SUBCHAPTER H—UTILIZATION AND DISPOSAL

PART 101–45—SALE, ABANDONMENT, OR DESTRUCTION OF PERSONAL PROPERTY

Identical Bids

Section 101–45.318 is added to provide that when an invitation for bids for the sale of personal property results in submission of identical bids consideration shall be given to whether adequate price competition was obtained. This amendment is intended to insure that Federal agencies resolicit the sale if the circumstances do not permit a reasonable determination that the price competition was adequate. This amendment is in response to a decision of the Comptroller General (B–169843(1)), dated December 7, 1970.

The table of contents for Part 101–45 is amended by adding new § 101–45.318 as follows:

Sec.

101–45.318 Identical bids.

Section 101–45.318 is added as follows:

Subpart 101–45.3—Sale of Personal Property

§ 101–45.318 Identical bids.

In addition to complying with the requirements of §§ 101–45.316 and 101–45.317, when an invitation for bids for the sale of personal property results in the submission of identical bids, consideration shall be given to whether adequate price competition was obtained. Whether there is adequate price competition for a given sale is a matter of judgment to be based on the circumstances of the sale. If the circumstances do not permit a reasonable determination that the price competition was adequate, the sale should be resolicited.

(Sec. 205(c), 63 Stat. 390; 40 U.S.C. 486(c))

Effective date. This amendment is effective June 30, 1971.

Dated: June 22, 1971.

ROBERT L. KUNZIG,
Administrator of General Services.

[FR Doc.71–9180 Filed 6–29–71;8:45 am]

Title 49—TRANSPORTATION

Chapter I—Hazardous Materials Regulations Board, Department of Transportation

[Docket No. OPS–5; Amdt. 192–4]

PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS

Requirements for Corrosion Control

This amendment establishes a new Subpart I to Part 192 in Title 49, Code of Federal Regulations, containing the minimum Federal safety standards for the transportation of gas and for pipeline facilities used in this transportation.

On April 30, 1970, the Department issued a notice of proposed rule making, Notice 70–8, containing requirements for corrosion control (35 F.R. 2127, May 6, 1970). Interested persons were invited to participate in the making of the proposed rules by submitting written comments before June 29, 1970.

On June 6, 1970, an amended notice of proposed rule making was published in the FEDERAL REGISTER (Notice 70–10, 35 F.R. 8833) to make certain changes in the proposed rules relating to cast iron and ductile iron pipe. After a request for a public hearing on the requirements of these two notices, a public hearing (see Notice 70–12, 35 F.R. 10596, June 30, 1970) was held on July 20, 1970, and comment was received on the proposed applicability of the requirements to existing pipelines and to cast iron or ductile iron pipe. The information and views presented in the comments and at the hearing have been fully considered, and are reflected in this final rule. Some sections contained in the notice have been consolidated, eliminated, or reorganized and most sections have been renumbered. The deviation table below indicates the corresponding section number in the notice for each section of the final rule.

DERIVATION TABLE

New section	*Proposed section*
192.451	192.451.
192.453	192.481(b).
192.455	192.453, 192.455, 192.457.
192.457	192.467, 192.469, 192.473.
192.459	192.481(a).
192.461	192.455.
192.463	192.457.
192.465	192.475.
192.467	192.463, 192.465, 192.479.
192.469	192.459, 192.477.
192.471	192.461, 192.477.
192.473	192.491
192.475	192.487
192.477	192.487
192.479	192.489.
192.481	192.489.
192.483	192.481, 192.483, 192.485.
192.485	192.483.
192.487	192.485 (a) and (b).
192.489	192.485(c).
192.491	192.493.

Subpart I differs in many respects from the notice upon which it was based. Some changes were made for consistency in terminology and format. Others involve the moving of requirements from one section to another for better organization. Other changes are substantive in nature and are based both on the comments received on the notice and on the recommendations of the Technical Pipeline Safety Standards Committee. Each of these changes is within the general scope of the notice on which it was based.

A number of recommendations included in the comments were beyond the scope of the proposed regulations, and could therefore not be included in the final rule. However, these recommendations will be considered for inclusion in future rule-making actions.

Some of the comments were directed to the overall effect of Subpart I, and these general subjects are discussed below. All other significant changes and comments are discussed in a section-by-section analysis.

Effective date. Section 3(c) of the Natural Gas Pipeline Safety Act requires that standards and amendments thereto prescribed under the Act "shall become effective 30 days after the date of issuance * * * unless the Secretary, for good cause recited, determines an earlier or later effective date is required as a result of the period reasonably necessary for compliance". The notice invited comment on the adequacy of specific proposed effective dates, both as to whether earlier dates would be in the interest of increased safety and whether later dates are indicated by factors of cost or feasibility.

Besides the numerous comments received on proposed effective dates, the question was discussed with the Technical Pipeline Safety Standards Committee. Accordingly, this regulation will become effective 30 days after the date of issue. However, certain specific provisions will not become applicable at once. The primary reason for allowing additional time for these provisions is that the corrosion regulations are new requirements that were not contained in the interim minimum Federal regulations, and it is desirable to allow appropriate leadtime to all affected parties to receive copies of the new regulation and to thoroughly review its requirements, and to make the necessary preparations and arrangements for compliance. This additional leadtime is contained in provisions relating to cathodic protection of new pipelines (§ 192.455(a)(2)); cathodic protection of existing pipelines (§ 192.457 (a) and (b)); interference currents (§ 192.473); internal corrosion control (§ 192.475); atmospheric corrosion control of existing aboveground pipelines (§ 192.479); and corrosion control records (§ 192.491).

Retroactive effect on existing pipelines. Some comments related to the effect of this regulation on existing pipelines, and suggested the insertion of dates in particular sections to make clear that these sections are not intended to apply to installations, repairs or replacements made before the effective date. (See § 192.455(e) (installation of aluminum); § 192.461 (protective coating); § 192.467 (electrical isolation); and § 192.483 (repaired or replaced pipe).) As stated in the preamble when Part 192 was issued, there is no basis for such concern. The Natural Gas Pipeline Safety Act (section 3(b)) makes clear that only standards applying to the extension, operation, replacement, or maintenance, and subsequent inspection and subsequent testing are applicable to pipeline facilities in existence on the date the standards are adopted.

However, provisions applicable to existing lines need not be limited to cases in which a facility is hazardous to life

or property, as asserted in some comments, but are permissible as part of the regular operation and maintenance requirements for existing lines. The determination of areas of active corrosion on existing pipelines by electrical survey, by study of corrosion and leak history records and by leak detection survey, as well as the application of cathodic protection to such areas, or repaired or replaced areas, and subsequent inspection and testing to determine the adequacy and efficacy of corrosion control, are examples of operation, replacement, maintenance, and subsequent testing and inspection specifically permitted under the Act.

Where a particular section applies only to existing pipelines, that is made clear by use of the phrase "pipelines installed before August 1, 1971". (See §§ 192.457, 192.479(b).)

Distinction between high and low stress pipe; distinction between bare and coated pipe. To be consistent with the previously issued subparts of Part 192, the terms "transmission line" and "distribution line" have been substituted for the phrases "pipelines, mains and service lines operating at 20 percent or more of SMYS", and "pipelines, mains, or service lines operating at less than 20 percent of SMYS", which were used in the notice. Some of the comments maintained that the distinction between high- and low-stress pipe, and between bare and coated pipe, was unjustifiable as a basis for differing corrosion control requirements. However, the problems of cathodically protecting existing distribution lines are different from those of existing transmission lines. Special problems make compliance in the case of the distribution lines more difficult, so more time must be allowed for meeting these requirements. In many cases it is more practical to cathodically protect an existing coated transmission line in its entirety than to survey it for "hot spots" and cathodically protect only those areas where active corrosion is found. Consequently, it is required that effectively coated existing transmission lines be cathodically protected within 3 years of the effective date, but 5 years is allowed for existing bare transmission lines, all distribution lines and all station piping.

Distinction based on type of metal. Special provisions deal with specific metals having unique characteristics, such as copper (§ 192.455(c)(1)), aluminum (§ 192.455(e)), and cast iron and ductile iron (§ 192.489). However, the phrase "steel or aluminum pipeline", as used in the notice, has been eliminated, since there was no intention to exclude other types of metallic pipe such as wrought iron.

Section 192.451. This section, stating the scope of the subpart, has been rewritten. The word "pipeline" has now been substituted for the words "gas pipeline facilities" and "pipelines, mains, service lines, and related facilities" which were used in proposed § 192.451, as well as in many other sections of the notice. As defined in § 192.3, "pipeline" means all parts of those physical facilities through which gas moves in transportation, including pipes, valves, and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies. The second sentence of the proposed scope section in the notice was deleted as unnecessary.

Various suggestions were made that the scope section state that these requirements are for the protection of pipelines from "harmful" corrosion, or corrosion "detrimental to safety", or that it state that it prescribes minimum requirements for the protection of pipelines from corrosion, "consistent with public safety", in order to make clear that not every degree or type of existing corrosion imposes an obligation on the operator to take protective steps. These proposals were deemed unnecessary, since their purpose is accomplished by the definition of "active corrosion" in § 192.457(c) as "continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety". Moreover, under §§ 192.485, 192.487, and 192.489, remedial action is required only where corrosion is of the degree or extent described in those sections. In addition, cathodic protection of most existing lines is now required only in "areas in which active corrosion is found" (§§ 192.457(b) and 192.465(e)) thus eliminating any implication that an operator must cathodically protect the pipeline in all areas of existing corrosion, even where the operator has not been able to detect it.

Section 192.453. This section, based on proposed § 192.481(b), which applied only to cathodic protection systems, now applies to all procedures to implement the requirements of this subpart, "including those for the design, installation, operation, and maintenance of cathodic protection systems".

Recommendations that some standards be included to assure the competence of the "person qualified by experience and training in pipeline corrosion control methods", or that such a person be qualified under the terms of the accreditation program of the National Association of Corrosion Engineers, were deemed inappropriate at this time. The word "corrosion specialist", suggested as a substitute for the word "person", was thought to be redundant in view of the additional language, "qualified by experience and training in pipeline corrosion control methods". A person so qualified, but not officially designated as a corrosion specialist, should not be precluded from acting under this section.

Section 192.455. Paragraph (a) of § 192.455 requires, with certain exceptions, protection against external corrosion for all newly constructed pipelines, by means of a combination of external protective coating and cathodic protection.

The proposed regulation would have required new buried pipelines to be "cathodically protected not later than 1 year after completion of construction". Since time must be allowed for the environment to reach a stable level due to changes in soil settling and in oxygen and water content of backfill, before final measurements can be taken to determine adequacy of protection, it is now provided that a properly designed cathodic protection system must be "installed and placed in operation within 1 year". An additional year will then be available under § 192.465 for any adjustments necessary because of changes in the soil following construction.

No differentiation has been made in § 192.455(a) between new transmission and new distribution lines. Except as provided in paragraphs (b) and (c), all new pipelines must be coated and cathodically protected.

New pipe that replaces pipe removed from an existing buried or submerged pipeline because of external corrosion, is covered by § 192.483 (a) and (b), but it should be noted that such new replacement pipe also must be coated and cathodically protected.

Paragraph (b) provides an exception to the requirements of paragraph (a). Many comments recommended that an exception to the coating and cathodic protection requirements, similar to that proposed for new copper pipelines (where the operator can demonstrate by test, investigation or experience in the area of application that a corrosive situation does not exist), should be extended to all new pipelines. This has been done in paragraph (b) of § 192.455, but with additional safeguards. Certain minimum tests for soil resistivity and corrosion accelerating bacteria will be required. These tests are a prerequisite in every instance of an installation made without complying with the requirements of paragraph (a). In addition, within 6 months after such an installation, the operator must conduct tests, including pipe-to-soil potential measurements and soil resistivity measurements at potential profile peak locations, and the pipeline must be cathodically protected in those areas in which the tests indicate a corrosive condition exists.

Paragraph (c) provides an additional exception to the requirements for coating and cathodic protection, for new temporary pipelines, where the operating period of service is not to exceed 5 years beyond installation.

Paragraph (d) provides that even where protection of a new buried pipeline against external corrosion control is not required under one of these exceptions set out in paragraphs (b) or (c), if the pipeline is coated, it must then also be cathodically protected. This is necessary because first leaks can develop sooner on a coated pipeline than they would on the same line left bare, since harmful discharge of current would be concentrated at the breaks in the coating (holidays).

Paragraph (e) of § 192.455 has been modified to incorporate suggested language in regard to installation of aluminum, which is the same as that used in

the 1969 edition of NACE Standard RP-01-69. Comments criticized the term "highly alkaline environment" used in the notice as too vague, and suggested that the use of aluminum should be prohibited in "an environment with a natural pH in excess of 8.0", unless tests indicate its suitability in the particular environment involved.

Finally, it should be noted that no exception to the requirements of § 192.455 is provided for new cast iron or ductile iron. Because of the unique physical characteristics of its corrosion process (graphitization), and because of the normal allowance of extra wall thickness, it was argued in some of the comments and at the hearing on July 20, 1970, that it should not be required that newly installed cast iron or ductile iron be coated and cathodically protected, but that a loose polyethylene wrap should be considered an appropriate coating adequate for proper corrosion control. But moisture and ground water which can enter the loose polyethylene wrap may form a breeding ground for bacteriological corrosion. Moreover, in the event there is a break in the polyethylene wrap and corrosion started, there is no way to apply cathodic protection to prevent further corrosion. The current would be intercepted by the insulating qualities of the polyethylene sheet, and cathodic protection would only reach the metal under the break. The other areas under the wrap that may be corroding from water and access to oxygen would not be cathodically protected. Therefore, new cast iron and ductile iron have not been treated differently from steel and a coating bonded to the pipe and cathodic protection are required.

Section 192.457. Whereas § 192.455, which deals with new pipelines, makes no distinction for corrosion control purposes, between new transmission lines and new distribution lines, generally requiring both to be coated and cathodically protected in the entirety, § 192.457, which applies to existing pipelines, has different requirements for coated transmission lines than for distribution lines.

Several comments pointed out that coated pipe with deteriorated coating that is no longer effective should be treated as bare pipe for corrosion control purposes. Accordingly, the proposed requirement that coated pipelines operating at 20 percent or more of SMYS must be cathodically protected in the entirety within 3 years, now applies only to existing buried or submerged transmission lines that have an effective external coating (§ 192.457(a)). The effectiveness of the coating is to be established by tests to determine the current requirements of the pipeline for cathodic protection. Coating is deemed ineffective if the cathodic protection current requirements are substantially the same as if the pipeline were bare.

Paragraph (b) of § 192.457 provides that except for cast iron or ductil bare transmition lines (including those with ineffective coating), bare or coated station piping, and bare or coated distribution lines, all must be cathodically protected within 5 years in areas in which active corrosion is found. "Active corrosion" is defined in paragraph (c).

The proposed regulation would have required cathodic protection of existing distribution lines and bare transmission lines within 5 years, "in areas in which corrosion exists". The operator was to determine these areas by electrical survey or other means. There appeared to be some concern in the comments that the proposal contained an absolute requirement that every area of existing corrosion be found and protected against within 5 years. This was apparently felt to be impossible for some distribution lines, since determination of areas of corrosion by electrical survey is often impractical in the case of distribution lines (such as those under paved city streets and sidewalks). This has now been changed to require cathodic protection "in areas in which active corrosion is found", and that areas of active corrosion be determined by electrical survey, or "where electrical survey is impractical, by the study of corrosion and leak history records, by leak detection survey, or by other means". This modified language should make clear that the operator is not obligated to take action concerning active corrosion which cannot be found by the required methods. The operator must conduct electrical surveys in areas where they are practical. In other areas, he must make diligent efforts, utilizing leak surveys, all available records such as corrosion and leak history records, or other appropriate methods, to discover active corrosion. Leak surveys could be made by such commonly used means of leak detection as flame ionization, infrared detectors and combustible gas detectors. If these efforts do not indicate the presence of active corrosion, the operator may assume that none exists, until such time as an actual indication of its existence arises. Moreover, it should be noted that an operator may apply for a waiver if it is shown that justification exists for not meeting the 5-year time period in cathodically protecting "hot spots" found by the methods set out in § 192.457(b).

In summary, § 192.457 now provides that existing, effectively coated transmission lines must be cathodically protected in the entirety within 3 years, while all other existing lines (including bare transmission lines, bare or coated buried station piping operating at above or below 20 percent of SMYS, and bare or coated distribution lines) must be cathodically protected within 5 years in areas in which active corrosion is found. On new construction, § 197.455 provides that all new pipe (both transmission and distribution) must be coated and cathodically protected within 1 year of installation unless the operator can demonstrate that a corrosive environment does not exist.

Section 192.459. The requirement that whenever any buried piping is exposed for any reason it must be examined for evidence of external corrosion has been modified. Comments suggested that it be made clear that this requirement would not necessitate tearing off good coating to examine the pipe. As the section is rewritten, it requires only that "Whenever an operator has knowledge" that any portion of buried pipeline is exposed, the pipe must be examined for evidence of external corrosion "if the pipe is bare or if the coating is deteriorated".

Section 192.461. This section, dealing with protective coating, has been slightly reworded.

Subparagraph (a)(2) requires a protective external coating to have sufficient adhesion to the metal surface to "effectively resist" (rather than "prevent") underfilm migration of moisture, in response to comments asserting that the coating could not absolutely prevent underfilm migration of water.

Paragraph (c) relating to inspection of coating prior to lowering the pipe and backfilling, now requires repair only of "any damage detrimental to effective corrosion control", since the comments indicated that minor damage often does not require repair.

Paragraph (e) is a new paragraph requiring that precautions be taken to minimize damage to coating during installation by boring or driving. This paragraph, although proposed in Notice 70-3, Subpart H (Customer's Meters, Service Regulators, and Service Lines) as proposed § 192.429(b), was omitted in the final rule for that subpart, since it was considered to be more properly a part of the corrosion subpart.

Section 192.463. Paragraph (a) of this section refers to the criteria for cathodic protection contained in a new Appendix D, rather than to paragraph 6.3 of the 1969 edition of NACE Standard RP-01-69. However, it should be noted that the criteria in the appendix are substantially the same as those in the NACE Standard. In addition, it is now provided that "If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria." It was felt that the possibility of an exception should be provided, but that where the criteria are applicable, they should be followed.

In accordance with several suggested comments, paragraph (d) of proposed section 192.457 was deleted as unnecessary, and paragraph (f) of that proposed section has been reworded to eliminate the requirement that the cathodic protection "assure proper performance of the protective coating system", and instead now requires that the amount of cathodic protection must be controlled "so as not to damage the protective coating or the pipe".

Section 192.465. The section on monitoring differs from the proposal in several ways. It applies to monitoring of both new and existing lines. In paragraph (a), offshore pipelines, where monitoring is impractical, have been excepted. The phrase "at intervals not exceeding 12 months" has been changed to "at least once each calendar year, with intervals not exceeding 15 months". The

purpose of the change was to allow seasonal considerations in scheduling annual inspections, and it was felt that 3 months' leeway would provide sufficient flexibility for this purpose.

Instead of requiring that each interference bond be electrically checked for proper performance at intervals not exceeding 2 months, it is now provided in § 192.465(c) that each interference bond "whose failure would jeopardize structure protection", must be electrically checked for proper performance at intervals not exceeding 2 months. Each other interference bond must be checked at least annually, but with intervals not exceeding 15 months.

Section 192.467. This section, entitled "External corrosion control: Electrical isolation", is based on the proposed sections which dealt with electrical insulation on new construction and existing pipelines, and with clearance between pipe and underground structures on new construction.

Paragraph (a) still requires that each buried pipeline must be electrically isolated from other underground metallic structures, but in accordance with suggestions received, it permits an exception if the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

Paragraph (b) of § 192.467, requires that an insulating device be installed where electrical isolation of a portion of a pipeline is necessary to facilitate corrosion control. It was felt that this performance-type language is sufficient to cover such specific situations as the necessary insulation of ferrous valves and fittings installed in underground copper service lines.

Paragraph (c) of § 192.467, providing for electrical isolation of the pipeline from metallic casings that are a part of the underground system, now permits other measures to minimize corrosion of the pipeline inside the casing, where isolation is impractical. The additional language was added in response to comments suggesting that this requirement should not apply to a service going through a casing in a cement or masonry wall, where the casing is above ground. Other measures that may be taken include placing a noncorrosive casing filler made of high dielectric material in the annular space between the pipe and casing.

Paragraph (f) concerning protection against damage due to fault currents and lightning now refers to "areas where fault currents or unusual risk of lightning may be anticipated".

Proposed § 192.463(e) has been eliminated as unnecessary, since the specific situations described in that paragraph are covered by the more performance-oriented type of language of § 192.467 (a) and (b).

Section 192.473. This section now requires that after July 31, 1973, each operator whose pipeline system is subjected to stray currents must have a continuing program to minimize the detrimental effects of such currents. Comments indicated that the 12-month leadtime originally proposed was insufficient for the acquisition of manpower and equipment for such a program.

Sections 192.475 and 192.477. These sections are essentially the same as proposed. However, paragraph (c) of § 192.475, providing that gas containing more than 0.1 grain of hydrogen sulfide per 100 standard cubic feet may not be stored in pipe-type or bottle-type holders, is newly added. It was originally proposed as part of Notice 70-7, Subpart D (Design of Piping System Components and Facilities), as proposed § 192.168(b), but was not included in Subpart D, since it was considered to be more appropriately within the corrosion subpart.

In response to comments, § 192.477 makes clear that coupons are required only "if corrosive gas is being transported". However, it should be noted that § 192.475(b) applies also in cases where corrosive gas is not being transported, but internal corrosion is caused by other factors.

Sections 192.479 and 192.481. The sections on atmospheric corrosion control have been completely rewritten. The proposal would have required all new and existing steel, cast iron and ductile iron aboveground pipelines to be coated or jacketed within 1 year for the prevention of atmospheric corrosion. This requirement would have applied to aluminum and copper pipe only when exposed to an atmospheric environment corrosive to those metals.

The comments objected to the 1 year time limitation as insufficient, and also suggested that coating only be required where atmospheric corrosion was actually taking place. While § 192.479(a), applying to newly installed aboveground pipelines, still requires that such pipelines be cleaned and coated with a material suitable for the prevention of atmospheric corrosion, it now also allows for an exception to this requirement if the operator can demonstrate by tests, investigation or experience in the area of application that a corrosive atmosphere does not exist.

Paragraph (b), applying to existing aboveground pipelines, now requires that they be cleaned and coated within 3 years, but only in areas where atmospheric corrosion has taken place on the pipeline.

Section 192.481 requires that at intervals not exceeding 3 years, aboveground pipelines must be reevaluated and necessary action taken to maintain protection against atmospheric corrosion.

Section 192.483. This section on general remedial measures requires that all new replacement pipe installed because of external corrosion (including cast iron or ductile iron) must be coated and cathodically protected, as is required for new pipelines in § 192.455(a). The exception to these requirements allowed for new pipelines in § 192.455(b) (where the operator can demonstrate that a corrosive environment does not exist), would not apply to replacement pipe, where replacement is necessitated by external corrosion, since it would normally be impossible to make such a demonstration. However, it should be noted that if copper pipe is used to replace corroded steel, cast iron or ductile iron, the provisions of § 192.455(c)(2) might permit the use of uncoated copper replacement without cathodic protection, in the highly unlikely event that the operator could demonstrate by test that the environment (which had been corrosive to the other metals) was not corrosive to copper.

Except for repaired cast iron or ductile iron, a segment of buried pipe that is repaired because of external corrosion must be cathodically protected. Repaired cast iron and ductile iron are excepted from the cathodic protection requirement because the density of cathodic protection current, as normally provided by galvanic anodes, is not sufficient to reach the cast iron beneath the graphitized surface so as to prevent further graphitization. Current of such low density from such low electromotive force collects on the graphitized area and continues through adjacent cast iron and back to the galvanic anode source without providing protection.

It should be noted that at this time, the regulations are not requiring that repaired pipe be coated in every case, since it is not always practical to do so, especially where the repair is in a very small area, or on a bare pipeline. However, where the repaired segment is part of an effectively coated pipeline, the repaired area would also have to be coated.

The proposed regulation provided that generally corroded pipe would not need to be replaced or repaired if the operating pressure were reduced so as to be commensurate with the specified limits on operating pressure based on the actual remaining wall thickness. That option is retained in § 192.485(a) covering general corrosion on transmission lines. However, § 192.487(a) dealing with general corrosion on distribution lines does not provide the option of reducing operating pressure instead of replacing the pipe. Since such lines are already operating at low pressure, the reduction of pressure would be meaningless. In this connection, it should be noted that the minimum percentage of remaining wall thickness required in such cases is not contingent on internal pressure (hoop stress) but on external loads.

Sections 192.485 and 192.487. The proposed regulations dealing with remedial measures for isolated corrosion pitting were the subject of considerable comment. Based on the information available at this time, the Department has developed the following regulations which are considered adequate to protect the public:

§ 192.485 Remedial measures: transmission lines. * * *

(b) *Localized corrosion pitting.* Each segment of transmission line pipe with localized corrosion pitting must be replaced or repaired, or the operating pressure must be reduced based on the actual remaining wall

thickness in the pits, if either of the following exists:

(1) The diameter of the pits as measured at the surface of the pipe is greater than three times the nominal wall thickness of the pipe.

(2) The remaining wall thickness at the bottom of the pits is less than 30 percent of the nominal wall thickness.

§ 192.487 Remedial measures: distribution lines other than cast iron or ductile iron lines. * * *

(b) *Localized corrosion pitting.* Except for cast iron or ductile iron pipe, each segment of distribution line pipe with localized corrosion pitting must be replaced or repaired if either of the following exists:

(1) The diameter of the pits, as measured at the surface of the pipe, is greater than five times the nominal wall thickness of the pipe.

(2) The remaining wall thickness at the bottom of the pits is less than 20 percent of the nominal wall thickness.

However, we are aware that the completion of research now going on is anticipated in the near future, on the subject of the effect of pitting on the integrity of pipe, requiring repair or replacement for the protection of the public. Accordingly, the Department intends to delay the issuance of these regulations on localized corrosion pitting, in order to hold a public hearing on July 20, 1971, to explore the problem further. (See p. 12309 of this issue.) This will give interested persons an opportunity to present new material or to demonstrate that the criteria set out above are inappropriate.

In issuing this rule, the Department has included general criteria on corrosion pitting in §§ 192.485(b) and 192.487(b) as interim regulations. These interim regulations give the operator discretion to determine the severity of pitting that requires remedial action.

Unless the hearing discloses information indicating other criteria are more appropriate, the regulations set forth above in this preamble will be substituted for the interim provisions within 60 to 90 days from the effective date of this regulation.

Section 192.491. The comments on this provision urged that construction drawings and records should not both be required, and that records or drawings should not be required as to all neighboring structures. In response to these comments, § 192.491(a) now requires that "records or maps" be maintained to show the location of cathodically protected piping, cathodic protection facilities "other than unrecorded galvanic anodes installed prior to August 1, 1971", and neighboring structures that are "bonded to" the cathodic protection system.

In response to other comments urging that the retention of all records of tests, surveys, and inspections is unnecessary and unduly burdensome, paragraph (b) now provides for retention only of records, tests, and inspections in sufficient detail to demonstrate the adequacy of corrosion control measures, or, in the case of unprotected pipelines, that a corrosive condition does not exist.

Appendix D. An appendix has been added, setting out criteria for cathodic protection required by § 192.463(a), and methods of determining such measurements as voltage, voltage shifts, and polarization voltage shifts. These criteria and methods of measurement are based on the 1969 issue of the National Association of Corrosion Engineers' Standard RP–01–69, Recommended Practice—Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

Report of Technical Pipeline Safety Standards Committee. Section 4 of the Natural Gas Pipeline Safety Act requires that all proposed standards and amendments to such standards be submitted to the Committee and that the Committee be afforded a reasonable opportunity to prepare a report on the "technical feasibility, reasonableness, and practicality of each such proposal". This amendment to Part 192 has been submitted to the Technical Committee and that Committee has submitted a favorable report. The Committee's report and the minority views of the Committee member who disagreed with the majority report are set forth below.

JUNE 21, 1971.

Memorandum to: The Secretary of Transportation, Attention: Joseph C. Caldwell, Acting Director Office of Pipeline Safety.
From: Secretary, Technical Pipeline Safety Standards Committee.
Subject: Office of Pipeline Safety Proposed Requirements For Corrosion Control (Part 192, Subpart I).

The following letter and attachments represent an official report by the Technical Pipeline Safety Standards Committee concerning the Committee action related to "Requirements for Corrosion Control (Part 192, Subpart I)" which the Office of Pipeline Safety proposes to adopt as a part of Minimum Federal Safety Standards: Transportation of Natural and Other Gas by Pipeline.

The Committee reviewed proposals of the Office of Pipeline Safety at a meeting held on April 13–14, 1971, and through an informal ballot procedure recommended modification to the OPS proposed regulations. The Office of Pipeline Safety considered the recommendations of the Technical Committee and prepared a revised draft regulation which reflected recommendations of the Committee. The revised draft regulation accompanied by a "Discussion of Technical Committee Recommendations" prepared by OPS was distributed to the membership of the Committee on May 4, 1971, by the undersigned together with a formal letter-ballot.

The results of the letter-ballot as finally tabulated reveal that 13 members of the Committee approved the proposed regulation as being technically feasible, reasonable and practicable. One member disapproved the proposed regulation.

Attached, as Item A, are the minority views expressed by the dissenting Committee member.

Also attached, as Item B, is a summary of views expressed by Committee members who voted in favor of the proposed regulation but disagreed with minor specifics.

LOUIS W. MENDONSA.

EXPLANATION OF THE DISAPPROVAL BY FREDERIC A. LANG OF THE PROPOSED MAJORITY REPORT ON THE PROPOSED PART 192 SUBPART I "REQUIREMENTS FOR CORROSION CONTROL."

As a member of the Technical Pipeline Safety Standards Committee, I disapprove of the proposed majority report because it is less than adequate for providing safety to the public living beside gas pipelines, distribution lines, and mains.

Design and operation of pipelines as regulated by Federal Pipeline Safety Standards Part 192 already issued except for this Subpart I, does not contemplate any weakening of the pipe wall by corrosion, therefore, the "Requirements of Corrosion Control" as proposed, should guarantee, within practical limits, that corrosion does not occur. Unfortunately, the regulations as drafted are less than adequate to prevent a dangerous degree of corrosion.

My comments on the need for better corrosion control appear in the transcript of the Committee meetings held April 13 and 14, 1971, to discuss the proposed regulation. In summary, my recommendations are that cathodic protection be used on all piping at all times to prevent corrosion and that scientifically designed sampling be used to determine whether corrosion has occurred. When corrosion has occurred the piping should be replaced or downrated in accordance with the remaining wall thickness available to contain the pressurized gas.

FREDERIC A. LANG.

This regulation is issued under the authority of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. § 1671 et. seq.), Part 1 of the Regulations of the Office of the Secretary of Transportation (49 CFR Part 1), and the delegation of authority to the Director, Office of Pipeline Safety, dated November 6, 1968 (33 F.R. 16468).

In consideration of the foregoing, a new Subpart I is added to Part 192 of Title 49 of the Code of Federal Regulations, effective August 1, 1971, to read as set forth below.

Issued in Washington, D.C., on June 25, 1971.

JOSEPH C. CALDWELL,
Acting Director,
Office of Pipeline Safety.

Subpart I—Requirements for Corrosion Control

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AUTHORITY: The Provisions of this Subpart I issued under Natural Gas Pipeline Act of 1968 (49 U.S.C. sec. 1671 et seq., Part I regulations of Office of the Secretary of Transportation, 49 CFR Part I, and delegation of authority to Director, Office of Pipeline Safety, 33 F.R. 16468.

Subpart I—Requirements for Corrosion Control

§ 192.451 Scope.

This subpart prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion.

§ 192.453 General.

Each operator shall establish procedures to implement the requirements of this subpart. These procedures, including those for the design, installation, operation and maintenance of cathodic protection systems, must be carried out by, or under the direction of, a person qualified by experience and training in pipeline corrosion control methods.

§ 192.455 External corrosion control: buried or submerged pipelines installed after July 31, 1971.

(a) Except as provided in paragraphs (b) and (c) of this section, each buried or submerged pipeline installed after July 31, 1971 must be protected against external corrosion, including the following:

(1) It must have an external protective coating meeting the requirements of § 192.46.

(2) It must have a cathodic protection system designed to protect the pipeline in its entirety in accordance with this subpart, installed and placed in operation within one year after completion of construction.

(b) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience in the area of application, including, as a minimum, soil resistivity measurements and tests for corrosion accelerating bacteria, that a corrosive environment does not exist. However, within 6 months after an installation made pursuant to the preceding sentence, the operator shall conduct tests, including pipe-to-soil potential measurements with respect to either a continuous reference electrode or an electrode using close spacing, not to exceed 20 feet, and soil resistivity measurements at potential profile peak locations, to adequately evaluate the potential profile along the entire pipeline. If the tests made indicate that a corrosive condition exists, the pipeline must be cathodically protected in accordance with paragraph (a) (2) of this section.

(c) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience that—

(1) For a copper pipeline, a corrosive environment does not exist; or

(2) For a temporary pipeline with an operating period of service not to exceed 5 years beyond installation, corrosion during the 5-year period of service of the pipeline will not be detrimental to public safety.

(d) Notwithstanding the provisions of paragraph (b) or (c) of this section, if a pipeline is externally coated, it must be cathodically protected in accordance with paragraph (a) (2) of this section.

(e) Aluminum may not be installed in a buried or submerged pipeline if that aluminum is exposed to an environment with a natural pH in excess of 8, unless tests or experience indicate its suitability in the particular environment involved.

§ 192.457 External corrosion control: buried or submerged pipelines installed before August 1, 1971.

(a) Except for buried piping at compressor, regulator, and measuring stations, each buried or submerged transmission line installed before August 1, 1971, that has an effective external coating must, not later than August 1, 1974, be cathodically protected along the entire area that is effectively coated, in accordance with this subpart. For the purposes of this subpart, a pipeline does not have an effective external coating if its cathodic protection current requirements are substantially the same as if it were bare. The operator shall make tests to determine the cathodic protection current requirements.

(b) Except for cast iron or ductile iron, each of the following buried or submerged pipelines installed before August 1, 1971, must, not later than August 1, 1976, be cathodically protected in accordance with this subpart in areas in which active corrosion is found:

(1) Bare or ineffectively coated transmission lines.

(2) Bare or coated pipes at compressor, regulator, and measuring stations.

(3) Bare or coated distribution lines. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of corrosion and leak history records, by leak detection survey, or by other means.

(c) For the purpose of this subpart, active corrosion means continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety.

§ 192.459 External corrosion control: examination of buried pipeline when exposed.

Whenever an operator has knowledge that any portion of a buried pipeline is exposed, the exposed portion must be examined for evidence of external corrosion if the pipe is bare, or if the coating is deteriorated. If external corrosion is found, remedial action must be taken to the extent required by § 192.483 and the applicable paragraphs of §§ 192.485, 192.487, or 192.489.

§ 192.461 External corrosion control: protective coating.

(a) Each external protective coating, whether conductive or insulating, applied for the purpose of external corrosion control must—

(1) Be applied on a properly prepared surface;

(2) Have sufficient adhesion to the metal surface to effectively resist underfilm migration of moisture;

(3) Be sufficiently ductile to resist cracking;

(4) Have sufficient strength to resist damage due to handling and soil stress; and

(5) Have properties compatible with any supplemental cathodic protection.

(b) Each external protective coating which is an electrically insulating type must also have low moisture absorption and high electrical resistance.

(c) Each external protective coating must be inspected just prior to lowering the pipe into the ditch and backfilling, and any damage detrimental to effective corrosion control must be repaired.

(d) Each external protective coating must be protected from damage resulting from adverse ditch conditions or damage from supporting blocks.

(e) If coated pipe is installed by boring, driving, or other similar method, precautions must be taken to minimize damage to the coating during installation.

§ 192.463 External corrosion control: cathodic protection.

(a) Each cathodic protection system required by this subpart must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D of this subpart. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.

(b) If amphoteric metals are included in a buried or submerged pipeline containing a metal of different anodic potential—

(1) The amphoteric metals must be electrically isolated from the remainder of the pipeline and cathodically protected; or

(2) The entire buried or submerged pipeline must be cathodically protected at a cathodic potential that meets the requirements of Appendix D of this part for amphoteric metals.

(c) The amount of cathodic protection must be controlled so as not to damage the protective coating or the pipe.

§ 192.465 External corrosion control: monitoring.

(a) Except where impractical on offshore pipelines, each pipeline that is under cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of § 192.463. However, if tests at those intervals are impractical for separately protected service lines or short sections of protected mains, not in excess of 100 feet, these service lines and mains may be surveyed on a sampling basis. At least 10 percent of these protected structures, distributed over the entire system, must be surveyed each calendar year, with a different 10 percent checked each subsequent year, so that the entire system is tested in each 10-year period.

(b) At intervals not exceeding 2 months, each cathodic protection rectifier or other impressed current power source must be inspected to ensure that it is operating.

(c) At intervals not exceeding 2 months, each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection, must be electrically checked for proper performance. Each other interference bond must be checked at least once each calendar year, but with intervals not exceeding 15 months.

(d) Each operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring.

(e) After the initial evaluation required by paragraphs (b) and (c) of § 192.455 and paragraph (b) of § 192.457, each operator shall, at intervals not exceeding 3 years, reevaluate its unprotected pipelines and cathodically protect them in accordance with this subpart in areas in which active corrosion is found. The operator shall determine the areas of active corrosion by electrical survey, or where electrical survey is impractical, by the study of corrosion and leak history records, by leak detection survey, or by other means.

§ 192.467 External corrosion control: electrical isolation.

(a) Each buried or submerged pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

(b) An insulating device must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control.

(c) Except for unprotected copper inserted in ferrous pipe, each pipeline must be electrically isolated from metallic casings that are a part of the underground system. However, if isolation is not achieved because it is impractical, other measures must be taken to minimize corrosion of the pipeline inside the casing.

(d) Inspection and electrical tests must be made to assure that electrical isolation is adequate.

(e) An insulating device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.

(f) Where a pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents or unusual risk of lightning may be anticipated, it must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices.

§ 192.469 External corrosion control: test stations.

Except where impractical on offshore and wet marsh area pipelines, each pipeline under cathodic protection required by this subpart must have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection.

§ 192.471 External corrosion control: test leads.

(a) Each test lead wire must be connected to the pipeline so as to remain mechanically secure and electrically conductive.

(b) Each test lead wire must be attached to the pipeline so as to minimize stress concentration on the pipe.

(c) Each bared test lead wire and bared metallic area at point of connection to the pipeline must be coated with an electrical insulating material compatible with the pipe coating and the insulation on the wire.

§ 192.473 External corrosion control: interference currents.

(a) After July 31, 1973, each operator whose pipeline system is subjected to stray currents shall have in effect a continuing program to minimize the detrimental effects of such currents.

(b) Each impressed current type cathodic protection system or galvanic anode system must be designed and installed so as to minimize any adverse effects on existing adjacent underground metallic structures.

§ 192.475 Internal corrosion control: general.

(a) After July 31, 1972, corrosive gas may not be transported by pipeline, unless the corrosive effect of the gas on the pipeline has been investigated and steps have been taken to minimize internal corrosion.

(b) Whenever any pipe is removed from a pipeline for any reason, the internal surface must be inspected for evidence of corrosion. If internal corrosion is found—

(1) The adjacent pipe must be investigated to determine the extent of internal corrosion;

(2) Replacement must be made to the extent required by the applicable paragraphs of § 192.485, § 192.487, or § 192.489; and

(2) Steps must be taken to minimize the internal corrosion.

(c) Gas containing more than 0.1 grain of hydrogen sulfide per 100 standard cubic feet may not be stored in pipe-type or bottle-type holders.

§ 192.477 Internal corrosion control: monitoring.

If corrosive gas is being transported, coupons or other suitable means must be used to determine the effectiveness of the steps taken to minimize internal corrosion. After July 31, 1972, each coupon or other means of monitoring internal corrosion must be checked at intervals not exceeding 6 months.

§ 192.479 Atmospheric corrosion control: general.

(a) *Pipelines installed after July 31, 1971.* Each aboveground pipeline or portion of a pipeline installed after July 31, 1971 that is exposed to the atmosphere must be cleaned and either coated or jacketed with a material suitable for the prevention of atmospheric corrosion. An operator need not comply with this paragraph, if the operator can demonstrate by test, investigation, or experience in the area of application, that a corrosive atmosphere does not exist.

(b) *Pipelines installed before August 1, 1971.* Not later than August 1, 1974, each operator having an aboveground pipeline or portion of a pipeline installed before August 1, 1971 that is exposed to the atmosphere, shall—

(1) Determine the areas of atmospheric corrosion on the pipeline;

(2) If atmospheric corrosion is found, take remedial measures to the extent required by the applicable paragraphs of §§ 192.485, 192.487, or 192.489; and

(3) Clean and either coat or jacket the areas of atmospheric corrosion on the pipeline with a material suitable for the prevention of atmospheric corrosion.

§ 192.481 Atmospheric corrosion control: monitoring.

After meeting the requirements of paragraphs (a) and (b) of § 192.479, each operator shall, at intervals not exceeding 3 years, reevaluate its aboveground pipelines or portions of pipelines that are exposed to the atmosphere and take remedial action wherever necessary to maintain protection against atmospheric corrosion.

§ 192.483 Remedial measures: general.

(a) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must have a properly prepared surface and must be provided with an external protective coating that meets the requirements of § 192.461.

(b) Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must be cathodically protected in accordance with this subpart.

(c) Except for cast iron or ductile iron pipe, each segment of buried or submerged pipe that is required to be repaired because of external corrosion must

be cathodically protected in accordance with this subpart.

§ 192.485 Remedial measures: transmission lines.

(a) *General corrosion.* Each segment of transmission line pipe with general corrosion and with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline, must be replaced or the operating pressure reduced commensurate with the actual remaining wall thickness. However, if the area of general corrosion is small, the corroded pipe may be repaired. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.

(b) *Localized corrosion pitting.* Each segment of transmission line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired, or the operating pressure must be reduced commensurate with the strength of the pipe, based on the actual remaining wall thickness in the pits.

§ 192.487 Remedial measures: distribution lines other than cast iron or ductile iron lines.

(a) *General corrosion.* Except for cast iron or ductile iron pipe, each segment of generally corroded distribution line pipe with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline, or a remaining wall thickness less than 30 percent of the nominal wall thickness, must be replaced. However, if the area of general corrosion is small, the corroded pipe may be repaired. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.

(b) *Localized corrosion pitting.* Except for cast iron or ductile iron pipe, each segment of distribution line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired.

§ 192.489 Remedial measures: cast iron and ductile iron pipelines.

(a) *General graphitization.* Each segment of cast iron or ductile iron pipe on which general graphitization is found to a degree where a fracture or any leakage might result, must be replaced.

(b) *Localized graphitization.* Each segment of cast iron or ductile iron pipe on which localized graphitization is found to a degree where any leakage might result, must be replaced or repaired, or sealed by internal sealing methods adequate to prevent or arrest any leakage.

§ 192.491 Corrosion control records.

(a) After July 31, 1972, each operator shall maintain records or maps to show the location of cathodically protected piping, cathodic protection facilities, other than unrecorded galvanic anodes installed before August 1, 1971, and neighboring structures bonded to the cathodic protection system.

(b) Each of the following records must be retained for as long as the pipeline remains in service:

(1) Each record or map required by paragraph (a) of this section.

(2) Records of each test, survey, or inspection required by this subpart, in sufficient detail to demonstrate the adequacy of corrosion control measures or that a corrosive condition does not exist.

APPENDIX D—CRITERIA FOR CATHODIC PROTECTION AND DETERMINATION OF MEASUREMENTS

I. *Criteria for cathodic protection*—A. *Steel, cast iron, and ductile iron structures.* (1) A negative (cathodic) voltage of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be made with the protective current applied, and in accordance with sections II and IV of this appendix.

(2) A negative (cathodic) voltage shift of at least 300 millivolts. Determination of this voltage shift must be made with the protective current applied, and in accordance with sections II and IV of this appendix. This criterion of voltage shift applies to structures not in contact with metals of different anodic potentials.

(3) A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

(4) A voltage at least as negative (cathodic) as that originally established at the beginning of the Tafel segment of the E-log-I curve. This voltage must be measured in accordance with section IV of this appendix.

(5) A net protective current from the electrolyte into the structure surface as measured by an earth current technique applied at predetermined current discharge (anodic) points of the structure.

B. *Aluminum structures.* (1) Except as provided in subparagraphs (3) and (4) of this paragraph, a minimum negative (cathodic) voltage shift of 150 millivolts, produced by the application of protective current. The voltage shift must be determined in accordance with sections II and IV of this appendix.

(2) Except as provided in subparagraphs (3) and (4) of this paragraph, a minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

(3) Notwithstanding the alternative minimum criteria in subparagraphs (1) and (2) of this paragraph, aluminum, if cathodically protected at voltages in excess of 1.20 volts as measured with reference to a copper-copper sulfate half cell, in accordance with section IV of this appendix, and compensated for the voltage (IR) drops other than those across the structure-electrolyte boundary, may suffer corrosion resulting from the build-up of alkali on the metal surface. A voltage in excess of 1.20 volts may not be used unless previous test results indicate no appreciable corrosion will occur in the particular environment.

(4) Since aluminum may suffer from corrosion under high pH conditions, and since application of cathodic protection tends to increase the pH at the metal surface, careful investigation or testing must be made before applying cathodic protection to stop pitting attack on aluminum structures in environments with a natural pH in excess of 8.

C. *Copper structures.* A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of this appendix.

D. *Metals of different anodic potentials.* A negative (cathodic) voltage, measured in accordance with section IV of this appendix, equal to that required for the most anodic metal in the system must be maintained. If amphoteric structures are involved that could be damaged by high alkalinity covered by subparagraphs (3) and (4) of paragraph B of this section, they must be electrically isolated with insulating flanges, or the equivalent.

II. *Interpretation of voltage measurement.* Voltage (IR) drops other than those across the structure-electrolyte boundary must be considered for valid interpretation of the voltage measurement in paragraph A(1) and (2) and paragraph B(1) of section I of this appendix.

III. *Determination of polarization voltage shift.* The polarization voltage shift must be determined by interrupting the protective current and measuring the polarization decay. When the current is initially interrupted, an immediate voltage shift occurs. The voltage reading after the immediate shift must be used as the base reading from which to measure polarization decay in paragraphs A(3), B(2), and C of section I of this appendix.

IV. *Reference half cells.* A. Except as provided in paragraphs B and C of this section, negative (cathodic) voltage must be measured between the structure surface and a saturated copper-copper sulfate half cell contacting the electrolyte.

B. Other standard reference half cells may be substituted for the saturated copper-copper sulfate half cell. Two commonly used reference half cells are listed below along with their voltage equivalent to −0.85 volt as referred to a saturated copper-copper sulfate half cell:

(1) Saturated KCl calomel half cell: −0.78 volt.

(2) Silver-silver chloride half cell used in sea water: −0.80 volt.

C. In addition to the standard reference half cells, an alternate metallic material or structure may be used in place of the saturated copper-copper sulfate half cell if its potential stability is assured and if its voltage equivalent referred to a saturated copper-copper sulfate half cell is established.

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Chapter X—Interstate Commerce Commission

SUBCHAPTER A—GENERAL RULES AND REGULATIONS

[S.O. No. 1051; Amdt. 2]

PART 1033—CAR SERVICE

Distribution of Privately Owned Coal Cars

At a Session of the Interstate Commerce Commission, held in Washington, D.C., on the 24th day of June 1971.

Upon further consideration of Service Order No. 1051 (35 F.R. 16088, 36 F.R. 64) and good cause appearing therefor:

It is ordered, That: § 1033.1051 *Service Order No. 1051* be, and it is hereby, amended by substituting the following