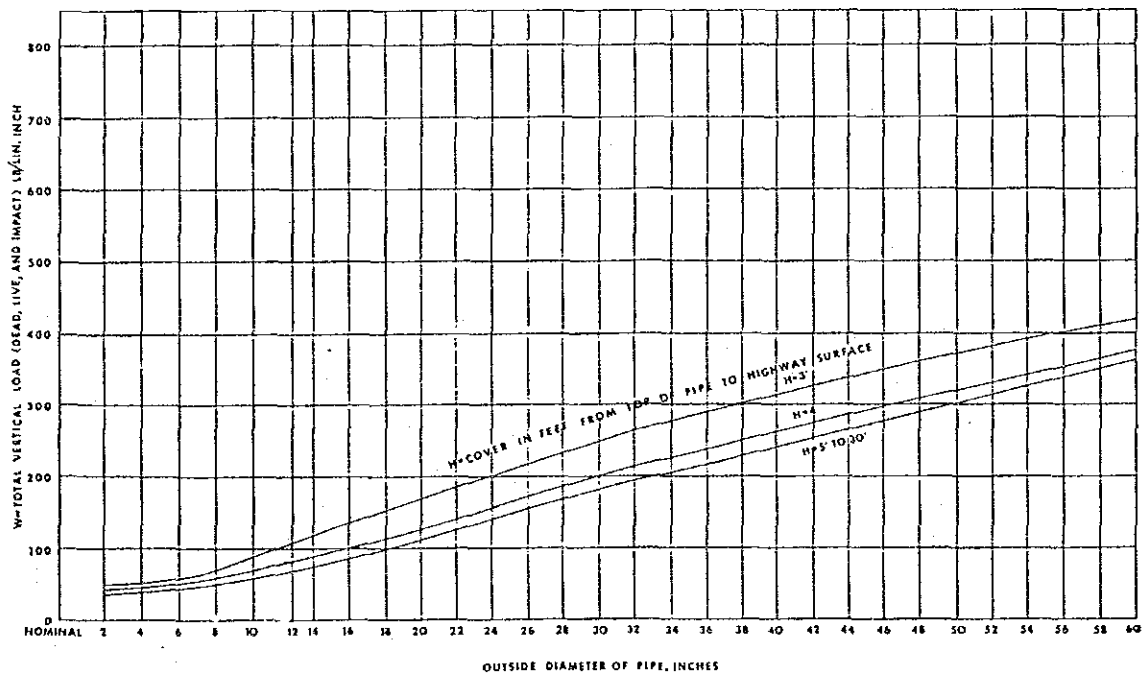
EXAMPLE—See Graph IV

Railroad Crossing

Given: P = 1500 psi
 D = 4.500-inch diameter
 T = .200-inch wall thickness
 H = 5 feet of cover

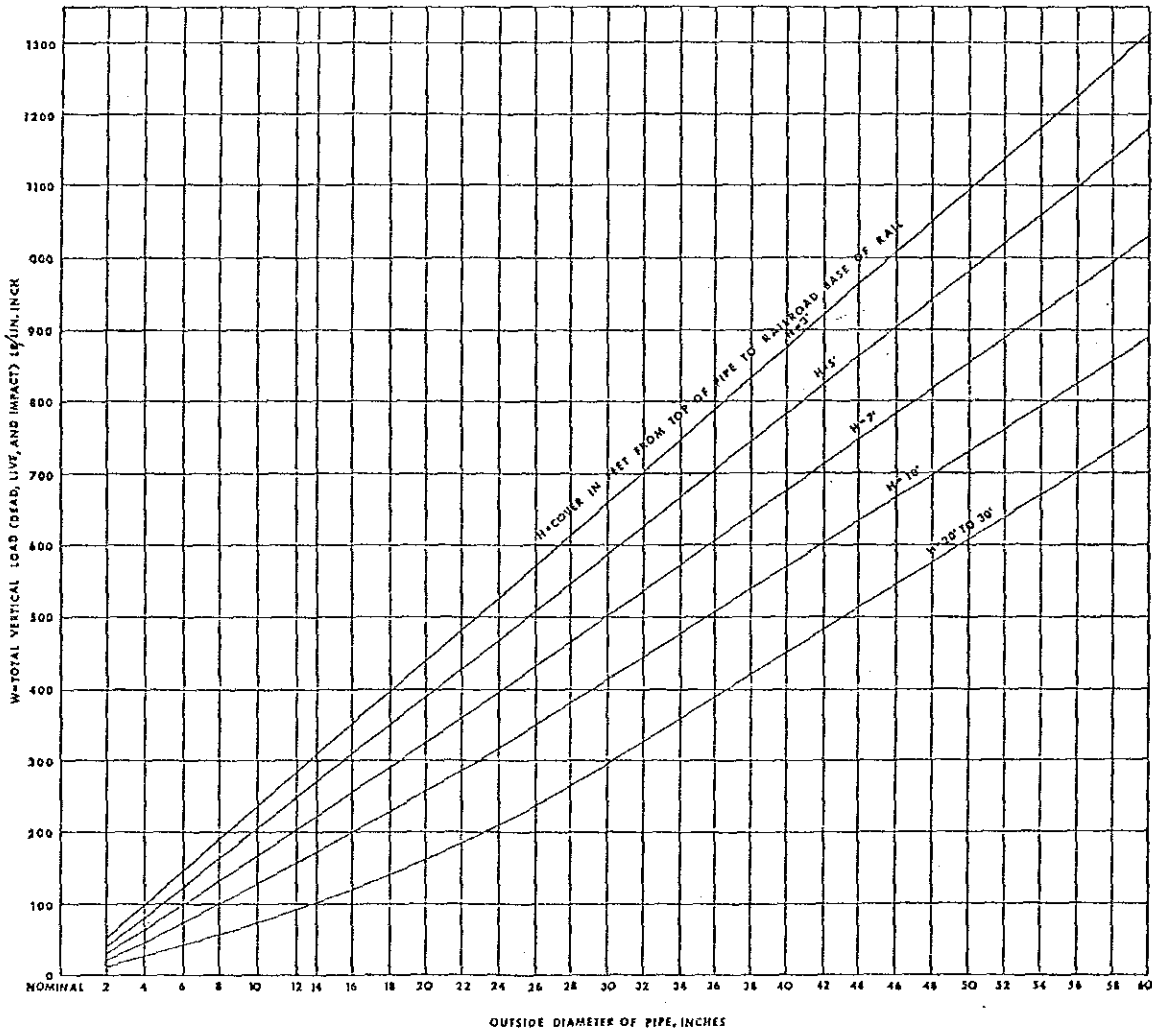
Find: W = 77 #/Lin. in. from Graph II with H = 5 & Nominal D = 4"
 D × T = .9 from Graph III, or by multiplying 4.500 × .2

- Step 1 Draw line from W = 77 through D × T = .9 to intersect Reference Line A at Point "X"
- Step 2 Draw line from D = 4.500 through P = 1500 to intersect Reference Line B at Point "Y"
- Step 3 Draw line from Point "Y" to T = .200, intersecting Reference Line C at Point "Z"
- Step 4 Draw line from Point "Z" to Point "X," intersecting "S."
 Read "S" = 3130 psi for answer.



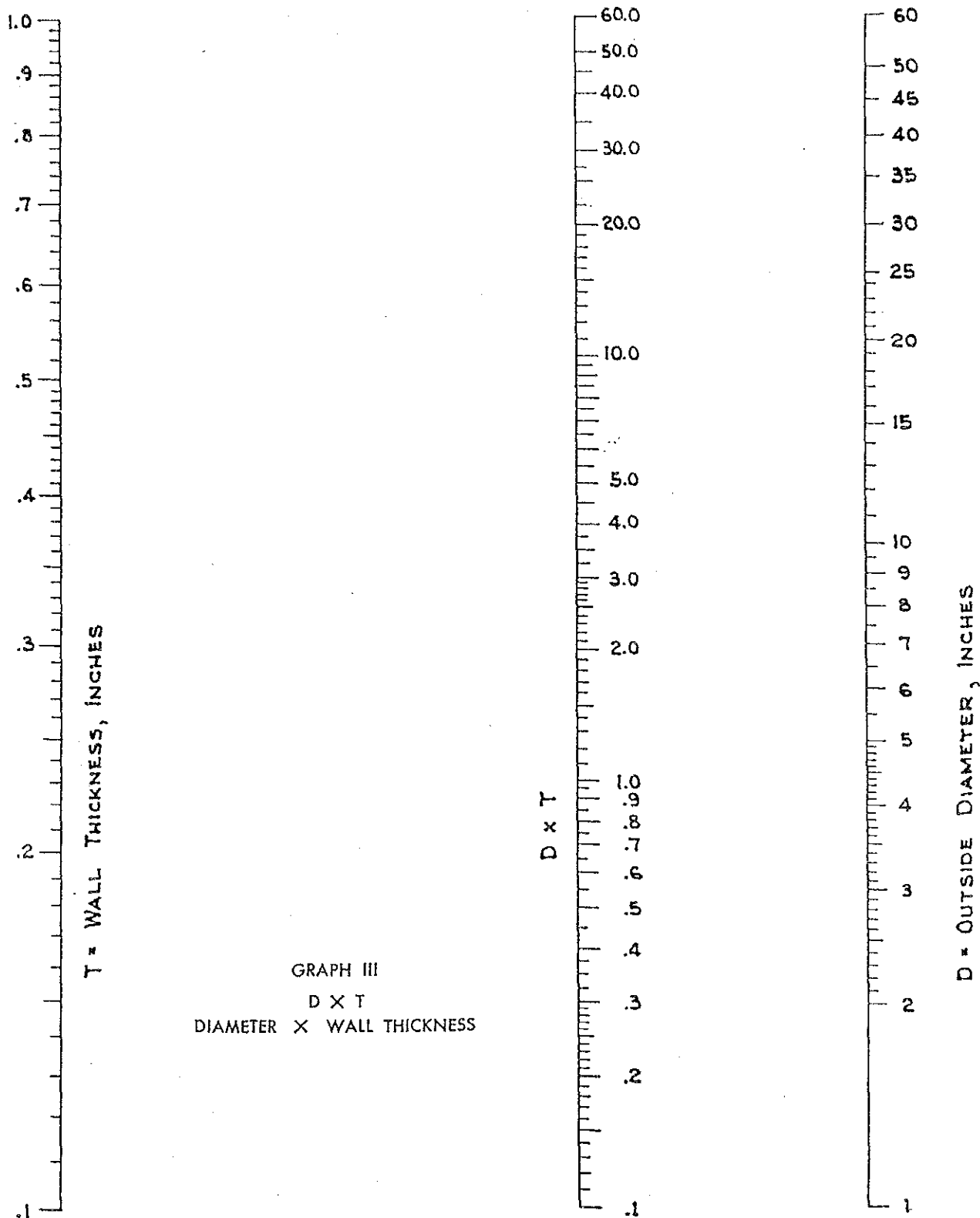
GRAPH I

TOTAL VERTICAL LOADS ON PIPE AT HIGHWAY CROSSINGS

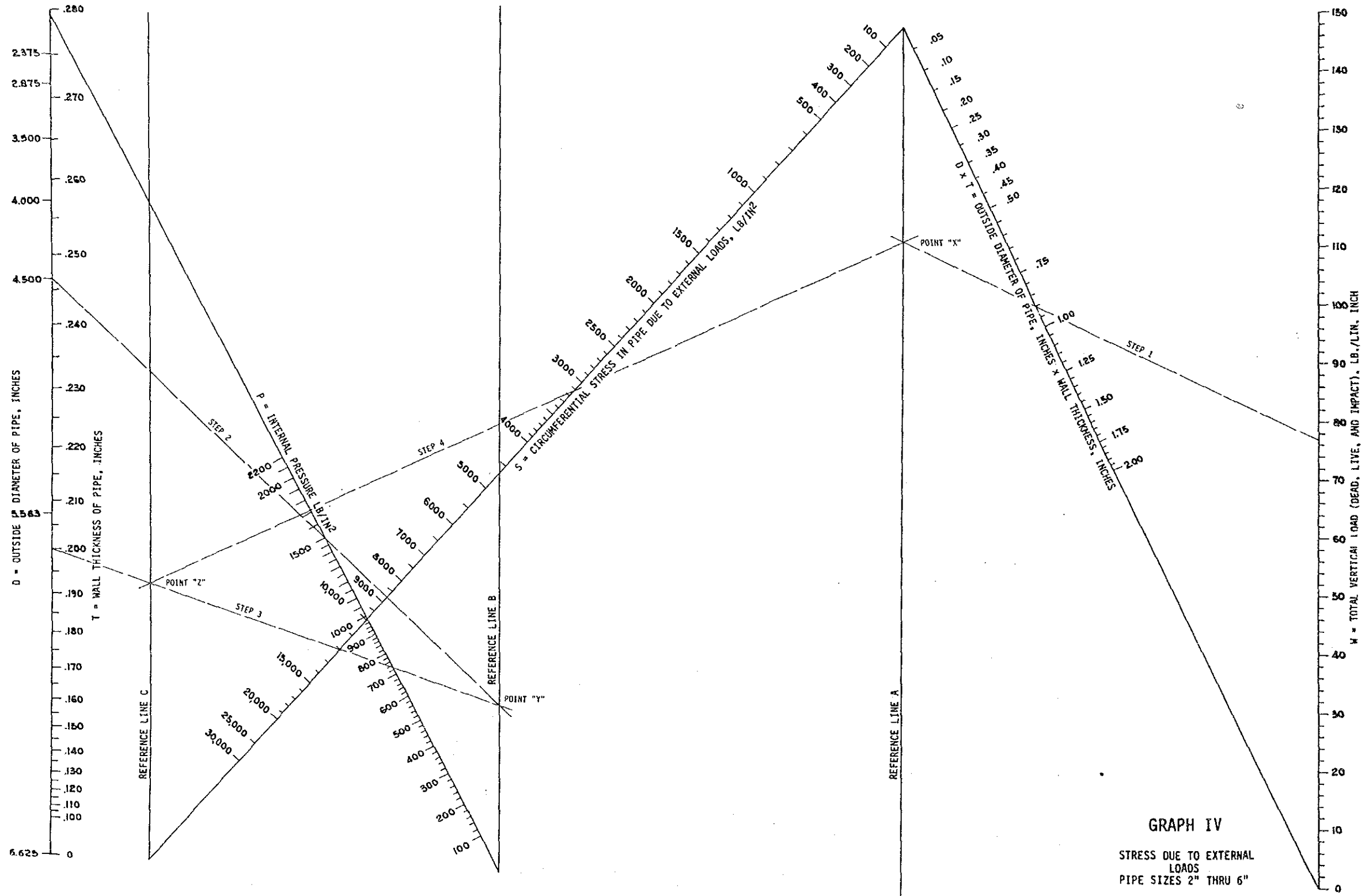


GRAPH II
TOTAL VERTICAL LOADS ON PIPE AT RAILROAD CROSSINGS

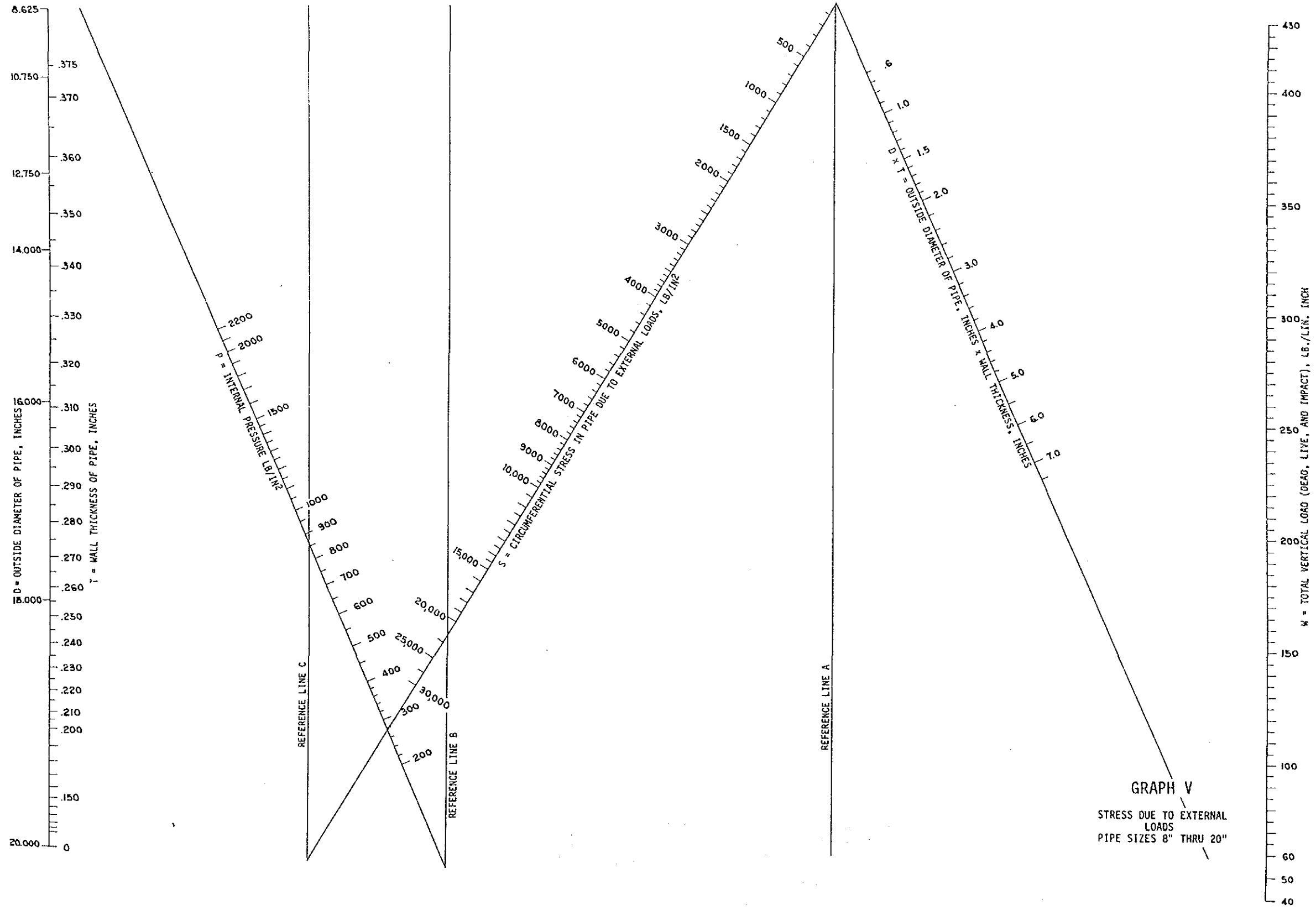
LIQUID PETROLEUM PIPELINES CROSSING RAILROADS AND HIGHWAYS

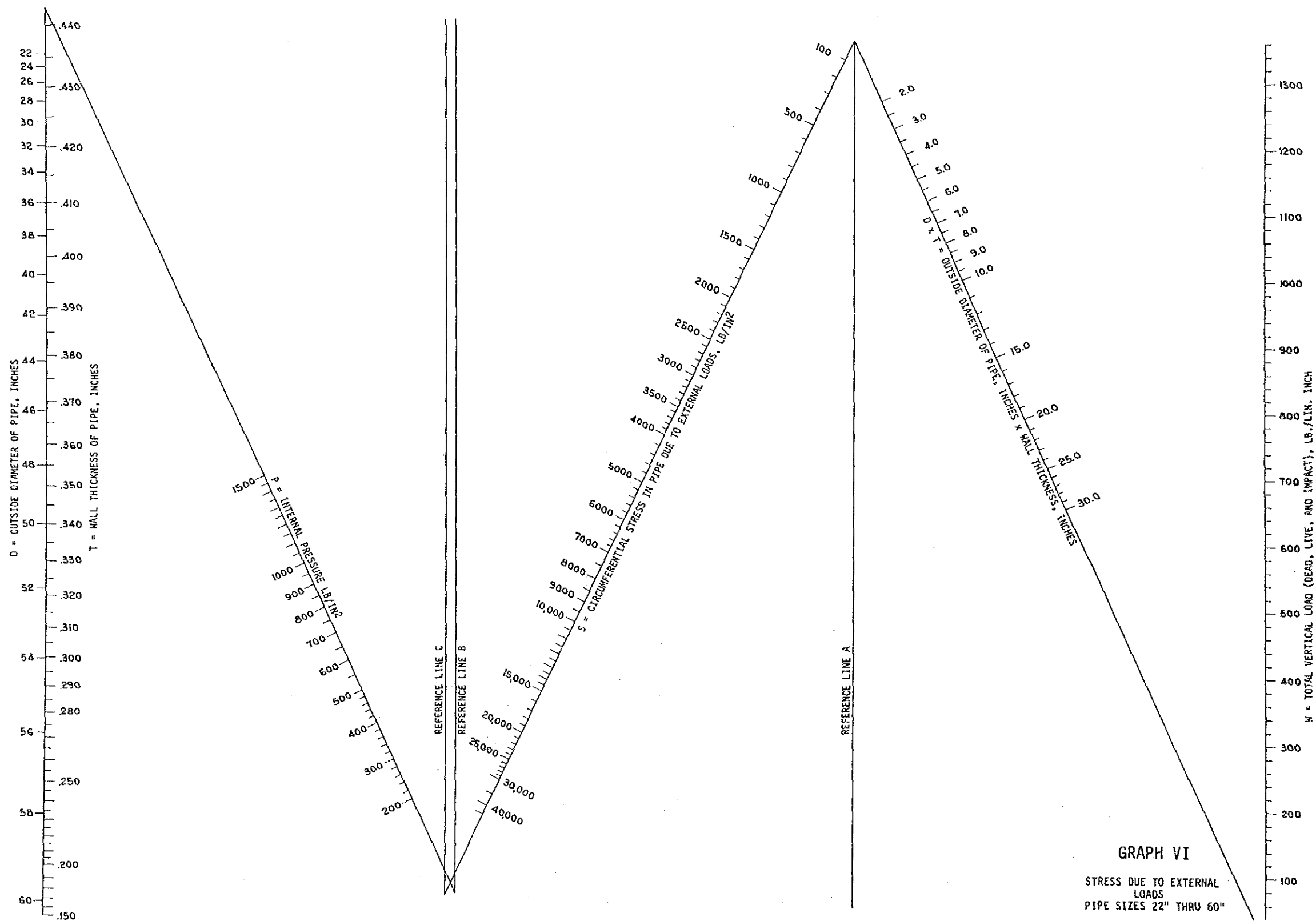


GRAPH III
D X T
DIAMETER X WALL THICKNESS



GRAPH IV
STRESS DUE TO EXTERNAL
LOADS
PIPE SIZES 2" THRU 6"





GRAPH VI
 STRESS DUE TO EXTERNAL
 LOADS
 PIPE SIZES 22" THRU 60"

JICA