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Standard Guide for Security of Tank Farm Installations for Compliance with Spill Prevention, Control and Countermeasure Plan (SPCC) Regulations¹

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INTRODUCTION

Federal Regulation 40 CFR 112.3 requires an owner or operator of certain onshore or offshore facilities that have tanks used for storing oil to prepare a written Spill Prevention Control and Countermeasure Plan (SPCC Plan). The SPCC Plan must include a description of the security measures that are implemented at the facility to prevent unauthorized access to oil handling, processing, and storage areas. Such security measures may involve fencing, lighting and other more sophisticated systems.

The SPCC rule defines Tier I and Tier II facilities. The owner/operator of Tier I and certain Tier II facilities may prepare and self-certify the SPCC Plan. Refer to United States Environmental Protection Agency - Office of Solid Waste and Emergency Response Spill Prevention, Control and Countermeasure (SPCC) Rule - Stream-lined Requirements for Tier I and Tier II Qualified Facilities for aid in determining if a particular facility is a qualified Tier I or Tier II facility. If the requirements for self-certification are not met then the SPCC Plan must be certified by a Professional Engineer (P.E.) Some states do not permit self-certification of SPCC Plans and thus requires that all SPCC Plans be certified by a Professional Engineer (P.E.) The owner/operator should check with the state engineering licensing board to find out if it prohibits SPCC Plan self-certification.

1. Scope*

1.1 This guide covers fencing and lighting only. More sophisticated security systems may be appropriate for the facility but discussion of these types of systems is beyond the scope of this document.

1.2 The information included in this guide is intended for petroleum bulk storage facilities. It is not intended for use with retail fueling and other motor fueling facilities, refineries, chemical plants, docks, oil production facilities, or electric power generation, transmission, distribution and service center facilities. Fencing, lighting or other security measures designed to prevent unauthorized access to the bulk storage facility may be components of Best Management Practices (BMPs) that the facility uses to prevent releases of petroleum to storm water

discharges. There are several different types of fencing and lighting that can be effective. The intent of this document is to outline a method for providing security fencing and lighting that has been effectively used. There are other fencing and lighting methods that may be adequately effective. Some facilities may be considered adequately secure without fencing or lighting. An analysis of the threat level should be made to determine the type of security system to employ.

1.3 Any facilities must meet local, state, and federal building, architectural, hazardous material handling and storage, and fire protection codes.

1.4 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.01 on Storage Tanks.

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*A Summary of Changes section appears at the end of this standard

2. Referenced Documents

2.1 *ASTM Standards:*²

- [A121 Specification for Metallic-Coated Carbon Steel Barbed Wire](#)
- [A123 Specification for Zinc \(Hot-Dip Galvanized\) Coatings on Iron and Steel Products](#)
- [A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric](#)
- [A817 Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire](#)
- [F567 Practice for Installation of Chain-Link Fence](#)
- [F626 Specification for Fence Fittings](#)
- [F900 Specification for Industrial and Commercial Steel Swing Gates](#)
- [F1043 Specification for Strength and Protective Coatings on Steel Industrial Fence Framework](#)
- [F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated \(Galvanized\) Welded, for Fence Structures](#)
- [F1184 Specification for Industrial and Commercial Horizontal Slide Gates](#)

2.2 *American National Standards Institute/American Petroleum Institute*³

- [ANSI/API Standard 780 Security Risk Assessment Methodology for the Petroleum and Petrochemical Industries](#)

2.3 *Chain Link Fence Manufacturers Institute:*⁴

- [CLF-SFR0111 Security Fencing Recommendations The Tested and Proven Performance of Security Grade Chain Link Fencing Systems](#)
- [CLF-WLG 0110 Chain Link Fence Wind Load Guide for Selection of Line Post and Line Post Spacing](#)
- [CLF-PM0610 Product Manual](#)

2.4 *United States Department of Transportation:*⁵

- [AC150/5370 – 10F](#)
- [Item F-161 – Wire fence With Steel Posts \(Class C and D Fence\)](#)
- [Item F-162 – Chain Link Fence Item](#)
- [Item F-163 – Wildlife Deterrent Fence](#)
- [Item F-164 – Wildlife Exclusion Fence](#)

2.5 *United States Environmental Protection Agency:*⁶

- [Federal Regulation 40 CFR 112 Oil Prevention Pollution Office of Solid Waste and Emergency Response – Spill Prevention, Control, and Countermeasure \(SPCC\) Rule – Streamlined Requirements for Tier I and Tier II Qualified Facilities](#)
- [United States Environmental Protection Agency 40 FR 112 Oil Pollution Prevention](#)

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Chain Link Fence Manufacturers Institute (CLFMI) 10015 Old Columbia Rd. Suite B215 Columbia, MD 21046. <http://www.chainlinkinfo.org>

⁵ United States Department of Transportation, 1200 New Jersey Avenue, SE Washington, DC 20590 855-368-4200, <https://www.transportation.gov>

⁶ USEPA William Jefferson Clinton Building North, USEPA William Jefferson Clinton Building North, Washington, DC 20004. <https://www.epa.gov/>

2.6 *Federal Standards:*⁷

- [Federal Specification RR-F-191K/GEN Fencing, Wire and Post Metal \(And Gates, Chain Link Fence Fabric, and Accessories-\(General Specification\)](#)
- [RR-F-191/1 Fencing, Wire and Post, Metal \(Chain-Link Fence Fabric\)](#)
- [RR-F-191/2 Fencing, Wire and Post, Metal \(Chain- Link Fence Gates\)](#)
- [RR-F-191/3 Fencing, Wire and Post, Metal \(Chain-Link Fence Posts, Top Rails, and Braces\)](#)
- [RR-F-191/4 Fencing, Wire and Post, Metal \(Chain-Link Fence Accessories\)](#)

2.7 *Lighting:*

- [NFPA 70 National Electric Code – Introduction, Chapter 1, Chapter 2, Chapter 3, Chapter 4, Article 410 –⁸](#)
- [International Building Code Section 1205⁹](#)
- [IES G-1-16 Guide for Security Lighting for People, Property, and Critical Infrastructure, Illumination Society of North America¹⁰](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *foot candle, n*—is a non-SI unit of illuminance or light intensity, abbreviated fc, lm/ft², ft-c.

3.1.1.1 *Discussion*—The SI unit is lux. One foot candle is approximately equal to 10.764 lux.

4. Threat Level

4.1 The first step is for the owner to investigate and determine the perceived threat level. From that determination a judgment on the type and extent of fencing and the type and extent of lighting can be made. Helpful references are detailed in Section 2 above. Contacting the Department of Homeland Security (DHS) to obtain a security analysis and a vulnerability study may be helpful. Further contacting the local police department or sheriff for guidance on security strategies in the local area based on familiarity with the threat characteristics of the area will be helpful.

4.2 Another document that may be useful in identifying the threat level and evaluating the risk involved is ASNI/API Standard 780 – Security Risk Assessment Methodology for the Petroleum and Petrochemical Industries.

5. Fencing Systems

5.1 The reference documents describe fencing systems that are more secure and fencing systems that are less secure. The owner should perform a risk analysis and determine the appropriate fencing system for the facilities to be protected.

NOTE 1—Some fence types may be restricted by local codes.

⁷ DLA Document Services Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094 <http://quicksearch.dla.mil/>

⁸ NFPA, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169. <https://www.nfpa.org/>

⁹ International Building Code, by the International Code Council, 4051 Flossmoor Road, Country Club Hills, IL 60478. <https://codes.iccsafe.org/>

¹⁰ Illumination Society of North America, 120 Wall St. Fl 17, New York, NY 10005-4026. <https://www.ies.org/>

6. Fencing Details

6.1 A chain-link fence is one type of fencing that has been used successfully with the type of facilities described in 1.2. There are other fencing details that will provide adequate security. Refer to **Appendix X1** for typical chain-link fence details.

7. Illumination

7.1 The illumination values included in **Appendix X2** have been used successfully for these types of facilities. The owner should determine if other illumination values are better suited to the facilities involved.

7.2 Facilities should be equipped with lights to prevent acts of vandalism and to allow facility personnel to discover discharges that occur at night.

NOTE 2—Lighting may not be helpful for security where a perpetrator has no fear of being caught and there are no patrols or other surveillance.

7.3 The lighting system used to provide the required illumination levels should be designed to provide the average illumination when the lighting is in operation.

8. Keywords

8.1 fencing; lighting; SPCC plan; tank farm security; tank farm security fencing; tank farm security lighting

APPENDIXES

(Nonmandatory Information)

X1. CHAIN-LINK FENCING DETAILS

INTRODUCTION

This appendix covers chain-link fencing details. It is being provided for reference only. There are other details of chain-link fence construction that may be better suited for a particular installation.

X1.1 Type of Fence

X1.1.1 Chain-link fabric, 72 in. high, with tubular top rail, bottom tension wire, and guard top.

X1.1.2 The guard top is three strands of barbed wire on 45 degree extension arm turned inside.

X1.1.3 If a wildlife deterrent fence is deemed necessary, refer to United States Department of Transportation, AC150/5370 Item F-163 for typical details.

X1.2 Materials

NOTE X1.1—Zinc coated (hot dipped galvanized) materials are specified below. Some jurisdictions may have regulations prohibiting zinc coated (hot dipped galvanized) material where zinc is regulated in stormwater runoff.

X1.2.1 Chain-Link Fabric:

X1.2.1.1 The chain-link fabric should be zinc coated (hot dipped galvanized) per Specification **A392**, Class 2, 2 in. mesh, and of No. 9 gauge steel wire.

(1) The fabric should be weaved before galvanizing.

X1.2.2 Barbed Wire:

X1.2.2.1 The barbed wire should be zinc coated (hot dipped galvanized) per Specification **A121** Class 3, and should be fabricated from two strands of No. 12 ½ gauge steel wire with four point No. 14 gauge aluminum barbs spaced on 5 in. centers.

X1.2.3 Bottom Tension Wire:

X1.2.3.1 The bottom tension wire should be zinc coated (hot dipped galvanized) per Specification **A817**, Type II, Class, and of No. 7 gauge steel coil tension wire.

X1.2.4 Top Rail:

X1.2.4.1 The top rail should be 1.660 in. O.D. Specification **F1043** and Specification **F1083** Group 1A Regular grade with Type A external and internal galvanized coatings pipe with galvanized sleeve type couplings.

NOTE X1.2—Omitting the top rail can make the fence more difficult to climb. In this Case a 7 – gauge coil spring wire can be installed in place of the top rail.

X1.2.4.2 One coupling in every five should have a 6 in. sleeve to accommodate temperature take up expansion and contraction.

X1.2.5 Bracing:

X1.2.5.1 Brace rail should be 1.666 in. OD per Specification **F1043** and Specification **F1043** Group 1A standard weight galvanized pipe with ¾ in. diameter galvanized truss rods and truss tighteners.

X1.2.6 Line Posts:

X1.2.6.1 Line posts should be NPS 2 (2.375 in. O.D.) Specification **F1043** and Specification **F1083** Group 1A standard weight galvanized pipe.

X1.2.7 Terminal Posts:

X1.2.7.1 Terminal posts (end, pull, and corner posts) should be NPS 2½ (2.875 in. OD.) Specification **F1043** and Specification **F1083** Group 1A standard weight galvanized pipe.

X1.2.8 Barbed Wire Extension Arms:

X1.2.8.1 Line Post:

(1) Barbed wire extension arms should be fabricated of pressed steel or malleable iron per Specification **F626** Type 1 galvanized in accordance with Specification **A123**.

(2) Extension arms should be able to withstand a minimum pull down of 300 lb at the end of the arm.

X1.2.8.2 Terminal Posts:

(1) Barbed wire arms should be fabricated of 11 gauge (minimum) pressed steel or heavy malleable iron base with 11 gauge (minimum) pressed steel per Specification **F626** Type I.

(2) Extension should be galvanized per Specification **A123**.

(3) Extensions should be able to withstand a minimum pull down weight of 300 lb and of the force of the barbed wire stretched to proper tension.

(4) Extensions should be securely fastened to post.

X1.2.9 Gate Posts:

X1.2.9.1 Gate posts should be Specification **F1043** and Specification **F1043** Group 1A Regular Grade standard weight galvanized pipe.

X1.2.9.2 The size of the gate post shall be determined from the maximum width of single leaf gates or by one leaf of double leaf gates per Specification **F900**.

X1.2.10 Tension Bars and Bands:

X1.2.10.1 Tension bars for pulling the fence fabric to terminal posts should be $\frac{3}{4}$ in. steel bars, hot dipped galvanized in accordance with Specification **F626**.

X1.2.10.2 Bands for fastening tension bars to terminal posts should be 11 gauge by 1 in. wide steel, hot dipped galvanized in accordance with Specification **F626**.

X1.2.11 Gates:

X1.2.11.1 Swing Gates:

(1) The frame should be NPS $1\frac{1}{2}$ (1.900 in.) OD Specification **F1083** and Specification **F1043** Group 1A Regular Grade standard weight galvanized pipe with galvanized pressed steel or galvanized malleable iron corner ells, riveted or bolted or welded corners.

(2) The internal bracing should be NPS 1 (1.666 in. OD) Specification **F1083** and Specification **F1043** Group 1A Regular Grade standard weight galvanized pipe with $\frac{3}{8}$ in. diameter galvanized adjustable truss. Bottom hinge should be galvanized malleable pivot type.

(3) Top hinge should allow the gate to swing 90 degrees to 180 degrees.

(4) The gate should be complete with padlocking device, center rest, and semi-automatic catch to secure the gate in the open position.

X1.2.12 Slide Gates:

X1.2.12.1 Slide gates may be the suppliers standard for width of opening and vertical clearance required per Specification **F1184**.

X1.3 Installation

X1.3.1 Installation shall meet Specification **F567**.

X1.3.2 Posts:

X1.3.2.1 Posts are set to line and grade in concrete of sufficient depth to ensure that the fence will remain straight, not be overturned by wind or other external forces.

X1.3.2.2 Line posts and terminal post footings shall be four times the largest post section up to 4 in. OD and three times for larger outside diameters and set at least 36 in. deep.

X1.3.2.3 The concrete should be rounded off to a smooth appearance approximately 2 in. above soil.

X1.3.3 Fabric:

X1.3.3.1 The fabric should be fastened to the top rail with No. 9 gauge aluminum tie wires on 24 in. centers.

X1.3.3.2 The fabric should be fastened to the line posts with No. 6 gauge galvanized clip on 14 in. centers or No. 9 galvanized wire on 12 in. centers.

X1.3.3.3 The bottom of the fabric should be set at the top of the concrete.

X1.3.4 Bottom Tension Wire:

X1.3.4.1 The bottom tension wire should be fastened to the fabric with No.1 gauge galvanized hog clips on 24 in. centers.

X1.3.5 Tension Bars:

X1.3.5.1 The tension bars should be fastened to the terminal posts with No. 11 gauge by 1 in. wide galvanized tension bars and $\frac{3}{8}$ in. diameter galvanized carriage bolts on approximately 14 in. centers.

X1.3.6 Line Posts:

X1.3.6.1 The line posts should be evenly spaced with a maximum spacing of 10 ft centers and meet the CLF-WLG 0110 Wind Load Guide requirements.

X1.3.7 Bracing:

X1.3.7.1 Bracing should be installed midway between the top rail and the ground from each terminal post to the first line post.

X1.3.7.2 Braces should be securely fastened to posts by heavy galvanized pressed steel connections.

X1.3.7.3 Braces should be trussed from the line post back to the terminal post with $\frac{3}{8}$ in. diameter galvanized steel rods.

X1.3.8 Fencing Layout:

X1.3.8.1 Fencing should essentially follow the contour of the natural grade.

X1.3.8.2 When a space of 6 in. or more occurs between the bottom of the Chain-link fabric and the ground then intermediate posts should be set at the low point. Tightly stretched barbed wire should be used to close the space between the bottom of the chain-link fabric and the ground. There should be sufficient strands of barbed wire to limit the clear opening above the ground and between the strands to 3 in.

X1.3.9 Fence Grounding:

X1.3.9.1 Fences in areas crossed by high voltage power lines should be grounded.

X1.3.9.2 Place one ground connection at the point where the power lines crosses.

X1.3.9.3 Additional ground connections should be placed 300 ft on either side of the power line crossing.

X1.4 Other Information

X1.4.1 Listed below are additional ASTM documents related to fencing that may be useful:

A116 Specification for Metallic-Coated, Steel-Woven Wire Fence Fabric

A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A428/A428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles

A491 Specification for Aluminum-Coated Steel Chain-Link Fence Fabric