

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Part 193

[Docket No. OPSO-46; Notice 5]

LNG Facilities: Federal Safety Standards

January 30, 1980.

AGENCY: Materials Transportation Bureau, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes establishment of a set of comprehensive safety standards governing operations (including security), maintenance, fire protection and corrosion control in liquefied natural gas (LNG) facilities used in the transportation of natural gas by pipeline in or affecting interstate or foreign commerce. Current safety standards do not adequately cover these topics. The new standards would provide safety primarily through development and implementation of written procedures, personnel training, and standardized tests and inspections.

DATE: Comments must be received by May 9, 1980. Late filed comments will be considered to the extent practicable.

ADDRESS: Send comments to Docket Branch, Room 8426, Department of Transportation, Materials Transportation Bureau, 400 7th Street, SW., Washington, D.C. 20590. Comments should identify the docket and notice number and be submitted in triplicate. They will be available to the public for review at the above location between 8:30 a.m. and 5:00 p.m. each working day.

FOR FURTHER INFORMATION CONTACT: Roy F. Williams, 202-426-2082.

SUPPLEMENTARY INFORMATION: In April 1977, MTB issued an Advanced Notice of Proposed Rulemaking (ANPRM) (42 FR 20776, April 21, 1977) inviting public participation at an early stage in the rulemaking process for adoption of new Federal safety standards in 49 CFR Part 193 governing the design, construction, operation, and maintenance of LNG facilities. Although that notice was not a proposal to amend the present standards in 49 CFR 192.12, it contained a comprehensive set of draft regulations which were intended to serve as a basis for public comment and participation in identification of LNG safety problems and the development of appropriate regulatory solutions to those problems, considering all reasonable alternatives. Subsequently, a correctional notice was

published at 42 FR 24758; and a third notice [42 FR 42235, August 22, 1977] extended the comment period to December 1, 1977, and set forth a bibliography of resource information.

Based on the comments received on the ANPRM and other available information, MTB is proposing the adoption of a new Part 193 through two notices of proposed rulemaking (NPRM). The first notice, notice 4 in this proceeding (44 FR 8142, February 8, 1979), relates to subparts A through K of the ANPRM, and applies to the siting, design, and construction aspects of LNG facilities. The period for public comment on Notice 4 closed May 9, 1979.

This NPRM, notice 5 in the proceeding, relates to Subparts L through O of the ANPRM, and applies to operation and maintenance aspects of both new and existing LNG facilities. Much of the supplementary information included in Notice 4 explains the basis for proposing Part 193 and is equally applicable to this NPRM. This includes such considerations as LNG characteristics; the need for comprehensive new Federal LNG facility safety standards; and an explanation of the existing federal safety standards for LNG facilities contained in 49 CFR Part 192, which incorporate by reference the 1972 edition of the National Fire Protection Association Standard No. 59A. Also included in Notice 4 was a discussion of the report on the hazards of liquefied energy gases issued on July 31, 1978, by the General Accounting Office; the study by Arthur D. Little, Inc. to provide safety information of LNG facilities; and the memorandum of understanding (MOU) between MTB and the United States Coast Guard (USCG) regarding the safety regulatory responsibility on waterfront LNG facilities. A copy of Notice 4 can be obtained by writing to the address given in this notice.

In this NPRM, as in Notice 4, MTB has used the 1975 edition of the NFPA 59A Standards as a basis for some of the proposed regulations. In this case, except for Subpart N, covering Fire Protection, NFPA 59A (1975) has little equivalent material covering operations, maintenance or corrosion control. The following table shows the 59A derivation of standards proposed in this notice.

Derivation Table

Part 193	NFPA 59A (1975)
Subpart L:	
193.1101	
193.1103	
193.1105	45
193.1106	46

Derivation Table—Continued

Part 193	NFPA 59A (1975)
193.1107	
193.1109	92
193.1111	94
193.1113	
193.1115	103
193.1117	86
193.1121	
193.1123	
193.1124	
193.1124a	
193.1125	202
193.1127	
193.1130	
193.1131	
193.1133	
193.1134	
193.1135	
193.1139	45
193.1140	80
193.1141	
193.1143	
Subpart M:	
193.1201	
193.1203	
193.1205	
193.1206	
193.1206a	
193.1207	
193.1208	
193.1209	
193.1211	
193.1215	
193.1217	874
193.1219	
193.1221	
Subpart N:	
193.1301	900
193.1303	
193.1305	91, 921
193.1306	91
193.1306a	91
193.1306b	91
193.1306c	91
193.1306d	91
193.1306e	92
193.1309	
193.1310	92, 926
193.1310a	
193.1311	
193.1313	
Subpart O:	
193.1401	
193.1402	
193.1403	
193.1405	
193.1407	601
193.1409	600
193.1411	
193.1415	
193.1419	
193.1421	
193.1423	

The Subparts proposed by this notice provide a broad coverage of closely related standards for the operation and maintenance of an LNG facility, including security, fire protection, and corrosion control. Unlike Subparts A through K, which deal primarily with design and construction of new facilities and parts of existing facilities that are replaced, relocated or significantly altered, the Subparts included in this notice pertain fully to all LNG facilities. Interested persons can meaningfully comment on this body of proposed standards in most cases without regard for the standards proposed in Notice 4, except where necessary to refer to definitions of terms.

As a result of comments to Notice 4, that the definition of "critical

component" is not clear, is too abstract, and not unlike the definition of "component." MTB is deleting the use of the term. Therefore, the proposed rules specify the appropriate components in the text, or use the term "component" as defined in Notice 4.

To ensure that the new Part 193 does not result in costs to the private sector, consumers, or government that are above those necessary to provide an acceptable level of public safety, in the ANPRM, MTB encouraged interested persons to submit information on the annual and aggregate costs, benefits, and other anticipated impacts associated with each of the draft regulations and all alternatives which commenters might suggest thereto. The information received has enabled MTB to adequately consider the impact of this rulemaking proposal early in the developmental process. A Draft Evaluation of the impact is in the docket for this proceeding in accordance with the Departmental procedures for improving regulations. MTB has determined that a Regulatory Analysis is not required under those procedures.

Draft Evaluation Review

The Draft Evaluation, prepared by Booz-Allen and Hamilton, is an impact analysis of the costs and benefits of the alternative potential Federal regulations affecting the operation and maintenance of new and existing LNG facilities. These alternatives are:

- This Notice of Proposed Rulemaking.
- Standard 59A of the National Fire Protection Association (1975 edition).
- Recommendations made in the General Accounting Office Report EMD-78-28.
- The Advance Notice of Proposed Rulemaking issued by MTB on April 21, 1977.

For this impact analysis, the NFPA Standard 59A (1975 edition) was used as the baseline regulatory standard against which the incremental facility costs, safety benefits, employment effects, and effects on consumers of the other alternative LNG regulations were measured. Standard 59A was considered to be the baseline because it is the minimum standard that normally would be observed if the MTB does not adopt a different one. Impacts were measured for five representative facilities which included baseload, peakshaving, and satellite facilities. Projections of costs and benefits were then made for two levels of planned LNG facilities, a minimum of 117 (all existing plus 6 projected new facilities) and a maximum of 175 (all existing plus

64 projected new facilities) for the years 1980 through 1999.

The Draft Evaluation indicates that a wide range of benefits are associated with reducing or minimizing several types of potential LNG facility accidents. These benefits may range from saving several lives and injuries and preventing, or otherwise avoiding, about a million dollars in damage which would be incurred with a 10 cubic meter spill of LNG at a remotely located satellite facility, to saving several thousand lives and injuries, and preventing several billion dollars damage associated with minimizing the possibility of a catastrophic spill and ignition of a large LNG storage facility in a densely populated area.

Despite the very large savings that would result from preventing a major accident at an LNG facility, costly measures which reduce the likelihood of accidents are not justified by conventional theoretical cost benefit analysis because of the extremely low probability of a major accident occurring. The limited number of LNG facility accidents requires that probability estimates of accidents be based on theoretical analysis of factors which might lead to their occurrence. There is large inherent uncertainty associated with such estimates, and hence of cost-benefit values derived from them. In light of such uncertainties, prudence dictates an extra measure of caution where there is potential for a catastrophic accident. Such caution should be weighed along with other considerations when judging the need for safety measures that can reduce the likelihood of a catastrophic LNG accident, even when these measures may not be justified based on a theoretical risk analysis technique.

The Evaluation identifies 9 sections in this notice that compared to baseline costs, would meet or exceed a two part threshold cost for any representative facility of either: \$50,000 in initial investment cost for any one out of 23 standard cost factors analyzed; or \$8,000 in annual cost over 20 years. The 9 costly sections are: Section 193.1111, *Personnel safety*; § 193.1121, *Investigation of failures*; § 193.1123, *Security; procedures*; § 193.1131, *Security; lighting*; § 193.1215, *Control systems*; § 193.1219, *Inspecting storage tanks*; §§ 193.1307 and 193.1308, *Fire fighting plan and Fire control equipment* (both sections were included under Section 193.1307 in the Evaluation); § 193.1419, *Monitoring corrosion control*; and § 193.1423, *Reports and records* (§ 193.1423 (a) was included under § 193.1419 in the Evaluation).

According to the Draft Evaluation, over the next 20 years, the incremental costs (in 1979 dollars, discounted at 10 percent) of these 9 NPRM sections range from \$60 million to \$69 million for the minimum and maximum estimated level of facilities. The annualized cost over the 20-year period ranges from \$7 million to \$8 million per year. Total aggregate costs for compliance with all proposed sections would range from \$7.8 to \$9.2 million per year. The NPRM would increase the average annualized cost of operating a facility by an amount ranging from \$53,000 to \$67,000 (approximately 4 percent), dependent not only upon the above estimates of new facilities constructed over the next 20 years, but also upon the fact that 111 existing facilities would also be covered by the provisions.

These cost estimates are based on an operator's choosing to follow the baseline (NFPA 59A) Standards in operating, providing security for, and maintaining an LNG facility. However, as shown above in the derivation table, only 3 of the costly sections have bases in 59A, and overall the NFPA document provides little coverage in the areas of operation, security, and maintenance (including corrosion control). In addition, the bulk of commenters' suggestions on comparable provisions in the ANPRM were adopted in this notice, and comments did not indicate that serious controversy exists with regard to the 9 sections. On the basis of these factors, MTB welcomes comments on whether "self-imposed" industry practices exceed the 59A baseline, and when they do, what impact they have on the incremental costs shown by the Draft Evaluation.

The Evaluation concludes that each of the 9 costly sections would produce benefits if an accident occurs. Nevertheless, because the estimated probabilities of accidents occurring are very low, the Evaluation further concludes that none of the 9 costly sections has "expected safety benefits" that justify the incremental costs of the section.

Considering the uncertainties inherent in risk analysis, the cost of these additional safety measures is not extreme, and the potential for the possible loss of thousands of lives and billions of dollars of property damage in the event of a major accident, MTB believes that a cost/benefit conclusion based on risk assessment alone should not be the exclusive determinant of what is necessary for public safety.

Comments are solicited on the costs estimated to comply with the proposed requirements as estimated in the Evaluation. Commenters to these

proposed regulations should further point out those particular areas where different standards might be appropriate because of size of component or the extent of the operation of an LNG facility and its associated risk.

After a careful review of the benefits, the annualized costs, and the uncertainties in predicting accident risks, MTB believes that the benefits outweigh the costs and that these proposed nine sections are warranted as an investment in public safety.

As stated in Notice 4, over 4,000 pages of comments were received on the ANPRM from 135 different commenters. The general discussion of these comments is set out in Notice 4 and significant comments relating to Subparts L-O are discussed hereinafter.

Concurrent with this proceeding, the USCG is developing regulations for the storage and handling of hazardous materials, including LNG, at ports. On August 3, 1978, the USCG issued an Advance Notice of Proposed Rulemaking in the Federal Register (43 FR 34362) inviting public participation at the earliest stages in the development of regulations to provide standards for safety, security, and environmental protection in the transportation, transfer, handling, and storage of liquefied natural gas at waterfront facilities. The USCG intends for these regulations to become an integral part of its revised general waterfront facility regulations. The USCG published an Advance Notice of Proposed Rulemaking as General Waterfront Facilities Requirements (43 FR 15107) on April 10, 1978. MTB and USCG are coordinating their regulatory activities in this area to preclude problems involving overlapping jurisdiction in consonance with the MOU mentioned above and published in Notice 4.

The ANPRM issued by MTB included draft regulations relating to (1) fire prevention and fire protection equipment, systems and methods at all facilities and (2) security at all facilities. In accordance with the MTB/USCG MOU, these safety matters at a "waterfront LNG facility" will be subject to USCG rather than MTB regulation. A future USCG NPRM on General Waterfront Facilities Requirements will propose identical waterfront LNG facility fire prevention, fire protection, and security standards (except where differences are warranted because of waterfront facility characteristics) to the standards proposed in this notice. It will also be the USCG that will issue, under its appropriate authorities, final standards on these matters as they apply to "waterfront LNG facilities."

In order to properly make the industry aware of the MTB's and USCG rulemaking responsibility with respect to waterfront LNG facilities in accordance with the terms of the MTB/USCG MOU, MTB and USCG have coordinated in the reformulation of the proposed definition of "waterfront LNG facility" as defined in Notice 4 of the NPRM. The reformulated proposed definition is as follows and is submitted for comments in this notice: "Waterfront LNG facility" means an LNG facility with docks, wharves, piers, or other structures in, on, or immediately adjacent to the navigable waters of the United States or Puerto Rico and any shore area immediately adjacent to those waters to which vessels may be secured and at which LNG cargo operations may be conducted.

MTB and USCG have coordinated in developing a format that would be used by both agencies in the publication of regulations for waterfront facilities, including LNG facilities. Using this format for all of the regulations in Part 193 will make it easier for waterfront facility operators to use LNG regulations. The proposed format to be used by MTB, as well as by the USCG, in the issuance of the final regulations for LNG facilities will be the following:

Subpart A—General
 Subpart B—Siting
 Subpart C—Design
 Subpart D—Construction
 Subpart E—Equipment
 Subpart F—Operations
 Subpart G—Maintenance
 Subpart H—Personnel Qualification & Training
 Subpart I—Fire Protection
 Subpart J—Security

This notice of proposed rulemaking, however, does not follow this format. Rather this NPRM follows the same format, section by section, as published in the ANPRM. In this way commenters to the ANPRM are able to more easily follow any revisions made by MTB to the draft regulations issued in the ANPRM.

The following portion of the preamble discusses the comments made to each particular section in the draft regulations in the ANPRM as well as any revisions to those draft regulations used in developing the standards proposed in this notice.

Subpart L—Operations

The safe operation of an LNG facility depends on the use of competent personnel; prompt and effective response to equipment malfunctions and emergencies; and security from unauthorized entry. This subpart would accomplish these goals by requiring the

personnel at new and existing LNG facilities have appropriate experience and training and follow prescribed written procedures. Also, security measures, including procedures and personnel training, would have to be provided at new and existing facilities for protection against vandalism and sabotage.

Personnel Qualifications. The proposed § 193.1103 (titled "General" in the ANPRM) would require that all facility personnel who operate components must have demonstrated their abilities by experience and training. For new employees, on-the-job training would be permitted with close supervision in order to gain the required experience. The suggested requirement for personnel testing by operators under § 193.1103(a)(2) of the ANPRM has been revised in light of comments so that an operator need not be the one to give the tests but need only verify that appropriate tests have been passed.

Operating Procedures. Section 193.1105 proposes that components be operated in accordance with written procedures, which must include steps necessary for inspection or testing, recognizing and responding to malfunctions and personnel errors, and purging combustible gases. Also, included in § 193.1105(a)(5) are vaporization procedures covered by §§ 193.711(b) and (c) in the ANPRM. The procedures suggested by § 193.1105(a)(4) of the ANPRM for purging are covered in more detail by the proposed § 193.1139. Section 193.1105(a)(6) covers operating procedures for the process of liquefaction. Section 193.1105(g) would require the operator to submit the written operating procedures to the Director or State agency. Also, § 193.1105(c) would allow the Director or State agency to amend the operating procedures if required.

Cooldown. Proposed procedures for lowering the temperature of components before introducing LNG (cooldown) are set forth in § 193.1106. This subject was covered in the ANPRM by §§ 193.1105(a)(5) and 193.1117(c)(5), but is now set out separately because of its importance. Without proper cooldown, a component could be damaged by excessive stresses due to temperature change.

Monitoring Operations. MTB believes the components of an LNG facility and buildings in which flammable fluids are handled should be monitored to detect malfunctions, failures, fires, hazardous leaks, and the presence of unauthorized personnel. Each of these items could have a significant effect on the safety of the facility, and monitoring would enable the operator to take prompt

remedial action. At a new facility, monitoring of components may be performed continuously from a control center by personnel observing warning alarms (see proposed § 193.921) that are designed to activate before automatic shutdown occurs or remote shutdown controls are used. For existing facilities that may not be so equipped (i.e., with sensing devices, alarms, and automatic or remote shutdown devices), MTB is proposing under § 193.1107 as an alternative monitoring approach, that (1) each component be inspected or tested at least daily for signs of any abnormal operating condition, and (2) all system start-ups or shutdowns and all transfer operations be observed by operating personnel from the control room or at the transfer area. Monitoring for security purposes is covered by § 193.1133.

Emergency Procedures. Section 193.1109 would require each operator to follow procedures for handling emergencies including fires. The written procedures would have to provide steps for handling the proposed items listed in § 193.1109(b). Proposed requirements for procedures to provide for cooperation with and notification of public safety agencies (based on § 193.1309 of the ANPRM) are now covered by this section. A further discussion of coordination with public agencies is included hereafter regarding § 193.1123(g).

Personnel Safety. Section 193.1111 would provide for personnel safety by requiring each operator to provide shelter for protection against thermal radiation and protective clothing and equipment needed as a safeguard against hazards associated with operation and maintenance activities. This latter proposal is intended to apply to those hazardous situations in which the safety of personnel has a direct bearing on the safe operation of an LNG facility. The suggested requirement in the ANPRM for provisions to immerse burned personnel in the shelter has been deleted. This appears to be a controversial subject in the medical profession, and could possibly induce traumatic shock. MTB agrees with commenters that, if appropriate, immersion should take place in a hospital, not as a first aid procedure at the facility. Section § 193.1111(c) has been added to propose that first aid material be available at the shelter. Commenters questioned the feasibility of protecting personnel against thermal radiation in areas that are not accessible to a building, such as in a diked area. The proposal has been changed from that proposed in the ANPRM to require shelter only for those

personnel who would have the highest exposure to risk. MTB solicits comments on the feasibility of having a portable water spray screen provide a thermal shelter in work areas such as a yard that are not accessible to a building. Such a device could consist of a sprinkler manifold or monitor nozzle connected to a water supply that could be manually operated to spray water up into the air in a manner that would serve as a barrier against thermal radiation. These water screens are used in various LNG facilities around the country.

The Draft Evaluation identifies § 193.1111 as a proposal with a major cost impact primarily because buildings may have to be constructed to provide shelter against thermal radiation. Most existing LNG facilities have buildings, such as control centers, parts buildings, and pump stations. Comments are requested on whether these buildings now provide, or could be retrofitted to provide, the necessary shelter. What would be the costs of retrofitting existing buildings in order to obtain the necessary thermal shelter?

Personnel, Performance, and Training. Under § 193.1113 an operator would have to carry out a program to ensure that operating personnel are capable of performing their duties. The title of § 193.1113 is changed from "Personnel participation" in the ANPRM to "Personnel performance" to better express the intent of this section.

Under § 193.1115, each operator would have to provide a program for personnel training. The program would instruct personnel about the hazards of LNG, to carry out the operating, maintenance, and emergency procedures, and to give first aid.

Transfer Procedures. A number of clarifying changes have been made to § 193.1117 in the ANPRM covering procedures for transferring hazardous fluids from one container to another. Under Paragraph (a), each transfer of LNG or other hazardous fluid would have to be performed in accordance with written transfer procedures. Paragraphs (b) and (c) in the ANPRM are restated in a new paragraph (c) devoted solely to cargo transfer procedures.

As noted above, § 193.1117(c)(5) of the ANPRM regarding cooldown has been incorporated in § 193.1106. With respect to prevention of stratification, § 193.1117(c)(7) of the ANPRM has been clarified in the proposed paragraph (b)(4) to state that it applies only to LNG bulk transfer. MTB agrees that top loading of tank cars and tank trucks is not applicable to LNG transfers, and thus, the reference to NFPA 77 in paragraph (d)(5) of the ANPRM is

deleted. Section 193.1117(e) the ANPRM, regarding marine vessel transfer, has been deleted, since in accordance with MTB's memorandum of understanding with the United States Coast Guard (see Notice 4), this type of transfer would not be subject to the proposed Part 193.

Section 193.1119 in the ANPRM, pertaining to protecting transfer operations, has been deleted, since paragraph (a) on ignition sources is covered in the proposed § 193.1305, and paragraph (b) concerning traffic, is covered in the § 193.611(a)(3).

Investigation of Failures. Under § 193.1121, operators would be required to determine the cause of component failures and personnel errors that result in serious incidents, and then report the incident to MTB. The Draft Evaluation identifies § 193.1121 as a proposal with major costs impacts primarily because of the possible need for a consultant to determine the cause of component failures. In those instances that the expertise of a consultant is required, the benefits derived from the determinations of the cause of a component failure far outweigh the costs of a consultant's fees.

Commenters' suggestions to § 193.1121 in the ANPRM did not indicate any serious controversy over these proposed rules. However, some operators felt that investigating and determining the cause of each failure of such components would hinder the facility's ability to provide its intended service and also threaten the operational capability of the facility. MTB does not agree with these commenters because the determination of a component failure would assure action to prevent recurrence of such failures, as well as provide MTB information to disseminate to other operators in order for action to be taken at other facilities to preclude such failures.

Security

Because of the vulnerability of an LNG facility to willful damage, under §§ 193.1123 thru 193.1135, MTB is proposing that each operator of a new or existing LNG facility take certain minimum security measures to protect its facility against potential vandalism and sabotage. These proposed rules incorporate a combination of performance standards and specific security requirements. Comments are requested on the needs of strengthening security measures to protect the LNG facility against terrorist attacks by incorporating other measures such as psychological screening, intrusion alarm systems, guard dogs, etc., in future rulemaking.

As indicated in Notice 4 of this proceeding, the format proposed for the final rules would include these proposed regulations in Subpart J called "Security." They are being proposed as operational requirements, as they were in the ANPRM, because MTB considers a sound security program essential to the safe operation of an LNG facility and for ease in comparison with the ANPRM.

The Draft Evaluation identifies § 193.1123, *Security procedures*, as a proposal with major cost impacts due to the suggested requirements for operators to prepare and follow written procedures. MTB and USCG believe that these proposed rules are essential in order to achieve the degree of security that must be maintained at the LNG facility in order to protect the public health and safety.

Procedures. Under the proposed § 193.1123, each operator would have to prepare and follow written security procedures to safeguard its LNG facility against sabotage or vandalism. The procedures would have to cover personnel duties, relations with appropriate local law enforcement officials, and identification of persons at the facility. The term "appropriate local law enforcement officials" means law officials in the locality of the LNG facility who are responsible for law enforcement, such as Fire, Police, or Sheriff's Departments. In §§ 193.1123(a)(2), (a)(3), and (a)(5)(i) of the ANPRM, it was suggested that the procedures include steps necessary for personnel to recognize a breach of security based on problems that may occur in the operation of components. These provisions have been deleted from this notice because it would be unreasonable to require a security check for every operational difficulty. MTB believes this aspect of security can be handled as well by requiring that the investigations of serious incidents under § 193.1121 include a check for any security breach and that personnel be trained to recognize security breaches (see §§ 193.1123(a)(4) and 193.1124(a)). An important provision not included in the ANPRM is § 193.1123(a)(6). This section would require procedures for positive identification of all persons entering a facility and on the facility, including the use of picture badges for facility personnel. This proposed section is based on a recommendation by the General Accounting Office (GAO). GAO recommended that regulations requiring that security personnel be screened and trained to understand threat awareness, recognition of hazardous devices, special safety precautions, and

preventative actions that can be taken to prevent unauthorized access to a facility.

Personnel training and qualifications. Sections 193.1124 and 193.1124a cover the training and qualifications of personnel who are assigned security duties. These proposed sections were included in the ANPRM as § 193.1123(b). Many security practices are already in place at many facilities throughout the country in order to protect the facility against vandalism or terrorism and to safeguard its employees and the public from possible harm. Comments are requested from LNG facility operators regarding costs to implement these proposed requirements.

Enclosures. Section 193.1125 proposes that certain components and areas of the LNG facility be surrounded by a protective enclosure. Either a single enclosure around the entire LNG facility or separate enclosures for each component would suffice to meet this proposed requirement. Protective enclosures would have to have at least two accesses located to minimize the escape distance in the event of emergency. Each access would be either locked or guarded. MTB also believes that such protective enclosures are already in place at most facilities throughout the country and the costs to comply with this requirement would be minimal. Comments are requested from LNG facility operators regarding costs to implement these proposed requirements. Section 193.1127 proposes a minimum standard for the design of enclosures, primarily that they be fences or walls topped by barbed wire.

Regarding the suggested requirement in § 193.1129(b) of the ANPRM that each enclosure access be locked or guarded, several commenters suggested that the word "secured" be used instead of "locked." The word "locked" is retained in this notice, however, since MTB feels that "secured" would be an ambiguous standard for the security to be provided by an enclosure access.

Security communications. Under a new proposed § 193.1130, a means must be provided for direct communications between security personnel and appropriate law enforcement officials and between security personnel and any control room and control stations. MTB and USCG believe that a direct communication system is required for effective communications during security and emergency operations. Communications can be by means of telephone or two-way radios.

Lighting. Under the proposed § 193.1131, when security warning systems are not provided for security monitoring, the area around each item

for which an enclosure is required and the protective enclosure must be illuminated with a minimum in service lighting intensity of 0.2 lux (2.2 ft.c) between sunset and sunrise for observation of those areas for security reasons. Lighting is important for early detection of trespassers during darkness when warning systems are not in use. Protecting the facility from intrusion that could result in vandalism or sabotage is very important because a determined effort to damage such a facility could cause a very serious and hazardous condition. Lighting is a very inexpensive method to prevent such intrusion from common vandalism. Nevertheless, it should be recognized that a determined intrusion by saboteurs or terrorists cannot be thwarted by lighting alone.

The Draft Evaluation identifies § 193.1131, *Lighting*, as a proposal with major cost impacts primarily because of the need to provide additional lighting to inspect the condition of components to guard against trespass and to provide suitable lighting for television cameras that may be used under § 193.1131 *Lighting*. Many existing facilities are now equipped with lighting. Comments are requested on the need to build more lights to comply with this proposed requirement.

Monitoring. Under the proposed § 193.1133, areas inside each protective enclosure as listed in § 193.1125a must be monitored for the presence of unauthorized persons by direct visual observation, based on a schedule included in the security procedures under § 193.1123, or by a "security warning system" that continuously transmits data to an attended location. The term "security warning system" is proposed to be defined as a device used to detect an unauthorized entry utilizing either electrical, electromechanical, electrooptical, electronics, or similar means. For facilities with a total LNG storage capacity of less than 250,000 barrels, MTB is proposing that only the protective enclosure be continuously monitored because for facilities of this size, it would be easier to detect persons inside the plant.

Alternative power sources. Under the proposed § 193.1134, an alternative source of power would have to be available for emergency use to run security warning systems and security lighting. This alternative power supply would have to meet the requirements of § 193.927, proposed in Notice 4 of the ANPRM. Those proposed requirements were essentially that there must be two separate and redundant sources of electrical power which function so that

the failure of one source does not affect the capability of the other source.

Warning signs. MTB agrees with those commenters to the ANPRM who argued that most persons would not understand the warning given, if warning signs were erected at the boundary of an exclusion zone, as suggested by § 193.1135(a) of the ANPRM. Thus, this provision is deleted in the NPRM. However, § 193.1135 would require signs along the enclosure to guard against trespass as suggested in the ANPRM. In addition, the signs would have to be luminescent or lighted so as to be visible at night from as far as 100 ft. away.

Operating Pressure. MTB agrees with those commenters to the ANPRM who argued that design requirements proposed to Part 193 adequately cover the maximum and minimum allowable pressure of components. Thus, this provision is deleted in the NPRM.

Purging. MTB has concluded that "Purging Principals and Practice," issued by the American Gas Association, provides detailed purging procedures that are appropriate for an LNG facility, as well as associated gas pipelines and equipment. Also, it is referenced in NFPA 59A. Accordingly, § 193.1139, which addresses purging, has been revised to require that these practices be followed.

Communications. A new § 193.1140 is included in this notice that would require each operator to provide for communications at the LNG facility. This facility communication system is made up of a primary and an emergency verbal communication system. The primary is required for communications between the operators and their assigned work locations, and the emergency is required for communications, in the event of an emergency, for orderly shutdown of the facility. The primary and emergency system must be independent and physically separated from each other.

Operating Records. Commenters indicated that it would be too onerous and unnecessary to keep a daily record of the operation of each component as suggested in the ANPRM because under normal circumstances, operations do not vary from design limits. MTB agrees and in this notice § 193.1141 proposes that records be kept only for abnormal operating conditions.

Notice to Director

A new § 193.1143 is included in this notice that would require each operator to notify the Director or a relevant State agency that has submitted a current certification or agreement with respect to the facility under Section 5 of the

Natural Gas Pipeline Safety Act of 1968 (49 U.S.C.1674), 30 days, before installation of any component or any existing component that is replaced, relocated, or significantly altered. The purpose of the notice is to give MTB an opportunity to check for compliance with applicable requirements of Part 193 or to determine whether additional steps are needed to assure that the component is not hazardous to life or property. The Director or State agency will notify the operator with regard to any hazard or violation identified in the agency review. In the absence of any action by the Director or State agency, the operator may initiate operation. This proposed requirement would not prohibit the initial installation, testing, and operation of the component so long as proper notification is given. If adopted, it is anticipated that this section would be included in Subpart A—General in the final rules.

Subpart M—Maintenance

Under this subpart, each operator would be required to maintain the operational capability of LNG facility components. Maintenance activities, which include inspection, testing and repair of components, can have a significant impact on the safety of an LNG facility. A malfunction or failure of a component could spread to others, possibly resulting in an emergency. To reasonably prevent such occurrences, certain maintenance activities must be performed periodically. Time intervals are included in this Subpart where considered necessary.

Some commenters to Subpart M in the ANPRM argued that the suggested maintenance standards should not apply to those parts of an LNG facility whose failure or malfunction would not pose a hazard. This view point is consistent with the purposed Subpart M which is to keep each LNG facility in a safe operating condition. It is reflected in Subpart M by use of the term "component," which is defined in Notice 4 of this proceeding to mean any part of an LNG facility which involves a hazardous fluid or some safety purpose.

General. As a general maintenance standard, MTB is proposing in § 193.1203(a) that each component in service be kept in a condition that is "compatible with its operational or safety purpose" by repair, replacement or other means. This proposal combines the suggested requirements of §§ 193.1203(a)(2) and (b) of the ANPRM. Paragraph (b) is intended to make it clear that Subpart M does not apply to components which are not in service. At the same time, under paragraph (c), components which Part 193 requires to

be installed at an LNG facility could not permanently be taken out of service to avoid the maintenance requirements of Subpart M. Section 193.1203(a)(2) of the ANPRM, which referred to certain conditions that proper maintenance must prevent, has been deleted, for as some commenters stated, these conditions essentially were covered by the performance suggested under § 193.1203(a)(2). Also, the suggested standards for repairs in § 193.1203(c) and (b) of the ANPRM are covered by § 193.1211 of this notice.

Maintenance Procedures. Under §§ 193.1205(a) and (b), each operator would be required to "determine" (using scientific methods and engineering judgment as proposed by the definition of the term "determine" in Notice 4) what tests and inspections are necessary to meet the maintenance standards of Subpart M, and then prepare and follow written procedures to carry them out.

The provisions of §§ 193.1205(a)(1)–(5) of the ANPRM are restated in other sections of the proposed Subpart M as discussed hereafter. As provided by paragraphs (c) and (d) of § 193.1205, the procedures and any changes to them would have to be filed with the Secretary (MTB) or, in the case of a facility that is subject to jurisdiction of a State agency under Sec. 5 of the Natural Gas Pipeline Safety Act of 1968 (NGPSA) (49 USC 1674), with that State Agency. These latter paragraphs were included as § 193.9 of the ANPRM, and are based on Sec. 11 of the NGPSA. Section 11 authorizes the Secretary or the relevant State agency to require that the procedures be revised if it finds that they are inadequate to achieve safe operation.

Obstructions. A new § 193.1206 is added to propose that the functioning of components not be obstructed by ice, contaminants, or other foreign matter. This new Section was included in the ANPRM as § 193.1205(a)(2). Examples of the problems which § 193.1206 are intended to correct are ice accumulations which restrain the movement of components like bellow joints or valves, plugged relief valve orifices, and incorrect instrument readings.

Support Systems. Section 193.1206(a) is based on § 193.1205(a)(4) of the ANPRM. This section proposes that each component's support system, including foundation, whose failure could cause a significant hazard must be inspected for any detrimental change that could impair support.

Firefighting equipment. Section 193.1207 of the ANPRM regarding the maintenance of firefighting equipment is

expanded in this NPRM to cover the propose maintenance requirements for the additional automatic fire detection, foam-water, hydrants, and sprinkler systems when applicable. Also, the title is changed to "Fire control equipment" in order to be compatible with § 193.1308 of this NPRM.

Auxiliary power. A new § 193.1208 has been added to provide for monthly testing of auxiliary power sources. It is essential that such sources be operational when needed, and this can be assured by periodic testing. As suggested by § 193.1205(a)(5) of the ANPRM, the test would have to account for all equipment to be served by the power source in an emergency.

Purging. Section 193.1209 would require that isolated components be purged before maintenance activities are performed. The section has been revised from the ANPRM version to be consistent with the proposed purging requirement of § 193.1139.

Repairs. Under § 193.1211(a), MTB is proposing that repair work on components be performed and tested as far as practicable in accordance with the construction requirements of Subpart K that were proposed in Notice 4 of this proceeding. In general, commenters did not object to a similar proposal included in §§ 193.1203 and 193.1211 of the ANPRM. Under paragraph (b), additional procedures would be required to provide safety for repairs made while a component is operating:

Contaminants. Section 193.1213 of the ANPRM, concerning removal of contaminants which impair the functioning of components, has been deleted as the subject is covered by §§ 193.1203(a), 193.1205, and 193.1206.

Control Systems. As a general standard for control systems, it is proposed in § 193.1215(a) that they be properly adjusted and maintained to operate as designed. MTB does not agree with commenters that it is unnecessary to prescribe a time period for inspection and testing of control systems which are operating satisfactorily on a regular basis because regular operation might not include activities of sensing and alarm devices. Therefore, an annual inspection and test would be required under paragraph (d) for each control system that is normally in operation. Section 193.1215(b) proposes that control systems be inspected and tested before use after being taken out of service for a month or more. Also, § 193.1215(c) has been added, as suggested by several commenters, to provide for periodic inspection and testing of components which are in service but not normally

operating, such as relief devices and automatic shutdown systems. It is imperative that such components be operational when needed. Some commenters objected to the suggested inspection and testing of control systems in the ANPRM "before returning to service after a shutdown of one month or more." Operators felt this would create a major maintenance problem if the plant were operated and shutdown three or four times a year. MTB agrees with these comments and feels it would be a burden for facility operators who are intentionally starting up and shutting down their liquefaction and vaporization train. Therefore, MTB has changed the proposed rules to allow for seasonal operation, such as occurs with liquefaction and vaporization. These proposed rules differ from the ANPRM, which called for inspection and testing of control systems before returning to service after a shutdown of one month or more.

The Draft Evaluation identifies § 193.1215 as a proposal with major cost impacts primarily because money will have to be expended for periodically testing equipment and instruments that have not been in use for periods indicated. Because the consequences of the failure of a control system would have a significant effect on the operation of an LNG facility, MTB considers testing these systems of primary importance.

Transfer hoses. As suggested in the ANPRM, § 193.1217(a) would require that hoses used to transfer LNG or flammable refrigerants be tested annually to a pressure level at least as high as the maximum pump pressure or the relief valve setting. Under paragraph (b), hoses would have to be visually inspected before each use. Some commenters recommended that testing of transfer hoses be limited to the lesser of the maximum pump pressure or relief valve setting. However, § 193.1217 provides an option for the pressure to be used, and thus satisfies the intent of the recommendation.

Storage tanks. MTB believes that each LNG storage tank should be checked periodically for the presence of certain potentially hazardous operating conditions that could result from environmental or operational causes. Section 193.1219 sets forth the conditions and the inspections that would have to be performed to determine whether the conditions exist at a storage tank. In accordance with recommendations of some commenters, the conditions have been restated and the inspections have been revised from the way they were stated in the

ANPRM. MTB agrees that inspections of the foundation, tank, and transfer lines at 3-month intervals are necessary only for the first year of service, for in that time conditions should be stabilized. Inspection for stratification is proposed at 3-month intervals and when "significant" additions of LNG are made; and temperature readings may be used as an inspection procedure. MTB believes that cold spots, which indicate possible inner tank leakage or other problems and are immediately visible, should be looked for at weekly intervals. In respect to adequacy of insulation (other than problems evidenced by cold spots), inspections using electronic devices would be required quarterly for the first year after a tank is placed in service and annually thereafter.

The Draft Evaluation identifies § 193.1219 as a proposal with major cost impacts primarily because significant sums of money will have to be expended for periodic inspection of tanks. The inspections proposed are very important to assure that the specified conditions are not a potential hazard to the tank. MTB has revised the periods of inspections to be more in conformance with comments to this section in the ANPRM, and MTB believes that the benefits associated with this proposal are justified.

Records. In light of many comments, the proposed recordkeeping requirement under § 193.1221 is changed from the ANPRM version to clarify that a log made available for inspection at each facility may be used to provide an adequate record of all maintenance activities.

Subpart N-Fire Protection

The purpose of this subpart is to ensure (1) that fires at new and existing LNG facilities are prevented to the maximum possible extent through proper planning and personnel training, and (2) that new and existing LNG facilities are properly equipped with firefighting equipment and systems. Under the proposed rules, written procedures would be required to prevent fires as far as possible or to protect components against damage from fires, that might occur, and ongoing training programs would have to be established for LNG facility personnel who will carry out such procedures. In accordance with the emergency procedures proposed under § 193.1109, operator activities would have to be performed in cooperation with appropriate law enforcement officials in the event of fire or other emergencies.

The title of the subpart has been changed to "Fire protection" from the term "Fire prevention" used in the

ANPRM. This was considered more appropriate by several commenters, is consistent with NFPA 59A, and has been agreed upon by MTB in coordination with the U.S. Coast Guard as part of the new format which will be used in the development of the final rules (see Notice 4).

Two commenters to § 193.1301 of the ANPRM felt that Subpart N should apply to existing LNG facilities only "as far as practical." MTB feel the danger of fire occurring at an LNG facility is so serious that fire prevention and protection standards should not differ regarding the operation of new and existing facilities. Also, the burden of compliance for existing facilities to meet the proposed requirements should not be onerous.

General. As a general standard, it is proposed in § 193.1303 that each operator minimize the occurrence of fires and their consequences by following sound fire protection engineering principles. The provision in the ANPRM regarding use of operation and maintenance techniques to minimize the potential for fires has been deleted as duplicative of the purposes of the operation and maintenance subparts proposed for Part 193. *Fire prevention.* The purpose of §§ 193.1305–193.1306d is to prevent fires by identifying and controlling ignition sources and the release of flammable fluids. Under § 193.1305(a), each operator would have to determine the areas within and outside the facility where flammable fluids may exist and the potential ignition sources. The suggestion in § 193.1305(a)(1) of the ANPRM that operators consult with local fire department officials on causes of fires has been deleted, as the coordination with law enforcement officials in respect to firefighting and other emergencies is covered by § 193.1109. Under § 193.1305(b), operators would be required to prepare and follow fire prevention procedures to minimize leakage in areas where it may occur as described in Section 500–4 of the National Electrical Code. The procedures would also be used to control ignition sources identified under paragraph (a).

Because § 193.1139 has been revised to reference the AGA "Purging Principles and Practice," which covers the full purging procedures for taking components out of service, or returning them to service, the suggested § 193.1305(b)(6) of the ANPRM regarding purging procedures has been deleted as redundant.

In the ANPRM, §§ 193.1305(b)(3) thru 193.1305(b)(5) pertained to procedures for smoking, open fires, welding, and

combustible materials. MTB is proposing specific actions for controlling smoking, open fires, welding, and storage of flammable fluids under §§ 193.1306 thru 193.1306c. Section 193.1305(b)(7) of the ANPRM pertained to proposed restrictions of motor vehicles and is now covered under § 193.1306d, *Motorized equipment.*

A number of commenters to § 193.1305(b)(7) of the ANPRM recommended that a minimum distance be required between vehicles or other mobile equipment which could constitute a potential ignition source and processing equipment containing flammable fluids. MTB agrees and is proposing a 15m (49.2 ft.) requirement under § 193.1306d, which is consistent with paragraph 911 of NFPA 59A. Section § 193.1306b would require operators to post areas where smoking is permitted, and § 193.1306c would require operators to post areas where smoking is prohibited. *Firefighting plan.* The suggested requirement in § 193.1307(b) of the ANPRM for firefighting procedures is transferred to § 193.1109 of this notice, concerning emergency procedures. *Fire control equipment.* A new § 193.1308 is proposed based on the suggested requirements of Sections 193.1307(a), (c)–(g) of the ANPRM concerning fire control equipment. This proposed section is intended to ensure that each operator has equipment and materials on hand to protect components against the damaging effects of exposure to a fire, by extinguishing small fires, preventing spills from igniting, and preventing a fire from spreading to a component. In the ANPRM, § 193.1307(c)(1) suggested that operators provide portable or wheeled fire extinguishers suitable for gas fires, preferably of the dry chemical type. MTB agrees with commenters who felt that any extinguisher suitable for gas fires should be acceptable, and § 193.1308(b)(1) is changed accordingly. In addition, paragraph (b)(1) is changed to provide that extinguishers be suitable for fires identified under § 193.1308(a), not just gas fires. In addition to fire extinguishers, § 193.1308(b)(2) would require that facilities with a capacity of 265m³ (70,000 gal.) or more be equipped with a water supply and delivery system adequate to protect or cool components for the duration of any endangering fire, including control of unignited leaks and spills. It is intended that this water supply system be used for sprays, water curtains, or deluge systems. Added water supply would be needed for any foam system an operator may provide.

In the ANPRM, § 193.1307(d) pertained to the general design of a water supply

system. This section has been deleted in this notice since the general design requirements are covered by requirements for components in § 193.303, by § 193.1303, and to some extent by the proposed § 193.1308(b) of the ANPRM. Paragraph (d) of § 193.1308 would require each facility operator who may be endangered by exposure to fire to have protective clothing and equipment. Paragraphs (e) and (f) propose requirements for recognition, accessibility, and operating instructions of fire control equipment.

The Draft Evaluation identifies § 193.1308 as a proposal with major cost impacts because monies would be required to provide additional firewater storage. Nevertheless, MTB considers this a critical requirement to properly safeguard an LNG plant from an ignited or unignited LNG spill. The failure to properly control the hazards from such a spill could result in an even more catastrophic result. *Coordination with public agencies.* Suggested requirements governing coordination of an operator's fire prevention and protection and other emergency control activities with public safety agencies were set forth in the ANPRM under § 193.1309. This section is deleted in this notice since proposed coordination responsibilities for emergencies have been appropriately included organizationally under § 193.1109 concerning emergency procedures.

Leak and fire detection. Section 193.1310 is an additional proposed rule not in the ANPRM that would require fixed flammable gas detection systems to monitor for the presence of flammable gases and vapors. Due to the expansion rate of LNG from its liquid to its gaseous state, MTB and USCG is proposing under § 193.1310(f) that all enclosed buildings on an LNG facility be continuously monitored for the presence of flammable gases and vapors with a fixed flammable gas detection system that provides a visible or audible alarm outside the enclosed building in order to warn the operator of a hazardous condition inside the building. Section 193.1307(g) of the ANPRM pertained to portable flammable gas indicators and is being proposed under § 193.1310(e). Also, a new § 193.1310(a) is being proposed to cover fire detection. Under this proposed requirement, fire detectors would continuously monitor for the presence of either flame, heat, or products of combustion. Sections 193.1310 and 193.1310a would insure timely warning of a potentially hazardous condition and alert facility personnel. The proposed § 193.1310 is similar to the current requirements in

NFPA 59A which MTB believes would not result in significant costs. Section 193.1310a is a new proposal that MTB believes would not have significant cost impacts because fire detection components are reasonable in cost. In addition, any LNG facilities already have fire detection systems. MTB specifically requests comments on these points.

Training. The vital function of training LNG facility personnel to carry out the fire prevention and protection plans of Subpart N would be covered by § 193.1311. Under this section, each operator would have to provide and maintain an instructional program for all new and existing personnel. As breaches of security are included in the training proposed by § 193.1123, reference to breaches of security in § 193.1311 of the ANPRM has been deleted.

Records. Records to show that the training has been provided to, and completed by, personnel would be required by § 193.1313. The ANPRM suggested that these records provide evidence that personnel have satisfactorily attained proficiency goals. Since many commenters indicated that such a conclusion would be highly subjective and open to broad interpretation, this suggested requirement has been deleted. There were also a number of objections to the suggested requirement in § 193.1313(b) of the ANPRM for maintaining records of personnel for 3 years after they have left a facility. MTB needs records for enforcement reasons. Therefore, MTB is proposing in this NPRM that records must be maintained for 1 year after personnel are no longer assigned duties at the LNG facility instead of the 3 years.

Subpart O—Corrosion Control

This subpart would insure that the integrity and reliability of components in new and existing LNG facilities are not adversely affected by external, internal, or atmospheric corrosion. Unless corrosion is controlled, certain corrosive conditions can cause leaks or malfunctions in metallic components and consequent hazardous conditions. The primary methods available for corrosion control include material selection, coating, and cathodic protection.

Because operators of existing LNG facilities may need some time to bring the facilities into compliance with Subpart O, MTB proposes that 1 year's lead time be allowed for this purpose after the final rules are issued.

The Draft Evaluation identifies § 193.1419 as a proposal with major cost

impacts primarily because major costs would be incurred to provide means for monitoring corrosion protection systems at the intervals indicated. Based on MTB pipeline failure data, corrosion has historically been the cause of approximately half of all pipeline leaks. The hazards due to a corrosion leak at an LNG facility are as significant as similar leaks on pipeline systems. Monitoring of corrosion protection is already required for certain LNG facilities as part of facility maintenance under 49 CFR 192.12(a) and 192.451. Section 193.1419 is proposing to expand these same requirements to cover the remaining facilities. Comments are requested on the additional cost to implement the additional corrosion monitoring. Also, the Draft Evaluation bases its high cost estimate on the assumption that in many cases LNG storage tanks will have to be taken out of service for compliance with § 193.1419. Comments are requested on whether new tanks can be designed to avoid this outcome and whether cathodic protection on existing tanks can be monitored without taking the tank out of service.

General. As a general requirement, MTB is proposing in Section 193.1402 that each metallic component in an LNG facility be protected from corrosion if its integrity and reliability could be adversely affected by corrosion during its intended service life. This proposal recognizes that in certain circumstances the corrosivity of a component's environment or the fluid it carries may not warrant protective measures.

Procedures. Each operator would be required by § 193.1403 to prepare and follow written procedures for determining which components in a facility must be protected from corrosion under § 193.1402, and for meeting the requirements of Subpart O in providing that protection. In accordance with the proposed definition of "determine" (Notice 4), under this section each operator would have to conduct a corrosion investigation, following the written procedures, to ascertain whether it is reasonable to assume that components will be adversely affected by corrosive environments or fluids during their lifetime. This section would also establish qualifications for personnel who are to be in charge of carrying out the procedures.

Overview. It was suggested in § 193.1403 of the ANPRM that a qualified person described in § 193.1403 reviewed from a corrosion control viewpoint all materials used in the construction, replacement, or repair of an LNG facility to insure they would not

imperil the safety or reliability of the facility. MTB agrees with the many commenters who felt this review would be unnecessary in many cases of replacement or repair where no change in the original material specifications is involved. As a result, § 193.1405(b) has been added, defining the conditions where such a review would be required in the case of replacement, repair or significant alteration. The proposed conditions are where changes in the original material specifications are involved or where failure or significant deterioration of the original material has taken place because of corrosion.

Atmospheric corrosion. If, as provided by § 193.1402, a component's integrity or reliability could be adversely affected by atmospheric corrosion, it would have to be protected in accordance with § 193.1407 by proper material selection or by applying a protective coating or jacketing over the outside of the exposed metal component.

External corrosion. Any component that could be adversely affected by external (or electrochemical) corrosion would have to be protected under the proposed § 193.1409 by proper material selection or by coating and cathodic protection.

The ANPRM suggested a similar requirement for metal reinforcing material, but the majority of the commenters objected to the need for protecting reinforcing materials for a number of reasons: It would not be practical to electrically interconnect all parts of a reinforcing grid so that it would be protected as a single unit; the protection level in existing piping systems could be adversely affected; such corrosion control methodology is not adequately developed; the need for and effectiveness of such protection has not been demonstrated; and such protection could adversely affect the bonding of concrete to reinforcing metal. Also, many commenters stated that experience shows there have not been any corrosion problems with reinforcing materials in LNG facilities. In view of these comments, MTB has reconsidered the need to protect metal reinforcing material in concrete structures in LNG facilities, and has determined that a proposed rule as suggested in the ANPRM cannot be justified on the basis of available information.

With regard to the cathodic protection system proposed under § 193.1409(a)(2)(ii), it was suggested in the ANPRM that such a system be placed in operation immediately after installation of a component. Many commenters pointed out that this was not consistent with the corrosion control requirements of 49 CFR Part 192, where

it has been recognized that immediate effective operation is not practical. This notice proposes that cathodic protection systems be placed in operation within one year after installation of a new component or, in the case of an existing component, within one year after § 193.1409 is issued as a final rule.

Internal corrosion. Section 193.1411 proposes that each component subject to internal corrosion that would adversely affect the integrity or reliability of the component be protected by an inhibitor, coating, or other means unless internal corrosion is controlled by proper material selection.

Environmentally induced cracking. In the ANPRM, § 193.1413 suggested that all components be protected from environmentally induced cracking. Based on a further review of available information, MTB deleted this section from the NPRM because at present environmentally induced cracking has not been identified as a problem in components contained in LNG facilities. Proposed reporting requirements in § 193.1423(a) should provide further information on the subject and show whether a need exists for future rulemaking.

Interference currents. Sections 193.1415 (a) and (b) are directed toward protecting metal components from corrosion caused by stray earth currents that may enter and leave a component. Cathodic protection rectifiers, electrical generators, or other sources may provide these currents. Section 193.1415(c) of the ANPRM suggested that each impressed power source have filters to prevent unintended interference with control networks. Commenters stated that § 193.1415(c) was not related to corrosion control. Although paragraph (c) is not intended to control corrosion, the interference problem derives in some cases from currents that are normally related to corrosion control equipment. Therefore, the proposed standard for protection is included in Subpart O. The paragraph has been revised to be more performance oriented, eliminating the requirement for the use of filters as the only means of minimizing interference.

Contaminants. Section 193.1417 of the ANPRM, which dealt with contaminants, has been deleted, as most of the section was either redundant or has been combined with the proposed requirements of Section 193.1015, relating to cleanup after construction, and Section 193.1017, relating to the pipe welding (see Notice 4).

Monitoring. Section 193.1419 of the ANPRM concerning monitoring of corrosion protection has been revised so as to make it more consistent with

similar requirements in 49 CFR Part 192 for gas pipelines. As recommended by many commenters, the proposed inspection or test periods have been made identical with those in Part 192. Section 193.1419(b) has been added to cover rectifiers and impressed current power sources. This had been omitted in the ANPRM. In the ANPRM, § 193.1419(c) related to both external and atmospheric corrosion protection, and it has been divided into separate paragraphs (a) and (d) for clarity in this notice, recognizing that external corrosion protection is monitored by test, whereas atmospheric corrosion protection is evaluated by inspection. Paragraphs (d) and (e) of the ANPRM concerning internal corrosion are restated in the proposed § 193.1419(e). Under paragraph (e), coupons or probes used for monitoring internal corrosion would have to be located where internal corrosion is "most likely to occur." It is recognized that any monitoring of the internal corrosion protection in cryogenic systems would be difficult during the periods a facility is in operation. The calendar year period, not exceeding 15 months, as proposed, should provide sufficient flexibility to permit such monitoring during facility shutdowns.

In the ANPRM, § 193.1419(g) suggested that the Director be advised of all corrosion caused failures occurring before the component's normal service life that are not reported individually under 49 CFR Part 191. This has been revised and restated in § 193.1423(a) to specifically include environmentally induced types of corrosion. MTB does not agree that the number of reports would be massive and would serve no useful purpose in the interest of safety, since a large number of corrosion failures are not anticipated at LNG facilities.

Paragraph (h) in the ANPRM has been deleted as the problem of contaminants in cleaning solutions is covered by the proposed § 193.1015.

Also, paragraph (i) has been deleted because the suggested requirement for obtaining corrosion rate data was too indefinite and the other proposed requirements of §§ 193.1419 and 193.1421 cover the subjects of inspecting for and correcting inadequate corrosion protection.

Remedial measures. If an operator learns through the activities conducted under § 193.1419, or otherwise, that an applied corrosion protection method is ineffective, or could not be expected to preserve the integrity or reliability of the protected component for its service life, then Section 193.1421 would require that prompt remedial action be taken.

Records. As suggested in the ANPRM under Section 193.1423, each operator would have to maintain a record of its cathodically protected components and of each investigation made to show the effectiveness of corrosion control or that corrosion control is not needed.

The Draft Evaluation identifies § 193.423 as a proposal with major cost impacts because of the additional sums of money that will be required for maintenance of corrosion control records. Because of the history of leaks due to corrosion, MTB believes that keeping records of the corrosion leaks and location of cathodically protected components is of sufficient importance to require such data. This data will be of significant value in evaluating trends in corrosion leaks and implementing corrective measures to mitigate such problems.

In consideration of the foregoing, MTB proposes to amend Title 49 of the Code of Federal Regulations as follows:

1. Part 193 is proposed to be amended by adding new Subparts L-O to read as set forth below.

2. The Appendix to Part 193 is proposed to be amended by adding the new material to be incorporated by reference which is set forth below.

(Sec. 3 Pub. L. 90-481, 82 Stat. 721 (49 U.S.C. 1672); 49 CFR 1.53, Appendix A of Part 1, and Appendix A of Part 106)

Issued in Washington, D.C. on January 30, 1980.

Cesar De Leon,

Associate Director for Pipeline Safety Regulations, Materials Transportation Bureau.

PART 193—LIQUEFIED NATURAL GAS FACILITIES: FEDERAL SAFETY STANDARDS

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Appendix A to Part 193—Incorporation by Reference.

- I. List of organizations and addresses.
 II. Documents incorporated by reference.

Authority: 49 U.S.C. 1671 et seq.; 49 CFR 1.53, Appendix A of Part 1, and Appendix A of Part 106.

Subpart L—Operations**§ 193.1101 Scope.**

This subpart prescribes requirements for the operation of LNG facilities except that it does not apply to security at waterfront LNG facilities.

§ 193.1103 Personnel qualifications.

(a) Each operator shall utilize for operating and maintaining components only those personnel who have demonstrated their capability to perform their assigned functions by—

- (1) Work related experience in operations and maintenance of an LNG facility or of a compatible facility such as an air separation or propane plant and successful completion of the

training required by §§ 193.1115 and 193.1311; and

(2) Performance or a qualification test relevant to the assigned function.

(b) A person who does not have the experience required by paragraph (a)(1) of this section may operate a component when accompanied by a supervisor who has the experience.

§ 193.1105 Operating Procedures.

(a) Each operator shall follow a manual of written procedures to assure safety in normal operation and in responding to an abnormal operating condition. The procedures must be available at the LNG facility and include provisions for—

(1) Conducting any inspections or tests of components and buildings required by § 193.1107;

(2) Startup and shutdown including for initial startup, performance testing to demonstrate that components will operate satisfactorily in service;

(3) Recognizing and responding to component malfunctions and personnel error, including taking action if—

(i) Pressure or temperature is outside limits; or

(ii) A component malfunctions because of contaminants;

(4) Purging and inerting components according to the requirements of § 193.1139;

(5) In the case of vaporizers,

(i) Minimizing thermal shock during the initiation of vaporization; and

(ii) Maintaining the rate of vaporization so that the temperature and pressure of the resultant gas are within the design limits of the vaporizer; and

(6) In the case of liquefaction, maintaining correct flow, temperature, and pressure within the design limits for facility turbines and compressors, for facility purification and regeneration equipment, and for heat exchangers, expanders and compressors located inside of the facility cold box.

(b) Before (effective date) or 60 days before an LNG facility is initially placed in operation, whichever is later, the procedures prepared under paragraph (a) of this section must be filed with the Director or with a State agency that has submitted a current certification or agreement with respect to the facility under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674). In addition, each change to the procedures must be filed within 20 days after the change is made.

(c) The Director or State agency may require the operator to amend the manual of operating procedures if it does not assure safety in operation.

(d) Procedures and changes filed with the Director must be sent to the Director, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590.

§ 193.1106 Cooldown.

(a) Each operator shall include in the manual of operating procedures under § 193.1105 written procedures for the cooldown of each component that is subjected to cryogenic temperatures.

(b) The procedures must assure that—

(1) Cooldown is limited to a rate and distribution pattern that keeps thermal stresses within design limits during the cooldown period, paying particular attention to the performance of expansion and contraction devices; and

(2) After cooldown stabilization is reached, all flange gaskets and seals are inspected for leaks.

§ 193.1107 Monitoring operations.

(a) Each component in operation or building that is subject to or otherwise in compliance with the applicable requirements of this part regarding the installation of sensing, warning, and remote or automatic control devices must be monitored from a control center. Monitoring must be accomplished by continuously watching or listening for warning alarms, such as gas, temperature, pressure, vacuum, and flow alarms.

(b) Other components in operation and other buildings in which a potentially hazardous quantity of flammable fluid is handled must be monitored by—

(1) Conducting an inspection or test at least daily for signs of any abnormal operating conditions or failure; and

(2) In the case of components, directly observing all startups, shutdowns, and transfer operations.

§ 193.1109 Emergency procedures.

(a) Each operator shall determine the types and places of emergencies other than fires that may reasonably be expected to occur at an LNG facility due to operating malfunctions, structural collapse, personnel error, forces of nature, and activities adjacent to the facility.

(b) To adequately handle each type of emergency identified under paragraph (a) of this section and each fire emergency identified under § 193.1308(a), each operator shall follow a manual of written procedures. The manual must be available at the LNG facility and provide for the following:

(1) Responding to controllable emergencies, including notifying personnel and using equipment appropriate for handling the emergency.

(2) Recognizing an uncontrollable emergency and taking actions to minimize harm to the public and personnel, including early notification of local law enforcement officials of the emergency and possible evacuation of the public in the vicinity of the LNG facility.

(3) An emergency evacuation plan, which sets forth the steps required to protect the public in the event of a catastrophic failure of the LNG tank.

(4) Cooperating with appropriate local law enforcement officials in handling evacuations, emergencies and keeping these officials advised of—

(i) The LNG facility fire control equipment, its location, and quantity of units located throughout the facility;

(ii) Potential hazards at the facility, including fires;

(iii) Communication and emergency control capabilities at the LNG facility; and

(iv) The status of each emergency.

(c) Before (effective date) or 60 days before an LNG facility is initially placed in operation, whichever is later, the procedures prepared under paragraph (b) of this section must be filed with the Director or with a State agency that has submitted a current certification or agreement with respect to the facility under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674). In addition, each change to the procedures must be filed within 20 days after the change is made.

(d) The Director may require the operator to amend the manual of emergency procedures if it does not provide for adequate handling of emergencies.

(e) Procedures and changes filed with the Director must be sent to the Director, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590.

§ 193.1111 Personnel safety:

(a) Each operator shall identify the potential hazards involved in operating and maintenance activities that affect the proper performance of those activities and provide suitable protective clothing and equipment necessary for the safety of personnel while they are conducting the activities.

(b) All personnel who are normally on duty at a fixed location, such as a building or yard, where they could be harmed by thermal radiation from a burning pool of impounded liquid must be provided a shelter at that location from the harmful effects of radiation.

(c) Each LNG facility, including each building used as a shelter, must be equipped with suitable first aid material,

the location of which is clearly marked and readily available to personnel.

§ 193.1113 Personnel performance.

Each operator shall provide and conduct a written program to ensure that operating personnel are mentally and physically capable while carrying out their assigned functions.

§ 193.1115 Personnel training.

(a) Each operator shall conduct a written initial training program to instruct—

(1) All permanent maintenance, operating, and supervisory personnel—

(i) About the characteristics and hazards of LNG and other flammable fluids used or handled at the facility, including, with regard to LNG, low temperatures, flammability of mixtures with air, odorless vapor, boiloff characteristics, and reaction to water and water spray;

(ii) About the hazards identified under § 193.1111(a); and

(iii) To carry out aspects of the operating and maintenance procedures under §§ 193.1105 and 193.1205 that relate to their assigned functions;

(2) All personnel—

(i) To carry out the emergency procedures under § 193.1109 that relate to their assigned functions; and

(ii) To give first aid;

(3) All operating and supervisory personnel—

(i) To understand detailed instructions on the facility operations, including controls, functions, and operating procedures; and

(ii) To understand the LNG transfer procedures provided under § 193.1117; and

(4) All supervisory personnel in the operation of all systems within the LNG facility.

(b) A written program of continuing instruction must be conducted at intervals of not more than two years to keep all personnel current on the knowledge and skills they gained in the program of initial instruction.

(c) Personnel training records must be maintained for one year after personnel are no longer assigned duties at the LNG facility.

§ 193.1117 Transfer procedures.

(a) Each transfer of LNG or other hazardous fluid must be conducted in accordance with a manual of written procedures to provide for safe transfers.

(b) The transfer procedures must include provisions for personnel to:

(1) Before transfer, verify that the transfer system is ready for use, with connections and controls in proper positions, including if the system could

contain a combustible mixture, verifying that it has been adequately purged in accordance with AGA "Purging Principles and Practice."

(2) Before transfer, verify that each receiving container or tank vehicle does not contain any substance that would be incompatible with the incoming fluid and that there is sufficient capacity available to receive the amount of fluid to be transferred;

(3) Before transfer, verify the maximum filling volume of each receiving container or tank vehicle to ensure that expansion of the incoming fluid due to warming will not result in overfilling or overpressure;

(4) Before making a bulk transfer of LNG into a partially filled (excluding cooldown heel) container, determine any differences in temperature or specific gravity between the LNG being transferred and the LNG already in the container and, if necessary, provide a means to prevent stratification;

(5) Verify that the transfer operations are proceeding within design conditions and that overpressure or overfilling does not occur by monitoring applicable flow rates, liquid levels, vapor returns, pressures and any other significant data.

(6) Manually terminate the flow before overfilling or overpressure occurs; and

(7) Deactivate cargo transfer systems in a safe manner by depressurizing, venting, and disconnecting lines and conducting any other appropriate operations.

(c) In addition to the requirements of paragraph (b) of this section, the procedures for cargo transfer must be located at the transfer area and include provisions for personnel to:

(1) Be in constant attendance during all cargo transfer operations;

(2) Before transfer, verify that tank trucks are positioned so that they need not exit the transfer area by backing;

(3) Prohibit the backing of tank trucks in the transfer area;

(4) Before transfer, verify that—

(i) Each tank car or tank truck complies with applicable regulations governing its use;

(ii) All transfer hoses have been visually inspected for damage and defects;

(iii) Each tank truck is properly immobilized with chock wheels, and electrically grounded; and

(iv) Each tank truck engine is shut off unless it is required for transfer operations; and

(5) Prevent a tank truck engine that is off during transfer operations from being restarted until the transfer lines have been disconnected and any released vapors have dissipated;

(6) Prevent loading LNG into a tank car or tank truck that is not in exclusive LNG service or that does not contain a positive pressure if it is in exclusive LNG service, until after the oxygen content in the tank is tested and if it exceeds 2 percent by volume, purged in accordance with AGA "Purging Principles and Practice";

(7) Verify that all transfer lines have been disconnected and equipment cleared before the tank car or tank truck is moved from the transfer position; and

(8) Verify that transfers into a pipeline system will not exceed the pressure or temperature limits of the system.

(d) Before (effective date) or 60 days before an LNG facility is initially placed in operation, whichever is later, the procedures prepared under this section must be filed with the Director or with a State agency that has submitted a current certification or agreement with respect to the facility under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674). In addition, each change to the procedures must be filed within 20 days after the change is made.

(e) The Director may require the operator to amend the manual of transfer procedures if it does not provide safety in conducting transfers of LNG or other hazardous fluids.

(f) Procedures and changes filed with the Director must be sent to the Director, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590.

§ 193.1121 Investigation of failures.

(a) Each operator shall determine the cause of each operational error or failure or malfunction of a component which results in—

(1) Death or injury requiring hospitalization; or

(2) Property damage exceeding \$10,000.00.

(b) As a result of such investigations, each operator shall take appropriate action to minimize recurrence of the incident, and except for an incident reported in a leak report under Part 191 of this chapter, report the incident and action taken in writing to the Director within 30 days.

(c) If the Director or relevant State agency under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674) investigates an incident, the operator involved shall make available all relevant information and provide reasonable assistance in conducting the investigation. No component involved in the incident may be moved from its location or otherwise altered until approval is obtained from the Director or State agency.

§ 193.1123 Security; procedures.

(a) Each operator shall prepare and follow a manual of written procedures to provide security for each LNG facility. The procedures must be available at the facility and include at least:

(1) A description and schedule of security inspection and patrols performed in accordance with § 193.1133;

(2) A list of security personnel positions utilized at the LNG facility;

(3) A brief description of the duties associated with each security personnel position;

(4) Instructions for actions to be taken, including notification of other facility personnel and appropriate law enforcement officials in the event of a potential or actual emergency or breach of security;

(5) Methods for determining which persons are allowed access to the LNG facility;

(6) Positive identification of all persons entering the facility and on the facility, including the use of picture badges for facility personnel; and

(7) Continual liaison with appropriate local law enforcement officials to keep them informed about current security procedures under this section.

(b) The Director may require the operator to amend the manual of security procedures if it does not adequately provide for security of the facility.

§ 193.1124 Security; personnel training.

(a) Personnel responsible for maintaining security at an LNG facility must be trained in accordance with a written program of initial instruction to:

(1) Recognize breaches of security;

(2) Carry out the security procedures under § 193.1123 that relate to their assigned duties;

(3) Be familiar with basic facility operations and all emergency procedures of the LNG facility; and

(4) Recognize conditions where security assistance is needed.

(b) A written program of continuing instruction must be conducted at intervals of not more than two years to keep all personnel current on the knowledge and skills they gained in the program of initial instruction.

(c) Training records must be maintained for one year after personnel are no longer assigned duties at the LNG facility.

§ 193.1124a Security; personnel qualifications.

Each operator shall ensure that security personnel are qualified to perform their assigned duties by:

(a) Successful completion of training required under § 193.1124 and;

(b) Being physically and mentally capable of performing those duties.

§ 193.1125 Security; protective enclosures.

(a) Each of the following items must be surrounded by a protective enclosure:

(1) Storage tanks;

(2) Impounding systems;

(3) Vapor barriers;

(4) Cargo transfer systems;

(5) Process, liquefaction, and vaporization equipment;

(6) Control room and stations;

(7) Control systems;

(8) Fire control equipment;

(9) Security communications systems; and

(10) Alternative power sources.

(b) Ground elevations outside a protective enclosure must be graded in a manner that does not impair the effectiveness of the enclosure.

(c) Protective enclosures may not be located near features outside of the facility such as trees, poles, or buildings, which could be used to breach the enclosure.

(d) At least two accesses must be provided in each protective enclosure and be located to minimize the escape distance in the event of emergency.

(e) Each access must be locked unless it is continuously guarded. During normal operations, an access may be unlocked only by persons designated in writing by the operator. During an emergency, a means must be readily available to all facility personnel within the protective enclosure to open each access.

§ 193.1127 Security; protective enclosure construction.

(a) Each protective enclosure must have sufficient strength and configuration to obstruct unauthorized access to the components being enclosed.

(b) Protective enclosures must be fences, or walls constructed as follows:

(1) Fences must be chainlink security fences constructed of No. 11 American wire gauge or heavier metal wire.

(2) Walls must be vertical and constructed of stone, brick, cinder block, concrete, steel or comparable materials.

(3) Protective enclosures must be topped by three or more strands of barbed wire or similar material on brackets angled outward between 30° and 45° from the vertical, with a height of at least 2.4 m (8 ft.) including approximately one foot of barbed topping.

(4) Openings in or under protective enclosures must be secured by grates,

doors or covers of construction and fastening of sufficient strength such that the integrity of the protective enclosure is not reduced by any opening.

193.1130 Security; communications.

A means must be provided for direct communications between:

(a) The LNG security personnel and appropriate law enforcement officials; and

(b) All security personnel and all control rooms and control stations.

§ 193.1131 Security; lighting.

Where security warning systems are not provided for security monitoring, the area around each item listed under § 193.1125(a) and each protective enclosure must be illuminated with a minimum in service lighting intensity of 0.2 lux (2.2 ftc) between sunset and sunrise.

§ 193.1133 Security; monitoring.

Each protective enclosure and the area around each item listed in § 193.1125(a) must be monitored for the presence of unauthorized persons. Monitoring must be done by direct visual observation based on the schedule included in the security procedures under § 193.1123 or by security warning systems that continuously transmit data to an attended location. At an LNG facility with less than 40,000 m³ (250,000 bbl) of storage capacity, only the protective enclosure must be monitored.

§ 193.1134 Security; alternative power sources.

An alternative source of power that meets the requirements of § 193.927 must be provided for security lighting and security warning systems.

§ 193.1135 Security; warning signs.

(a) Warning signs must be conspicuously placed along each protective enclosure at intervals so that at least one sign is recognizable at night from a distance of 30 m (100 ft.) from any way that could reasonably be used to approach the enclosure.

(b) Signs must be marked with at least the following on a background of sharply contrasting color:

The words "NO TRESPASSING," or words of comparable meaning.

§ 193.1139 Purging.

Components that could accumulate significant amounts of combustible mixtures must be purged in accordance with the provisions of the AGA "Purging Principles and Practice" after being taken out of service and before being returned to service.

§ 193.1140 Communication systems.

(a) Each LNG facility must have a primary communication system that provides for verbal communications between all operating personnel at their work stations in the LNG facility.

(b) Each LNG facility must have an emergency communication system that provides for verbal communications between all persons and locations necessary for the orderly shutdown of operating equipment and the operation of safety equipment in time of emergency. The emergency communication system must be independent of and physically separated from the primary communication system and the security communication system under § 193.1130.

(c) Each communication system required by this part must have an auxiliary source of power.

§ 193.1141 Operating records.

(a) Each operator shall maintain a record describing each abnormal operation of each component and the corrective action taken and keep a log of the results of each inspection and test required by this subpart.

(b) Records must be kept for a period of not less than 5 years.

§ 193.1143 Notice of intent to operate.

(a) Except as provided in paragraph (b) of this section, no person may operate a new LNG facility or an existing component that is replaced, relocated, or significantly altered unless written notice of intent to operate is provided the Secretary or a relevant State agency in the case of an LNG facility that is subject to jurisdiction of that State agency under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674). The notice must describe the LNG facility or component, its function, and state the location and date of intended operation.

(b) Notice must be sent to the Director, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590. It must be received 30 days before installation or alteration begins, except that for components added, replaced, relocated, or significantly altered in an emergency or to correct an abnormal operation, notice may be received as soon as practicable after the component is placed in operation.

Subpart M—Maintenance

§ 193.1201 Scope.

This subpart prescribes requirements for maintaining LNG facilities.

§ 193.1203 General.

(a) Each component in service, including its support system, must be maintained in a condition that is compatible with its operational or safety purpose by repair, replacement, or other means.

(b) An operator may not place, return, or continue in service any component which is not maintained in accordance with this subpart.

(c) Each component taken out of service for maintenance must be identified in the log book kept under § 193.1221.

(d) If a safety device is taken out of service for maintenance, the part of the LNG facility being served by the device must be taken out of service unless the same safety function is provided by an alternate means.

(e) Each component taken out of service for maintenance that could be inadvertently operated must have a tag attached to the controls bearing the words "do not operate" or words of comparable meaning.

§ 193.1205 Maintenance procedures.

(a) Each operator shall determine and perform, consistent with generally accepted engineering practices, the periodic inspections or tests needed to meet the applicable requirements of this subpart and to verify that components meet the maintenance standards prescribed by this subpart.

(b) Each operator shall follow a manual of written procedures for the maintenance of each component. The procedures must include—

(1) The details of the inspections or tests determined under paragraph (a) of this section and their frequency of performance; and

(2) A description of other actions necessary to maintain the LNG facility in accordance with the requirements of this subpart.

(c) Before (effective date) or 60 days before an LNG facility is initially placed in operation, whichever is later, the procedures prepared under paragraph (b) of this section must be filed with the Director or with a State agency that has submitted a current certification or agreement with respect to the facility under Section 5 of the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. 1674). In addition, each change to the procedures must be filed within 20 days after the change is made.

(d) The Director may require the operator to amend the manual of maintenance procedures if it does not assure that components are maintained in a safe condition.

(e) Procedures and changes filed with the Director must be sent to the Director,

Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590.

§ 193.1206 Foreign material.

(a) The functioning of a component must not be obstructed by foreign material, contaminants, or ice.

(b) LNG facility grounds must be free from rubbish, debris, and other material which present a fire hazard. Grass areas on the facility must be maintained in a manner that does not present a fire hazard.

§ 193.1206a Support systems.

Each support system or foundation of a component whose failure could reasonably be expected to cause a hazard must be inspected for any detrimental change that could impair support.

§ 193.1207 Fire control equipment.

(a) All fire control equipment must be maintained in a ready condition for operational use.

(b) When inspection and maintenance are required on fire control equipment, it shall be in accordance with:

(1) Portable fire extinguishers must be inspected and maintained in accordance with manufacturers' recommendations and Chapter 5 of NFPA Standard 10.

(2) Automatic fire detectors must be inspected and maintained in accordance with manufacturers' recommendations and Chapter 8 of NFPA Standard 72E.

(3) Foam-water sprinkler and spray systems must be inspected and maintained in accordance with manufacturers' recommendations and Chapter 7 of NFPA Standard 16.

(4) Hydrants must be inspected and maintained in accordance with manufacturers' recommendations and Chapter 4 of NFPA Standard 24.

(c) Access routes for the movement of fire control equipment must be maintained to provide for use in all weather conditions.

§ 193.1208 Auxiliary power sources.

Each auxiliary power source must be tested monthly to check its operational capability and capacity in an emergency. The test must take into account the power needed to start up and simultaneously operate equipment that would be served by that power source in an emergency.

§ 193.1209 Isolating and purging.

Components which are isolated for maintenance must be purged in accordance with AGA "Purging Principles and Practice" before personnel begin maintenance activities. If the component or maintenance activity provides an ignition source, a

technique in addition to isolation valves, such as removing spool pieces or valves and blank flanging the piping, must be used to ensure that the work area is free of flammable fluids.

§ 193.1211 Repairs.

(a) Repair work on components must be performed and tested in a manner which—

(1) As far as practicable, complies with the applicable requirements of Subpart K of this part; and

(2) Assures the integrity and operational safety of the component being repaired.

(b) For repairs made while a component is operating, each operator shall include in the maintenance procedures under § 193.1205 appropriate precautions to maintain the safety of the LNG facility and personnel during repair activities.

§ 193.1215 Control systems.

(a) Each control system must be properly adjusted and operate as designed.

(b) If a control system is out of service for 30 days or more, it must be inspected and tested for operational capability before returning it to service.

(c) Control systems in service, but not normally in operation (such as relief valve and automatic shutdown devices) must be inspected and tested once each calendar year, but with intervals not exceeding 15 months, with the following exceptions:

(1) Control systems used seasonally, such as for liquefaction or vaporization, must be inspected and tested before use each season.

(2) Control systems that are intended for fire protection must be inspected and tested at regular intervals not to exceed 6 months.

(d) Control systems that normally in operation, such as required by a base load system, must be inspected and tested once each calendar year but with intervals not exceeding 15 months.

(e) Relief valves must be inspected and tested for verification of the valve seat lifting and reseating pressures.

§ 193.1217 Testing transfer hoses.

Hoses used in LNG or flammable refrigerant transfer systems must be—

(a) Tested once each calendar year, but with intervals not exceeding 15 months, to the maximum pump pressure or relief valve setting; and

(b) Visually inspected for damage or defects before each use.

§ 193.1219 Inspecting storage tanks.

Each LNG storage tank in operation must be inspected, as prescribed, to

assure that each of the following conditions is not a potential hazard to the structural integrity or safety of the tank:

Condition	Inspection
(1) Foundation, tank, and transfer line movement.	At 3-month intervals for first year of service, thereafter at least annually, but at intervals not exceeding 15 months, and within 1 week after a major meteorological or geophysical disturbance, using reference monuments and surveying instruments.
(2) Stratification	Before and after each significant addition of LNG to the tank and at least at 3-month intervals using appropriate analyzers or temperature readings.
(3) Cold Spots	Weekly visual inspection.
(4) Adequacy of insulation.	At 3-month intervals for first year of service, thereafter at least annually, but at intervals not exceeding 15 months, using thermocouples, infrared scanners or similar devices.
(5) Frost heave	For LNG storage tanks that have temperature controlled ground heaters, monitor temperature weekly during the first year of service, thereafter at least monthly, using electronic temperature controller with an audible alarm located at an attended location.

NOTE.—Where the required cold spots and insulation inspections are impractical to perform, the tank boiloff gas may be monitored for any increases in boiloff rate that could be caused by cold spots or inadequate insulation.

§ 193.1221 Maintenance records.

Each operator shall keep a log at each LNG facility of the date and type of each maintenance activity performed on each component to meet the requirements of this subpart, including periodic tests and inspections, for a period of not less than 5 years.

Subpart N—Fire Protection

§ 193.1301 Scope.

This subpart prescribes requirements for fire prevention and fire control at LNG facilities other than waterfront LNG facilities.

§ 193.1303 General.

Each operator shall use sound fire protection engineering principles to minimize the occurrence and consequences of fires.

§ 193.1305 Fire prevention plan.

(a) Each operator shall determine—

- (1) Those potential sources of ignition located inside and outside the LNG facility which could cause fires that affect the safety of the facility; and
- (2) Those areas, as described in Section 500-4 of NFPA-70, where the potential exists for the presence of flammable fluids in an LNG facility. Determinations made under this paragraph must be kept current.

(b) With respect to the areas determined under paragraph (a)(2) of this section, each operator shall prepare

and follow a manual of written procedures for normal operations to minimize—

- (1) The leakage or release of flammable fluids; and
- (2) The possibility of flammable fluids being ignited by sources identified under paragraph (a)(1) of this section.

§ 193.1306 Smoking.

(a) Smoking is prohibited at an LNG facility in areas identified under § 193.1305(a)(2). Smoking is permitted only in each location that the operator designates as a smoking area.

(b) The facility operator shall display in prominent places, in each smoking area designated under paragraph (a) of this section signs marked with the words "smoking permitted".

(c) The facility operator shall display in prominent locations where smoking is prohibited, signs marked with the words "NO SMOKING".

§ 193.1306a Open fires.

Open fires are prohibited at LNG facilities.

§ 193.1306b. Hotwork.

Welding, flame cutting and similar operations are prohibited except at times and places that the operator designates in writing as safe and when constantly supervised in accordance with NFPA-51B.

§ 193.1306c Storage of flammable fluids.

Storage of flammable fluids is prohibited in areas where ignition sources are present.

§ 193.1306d Motorized equipment.

Use of motor vehicles and other motorized equipment which constitute potential ignition sources is prohibited in an impounding space, in areas within 15 m (49.2 ft) of a storage tank, and in areas within 15 m (49.2 ft) of processing equipment containing a flammable fluid except—

(a) At times the operator designates in writing as safe; and

(b) When the motorized equipment is constantly attended.

§ 193.1308 Fire control equipment.

(a) Each operator shall determine the types and sizes of potential fires within and outside each LNG facility that could affect the safety of the facility and the foreseeable consequences of these fires, including the failure of components or buildings due to heat exposure.

(b) Each operator shall provide fire control equipment and supplies to protect or cool components that could fail due to heat exposure from fires determined under paragraph (a) of this section and either worsen an emergency

or endanger persons or property located outside the facility. Protection or cooling must be provided for as long as the heat exposure exists. The fire control equipment and supplies must include the following:

(1) Portable fire extinguishers suitable for the types of fires identified under paragraph (a) of this section which meet the requirements of NFPA-10 (Ed. 1978); and

(2) If the total inventory of LNG is 265 m³ (70,000 gal.) or more, a water supply and associated delivery equipment.

(c) Each operator shall determine the type, size, quantity and location of the fire control equipment and supplies required under paragraph (b) of this section.

(d) Each operator shall provide each facility person who may be endangered by exposure to fire or the products of combustion in performing fire control duties protective clothing and equipment, including if necessary a self-contained breathing apparatus.

(e) Portable fire control equipment, protective clothing and equipment for personnel use, controls for fixed fire control equipment, and fire control supplies must be conspicuously located, marked for easy recognition, and readily available for use.

(f) Fire control equipment must have operating instructions. The instructions must be attached to portable equipment and placed at the location of controls for fixed equipment.

§ 193.1310 Gas detection.

(a) All areas determined under § 193.1305(a)(2) must be continuously monitored for the presence of flammable gases and vapors with fixed flammable gas detection systems.

(b) Each fixed flammable gas detection system must be provide with audible and visible alarms located at an attended control room or control station, and an audible alarm in the area of gas detection.

(c) Flammable gas detection alarms must be set to activate at not more than 25 percent of the lower flammable limit of the gas or vapor being monitored.

(d) Gas detection equipment must be installed so that it can be readily tested as required by this part.

(e) A minimum of two portable flammable gas detectors capable of measuring 0-100 percent by volume must be available at the LNG facility for use at all times.

(f) All enclosed buildings located on an LNG facility must be continuously monitored for the presence of flammable gases and vapors with a fixed flammable gas detection system that

provides a visible or audible alarm outside the enclosed building.

(g) Operational control venting of natural gas/vapor which could produce a hazardous gas atmosphere must be directed to a flare stack or heat exchanger in order to raise its temperature to at least 37.70C (100°F).

(h) Emergency venting of natural gas/vapor which could produce a hazardous gas atmosphere must be accomplished under the visual watch of an operator with a portable gas detector.

§ 193.1310a Fire detection.

(a) Fire detectors that continuously monitor for the presence of either flame, heat or products of combustion must be provided in the areas determined under § 193.1305(a)(2) and all other areas that are used for the storage of flammable or combustible material.

(b) Each fire detection system must be provided with audible and visible alarms located at an attended control room or control station, and an audible alarm in the area of fire detection.

§ 193.1311 Training.

(a) All permanent maintenance operation and supervisory personnel must be trained, in accordance with a written program of initial instruction to:

(1) Know and follow the fire prevention procedures under § 193.1305(b) and the requirements of §§ 193.1306—193.1306d that relate to their job assignments;

(2) Know the potential causes and areas of fire determined under § 193.1305(a);

(3) Know the types, sizes, and predictable consequences of fire determined under § 193.1308(a); and

(4) Know and be able to perform their assigned fire control duties according to the procedures established under § 193.1109 and by proper use of equipment provided under § 193.1308.

(b) A written program of continuing instruction must be conducted at intervals of not more than two years to keep personnel current on the knowledge and skills they gained in the instruction under paragraph (a) of the section.

§ 193.1313 Records.

(a) Each operator shall maintain a system of records which—

(1) Provide evidence that the training programs required by § 193.1311 have been implemented; and

(2) Provide evidence that personnel have undergone and satisfactorily completed the required training programs.

(b) Records must be maintained for one year after personnel are no longer assigned duties at the LNG facility.

Subpart O—Corrosion Control

§ 193.1401 Scope.

This subpart prescribes requirements for controlling corrosion of metallic components in new and existing LNG facilities.

§ 193.1402 General.

Each metallic component whose integrity or reliability could be adversely affected by external, internal, or atmospheric corrosion during its intended service life must be protected from corrosion in accordance with this subpart.

§ 193.1403 Procedures.

(a) Each operator shall prepare and follow written corrosion control procedures to—

(1) Determine which components are subject to § 193.1402; and
(2) Meet the other applicable requirements of this subpart.

(b) Corrosion control 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 corrosion control technology.

§ 193.1405 Corrosion control overview.

(a) Subject to paragraph (b) of this section, components may not be constructed, repaired, replaced, or significantly altered until a person qualified under § 193.1403(b) reviews the applicable design drawings and material specifications from a corrosion control viewpoint and determines that the materials involved will not imperil the safety or reliability of the LNG facility.

(b) The repair, replacement, or significant alteration of components must be reviewed only if the action to be taken—

(1) Involves a change in the original materials specified;
(2) Is due to a failure caused by corrosion; or
(3) Is occasioned by inspection revealing a significant deterioration of the component due to corrosion.

§ 193.1407 Atmospheric corrosion control.

Each exposed component to which § 193.1402 applies must be protected from atmospheric corrosion by—

(a) Material that has been designed and selected to resist the corrosive atmosphere involved; or
(b) Suitable coating or jacketing.

§ 193.1409 External corrosion control.

(a) Each buried or submerged component to which § 193.1402 applies must be protected from external corrosion by—

(1) Material that has been designed and selected to resist the corrosive environment involved; or

(2) The following means:

(i) An external protective coating designed and installed to prevent corrosion attack and to meet the requirements of § 192.461 of this chapter; and

(ii) A cathodic protection system designed to protect components in their entirety in accordance with the requirements of § 192.463 of this chapter and placed in operation before (1 year after issue date) or within 1 year after the component is constructed or installed.

(b) Where cathodic protection is applied, components that are electrically interconnected must be protected as a unit.

§ 193.1411 Internal corrosion control.

Each component to which § 193.1402 applies that is subject to internal corrosive attack must be protected from internal corrosion by—

(a) Material that has been designed and selected to resist the corrosive fluid involved; or

(b) Suitable coating, inhibitor, or other means.

§ 193.1415 Interference currents.

(a) Each LNG facility that is subject to electrical current interference must have in effect a continuing program to minimize the detrimental effects of currents.

(b) Each cathodic protection system must be designed and installed so as to minimize any adverse effects it might cause to adjacent metal components.

(c) Each impressed current power source must be installed and maintained to prevent adverse interference with communications and control systems.

§ 193.1419 Monitoring corrosion control.

Corrosion protection provided as required by this subpart must be periodically monitored to give early recognition of ineffective corrosion protection, including the following, as applicable:

(a) Each buried or submerged component under cathodic protection must be tested at least once each calendar year, but at intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of § 192.463 of this Chapter.

(b) Each cathodic protection rectifier or other impressed current power source must be inspected at least 6 times each calendar year, but at intervals not exceeding 2½ months, to ensure that it is operating properly.

(c) Each reverse current switch, each diode, and each interference bond whose failure would jeopardize component protection must be electrically checked for proper performance at least 6 times each calendar year, but at intervals not exceeding 2½ months. Each other interference bond must be checked at least once each calendar year, but with intervals not exceeding 15 months.

(d) Each component that is protected from atmospheric corrosion must be inspected at intervals not exceeding 3 years for onshore components and 1 year for offshore components.

(e) If a component is protected from internal corrosion, monitoring devices designed to detect internal corrosion, such as coupons or probes, must be located where corrosion is most likely to occur. Internal corrosion control monitoring devices must be checked two times each calendar year, but at intervals not exceeding 7½ months in noncryogenic systems, and at least once each calendar year, but at intervals not exceeding 15 months in cryogenic systems.

§ 193.1421 Remedial measures.

Prompt corrective or remedial action must be taken whenever an operator learns by inspection or otherwise that atmospheric, external, or internal corrosion is not controlled as required by this subpart.

§ 193.1423 Reports and records.

(a) Except for a failure reported in a leak report under Part 191 of this chapter, each component failure caused by corrosion, including corrosion fatigue, stress corrosion cracking, hydrogen embrittlement, and hydrogen stress cracking, which occurs before the end of the component's intended service life must be reported in writing to the Director within 30 days after the failure.

(b) Each operator shall maintain records or maps to show the location of cathodically protected components, neighboring structures bonded to the cathodic protection system, and corrosion protection equipment.

(c) Each of the following records must be retained for as long as the LNG facility 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 could not adversely affect the integrity or reliability of a component during its intended service life.

Appendix A to Part 193—Incorporation by Reference

I. List of Organizations and Addresses

A. American Gas Association (AGA), 1515 Wilson Boulevard, Arlington, Virginia 22209.

B. National Fire Protection Association (NFPA), 470 Atlantic Avenue, Boston, Massachusetts 02210.

II. Documents Incorporated by Reference

A. American Gas Association (AGA)

1. AGA Purging Principles and Practices

B. National Fire Protection Association (NFPA)

1. NFPA No. 10 Portable Fire Extinguishers, 1978 edition.

2. NFPA No. 59A Storage and Handling of LNG, 1979 edition.

3. NFPA No. 70 National Electric Code, 1978 edition.

4. NFPA No. 30 Flammable Liquids.

5. NFPA No. 16 Foam-Water Sprinkler and Spray Systems, 1974 ed.

6. NFPA No. 24 Outside Protection, 1977 edition.

7. NFPA No. 72E Automatic Fire Detectors, 1978 edition.

[FR Doc. 3718 Filed 2-6-80; 3:13 pm]

BILLING CODE 4910-60-M