ANNEX I -
Positioning and Technical Details of Lights and Shapes

1. Definition

The term “height above the hull” means height above the uppermost continuous deck. This height shall be measured from the position vertically beneath the location of the light.

2. Vertical positioning and spacing of lights

(a) On a power-driven vessel of 20 meters or more in length the masthead lights shall be placed as follows:
   (i) the forward masthead light, or if only one masthead light is carried, then that light, at a height above the hull of not less than 6 meters, and, if the breadth of the vessel exceeds 6 meters, then at a height above the hull not less than such breadth, so however that the light need not be placed at a greater height above the hull than 12 meters;
   (ii) when two masthead lights are carried the after one shall be at least 4.5 meters vertically higher than the forward one.

(b) The vertical separation of masthead lights of power-driven vessels shall be such that in all normal conditions of trim the after light will be seen over and separate from the forward light at a distance of 1000 meters from the stem when viewed from sea level.

(c) The masthead light of a power-driven vessel of 12 meters but less than 20 meters in length shall be placed at a height above the gunwale of not less than 2.5 meters.

—INLAND—

ANNEX I

33 CFR 84

Positioning and Technical Details of Lights and Shapes

§ 84.01 Definitions

(a) The term “height above the hull” means height above the uppermost continuous deck. This height shall be measured from the position vertically beneath the location of the light.

(b) High-speed craft means a craft capable of maximum speed in meters per second (m/s) equal to or exceeding: $3.7\nabla_{0.1667}$; where ∇ = displacement corresponding to the design waterline ($meters^3$).

(c) The term “practical cut-off” means, for vessels 20 meters or more in length, 12.5 percent of the minimum luminous intensity (Table 84.15(b)) corresponding to the greatest range of visibility for which the requirements of Annex I are met.

(d) The term “Rule” or “Rules” means the Inland Navigation Rules contained in Sec. 2 of the Inland Navigational Rules Act of 1980 (Pub. L. 96-591, 94 Stat. 3415, 33 U.S.C. 2001, December 24, 1980) as amended.

NOTE to paragraph (b): The same formula expressed in pounds and knots is maximum speed in knots (kts) equal to or exceeding 1.98 (lbs) $3.7\nabla_{0.1667}$; where ∇ = displacement corresponding to design waterline in pounds.

§ 84.03 Vertical positioning and spacing of lights

(a) On a power-driven vessel of 20 meters or more in length the masthead lights shall be placed as follows:
   (1) The forward masthead light, or if only one masthead light is carried, then that light, at a height above the hull of not less than 5 meters, and, if the breadth of the vessel exceeds 5 meters, then at a height above the hull not less than such breadth, so however that the light need not be placed at a greater height above the hull than 8 meters;
   (2) When two masthead lights are carried the after one shall be at least 2 meters vertically higher than the forward one.

(b) The vertical separation of the masthead lights of power-driven vessels shall be such that in all normal conditions of trim the after light will be seen over and separate from the forward light at a distance of 1000 meters from the stem when viewed from water level.

(c) The masthead light of a power-driven vessel of 12 meters but less than 20 meters in length shall be placed at a height above the gunwale of not less than 2.5 meters.

(d) A power-driven vessel of less than 12 meters in length may carry the uppermost light at a height of less than 2.5 meters above the gunwale. When, however, a masthead light is carried in addition to sidelights and a sternlight or the all-round light prescribed in rule 23(c)(i) is carried in addition to sidelights, then such masthead light or allround light shall be carried at least 1 meter higher than the sidelights.

(e) One of the two or three masthead lights prescribed for a power-driven vessel when engaged in towing or pushing another vessel shall be placed in the same position as either the forward masthead light or the after masthead light; provided that, if carried on the aftermast, the lowest after masthead light shall be at least 4.5 meters vertically higher than the forward masthead light.

(f)

(i) The masthead light or lights prescribed in Rule 23(a) shall be so placed as to be above and clear of all other lights and obstructions except as described in subparagraph (ii).

(ii) When it is impracticable to carry the all-round lights prescribed by Rule 27(b)(i) or Rule 28 below the masthead lights, they may be carried above the after masthead light(s) or vertically in between the forward masthead light(s) and after masthead light(s), provided that in the latter case the requirement of Section 3(c) of this Annex shall be complied with.

(g) The sidelights of a power-driven vessel shall be placed at a height above the hull not greater than three quarters of that of the forward masthead light. They shall not be so low as to be interfered with by deck lights.

(h) The sidelights, if in a combined lantern and carried on a power-driven vessel of less than 20 meters in length, shall be placed not less than 1 meter below the masthead light.

(i) When the Rules prescribe two or three lights to be carried in a vertical line, they shall be spaced as follows:

(i) on a vessel of 20 meters in length or more such lights shall be spaced not less than 2 meters apart, and the lowest of these lights shall, except where a towing light is required, be placed at a height of not less than 4 meters above the hull;

(ii) on a vessel of less than 20 meters in length such lights shall be spaced not less than 1 meter apart and the lowest of these lights shall, except where a towing light is required, be placed at a height of not less than 2 meters above the gunwale;

(iii) when three lights are carried they shall be equally spaced.

(d) The masthead light, or the all-round light described in Rule 23(c), of a power-driven vessel of less than 12 meters in length shall be carried at least one meter higher than the sidelights.

(e) One of the two or three masthead lights prescribed for a power-driven vessel when engaged in towing or pushing another vessel shall be placed in the same position as either the forward masthead light or the after masthead light, provided that the lowest after masthead light shall be at least 2 meters vertically higher than the highest forward masthead light.

(f) (f)

(1) The masthead light or lights prescribed in Rule 23(a) shall be so placed as to be above and clear of all other lights and obstructions except as described in paragraph (f)(2) of this section.

(2) When it is impracticable to carry the all-round lights prescribed in Rule 27(b)(i) below the masthead lights, they may be carried above the after masthead light(s) or vertically in between the forward masthead light(s) and after masthead light(s), provided that in the latter case the requirement of § 84.05(d) shall be complied with.

(g) The sidelights of a power-driven vessel shall be placed at least one meter lower than the forward masthead light. They shall not be so low as to be interfered with by deck lights.

(h) [Reserved]

(i) When the Rules prescribe two or three lights to be carried in a vertical line, they shall be spaced as follows:

(1) On a vessel of 20 meters in length or more such lights shall be spaced not less than 1 meter apart, and the lowest of these lights shall, except where a towing light is required, be placed at a height of not less than 4 meters above the hull;

(2) On a vessel of less than 20 meters in length such lights shall be spaced not less than 1 meter apart and the lowest of these lights shall, except where a towing light is required, be placed at a height of not less than 2 meters above the gunwale;

(3) When three lights are carried they shall be equally spaced.

(j) The lower of the two all-round lights prescribed for a vessel when engaged in fishing shall be at a height above the sidelights not less than twice the distance between the two vertical lights.
(k) The forward anchor light prescribed in Rule 30(a)(i), when two are carried, shall not be less than 4.5 meters above the after one. On a vessel of 50 meters or more in length this forward anchor light shall be placed at a height of not less than 6 meters above the hull.

3. Horizontal positioning and spacing of lights

(a) When two masthead lights are prescribed for a power-driven vessel, the horizontal distance between them shall not be less than one half of the length of the vessel but need not be more than 100 meters. The forward light shall be placed not more than one quarter of the length of the vessel from the stem.
(b) On a power-driven vessel of 20 meters or more in length the sidelights shall not be placed in front of the forward masthead lights. They shall be placed at or near the side of the vessel (c) When the lights prescribed in Rule 27(b)(i) or Rule 28 are placed vertically between the forward masthead light(s) and the after masthead light(s) these all-round lights shall be placed at a horizontal distance of not less than 2 meters from the fore and aft centerline of the vessel in the athwartship direction.
(c) When only one masthead light is prescribed for a power-driven vessel, this light shall be exhibited forward of amidships; except that a vessel of less then 20 meters in length need not exhibit this light forward of amidships but shall exhibit it as far forward as is practicable.

(j) The lower of the two all-round lights prescribed for a vessel when engaged in fishing shall be at a height above the sidelights not less than twice the distance between the two vertical lights.
(k) The forward anchor light prescribed in Rule 30(a)(i), when two are carried, shall not be less than 4.5 meters above the after one. On a vessel of 50 meters or more in length this forward anchor light shall be placed at a height of not less than 6 meters above the hull.

§ 84.05 Horizontal positioning and spacing of lights

(a) Except as specified in paragraph (e) of this section, when two masthead lights are prescribed for a power-driven vessel, the horizontal distance between them must not be less than one quarter of the length of the vessel but need not be more than 50 meters. The forward light shall be placed not more than one half of the length of the vessel from the stem.
(b) On a power-driven vessel of 20 meters or more in length the sidelights shall not be placed in front of the forward masthead lights. They shall be placed at or near the side of the vessel.
(c) When the lights prescribed in Rule 27(b)(i) are placed vertically between the forward masthead light(s) and the after masthead light(s) these all-round lights shall be placed at a horizontal distance of not less than 2 meters from the fore and aft centerline of the vessel in the athwartship direction.
(d) When only one masthead light is prescribed for a power-driven vessel, this light must be exhibited forward of amidships. For a vessel of less than 20 meters in length, the vessel shall exhibit one masthead light as far forward as is practicable.
(e) On power-driven vessels 50 meters but less than 60 meters in length operated on the Western Rivers, and those waters specified in §89.25, the horizontal distance between masthead lights shall not be less than 10 meters.

4. Details of location of direction-indicating lights for fishing vessels, dredgers and vessels engaged in underwater operations

(a) The light indicating the direction of the outlying gear from a vessel engaged in fishing as prescribed in Rule 26(c)(ii) shall be placed at a horizontal distance of not less than 2 meters and not more than 6 meters away from the two all-round red and white lights. This light shall be placed not higher than the all-round white light prescribed in Rule 26(c)(i) and not lower than the sidelights.

(b) The lights and shapes on a vessel engaged in dredging or underwater operations to indicate the obstructed side and/or the side on which it is safe to pass, as prescribed in Rule 27(d)(i) and (ii), shall be placed at the maximum practical horizontal distance, but in no case less than 2 meters, from the lights or shapes prescribed in Rule 27(b)(i) and (ii). In no case shall the upper of these lights or shapes be at a greater height than the lower of the three lights or shapes prescribed in Rule 27(b)(i) and (ii).

§ 84.07 Details of location of direction-indicating lights for fishing vessels, dredgers and vessels engaged in underwater operations

(a) The light indicating the direction of the outlying gear from a vessel engaged in fishing as prescribed in Rule 26(c)(ii) shall be placed at a horizontal distance of not less than 2 meters and not more than 6 meters away from the two all-round red and white lights. This light shall be placed not higher than the all-round white light prescribed in Rule 26(c)(i) and not lower than the sidelights.

(b) The lights and shapes on a vessel engaged in dredging or underwater operations to indicate the obstructed side and/or the side on which it is safe to pass, as prescribed in Rule 27(d)(i) and (ii), shall be placed at the maximum practical horizontal distance, but in no case less than 2 meters, from the lights or shapes prescribed in Rule 27(b)(i) and (ii). In no case shall the upper of these lights or shapes be at a greater height than the lower of the three lights or shapes prescribed in Rule 27(b)(i) and (ii).

5. Screens for sidelights

The sidelights of vessels of 20 meters or more in length shall be fitted with inboard screens painted matt black, and meeting the requirements of Section 9 of this Annex. On vessels of less than 20 meters in length the sidelights, if necessary to meet the requirements of Section 9 of this Annex, shall be fitted with inboard matt black screens. With a combined lantern, using a single vertical filament and a very narrow division between the green and red sections, external screens need not be fitted.

6. Shapes

(a) Shapes shall be black and of the following sizes:
  (i) a ball shall have a diameter of not less than 0.6 meter;
  (ii) a cone shall have a base diameter of not less than 0.6 meter and a height equal to its diameter;
  (iii) a cylinder shall have a diameter of at least 0.6 meter and a height of twice its diameter;
  (iv) a diamond shape shall consist of two cones as defined in (ii) above having a common base.

(b) The vertical distance between shapes shall be at least 1.5 meter.

(c) In a vessel of less than 20 meters in length shapes of lesser dimensions but commensurate with the size of the vessel may be used and the distance apart may be correspondingly reduced.

§ 84.09 Screens

(a) The sidelights of vessels of 20 meters or more in length shall be fitted with mat black inboard screens and meet the requirements of § 84.17. On vessels of less than 20 meters in length, the sidelights, if necessary to meet the requirements of § 84.17, shall be fitted with mat black inboard screens. With a combined lantern, using a single vertical filament and a very narrow division between the green and red sections, external screens need not be fitted.

(b) On power-driven vessels less than 12 meters in length constructed after July 31, 1983, the masthead light, or the all-round light described in Rule 23(c) shall be screened to prevent direct illumination of the vessel forward of the operator's position.

§ 84.11 Shapes

(a) Shapes shall be black and of the following sizes:
  (1) A ball shall have a diameter of not less than 0.6 meter;
  (2) A cone shall have a base diameter of not less than 0.6 meter and a height equal to its diameter;
  (3) A diamond shape shall consist of two cones (as defined in Paragraph (a)(2) of this section) having a common base.

(b) The vertical distance between shapes shall be at least 1.5 meter.

(c) In a vessel of less than 20 meters in length shapes of lesser dimensions but commensurate with the size of the vessel may be used and the distance apart may be correspondingly reduced.

7. Color specification of lights

(a) The chromaticity of all navigation lights shall conform to the following standards, which lie within the boundaries of the area of the diagram specified for each color by the International Commission on Illumination (CIE).

The boundaries of the area for each color are given by indicating the corner coordinates, which are as follows:

(i) White:
x 0.525 0.525 0.452 0.310 0.310 0.443
y 0.382 0.440 0.440 0.348 0.283 0.382

(ii) Green:
x 0.028 0.009 0.300 0.203
y 0.385 0.723 0.511 0.356

(iii) Red:
x 0.680 0.660 0.735 0.721
y 0.320 0.320 0.265 0.259

(iv) Yellow:
x 0.612 0.618 0.575 0.575
y 0.382 0.382 0.425 0.406

8. Intensity of lights

(a) The minimum luminous intensity of lights shall be calculated by using the formula:

$$I = 3.43 \times 10^{6} \times T \times D^{2} \times K^{-D}$$

where:

I is luminous intensity in candelas under service conditions.
T is threshold factor 2×10^{-7} lux.
D is range of visibility (luminous range) of the light in nautical miles,
K is atmospheric transmissivity. For prescribed lights the value of K shall be 0.8, corresponding to a meteorological visibility of approximately 13 nautical miles.

§ 84.13 Color specification of lights

(a) The chromaticity of all navigation lights shall conform to the following standards, which lie within the boundaries of the area of the diagram specified for each color by the International Commission on Illumination (CIE), in the "Colors of Light Signals", which is incorporated by reference. It is Publication CIE No. 2.2. (TC-1.6), 1975, and is available from the Illumination Engineering Society, 345 East 47th Street, New York, NY 10017. It is also available for inspection at the Office of the Federal Register, Room 8401, 1100 L Street N.W., Washington, D.C. 20408. This incorporation by reference was approved by the Director of the Federal Register.

(b) The boundaries of the area for each color are given by indicating the corner coordinates, which are as follows:

(1) White:
x 0.525 0.525 0.452 0.310 0.310 0.443
y 0.382 0.440 0.440 0.348 0.283 0.382

(2) Green:
x 0.028 0.009 0.300 0.203
y 0.385 0.723 0.511 0.356

(3) Red:
x 0.680 0.660 0.735 0.721
y 0.320 0.320 0.265 0.259

(4) Yellow:
x 0.612 0.618 0.575 0.575
y 0.382 0.382 0.425 0.406

§ 84.15 Intensity of lights

(a) The minimum luminous intensity of lights shall be calculated by using the formula:

$$I = 3.43 \times 10^{6} \times T \times D^{2} \times K^{-D}$$

where:

I is luminous intensity in candelas under service conditions,
T is threshold factor 2×10^{-7} lux,
D is range of visibility (luminous range) of the light in nautical miles,
K is atmospheric transmissivity. For prescribed lights the value of K shall be 0.8, corresponding to a meteorological visibility of approximately 13 nautical miles.

(b) A selection of figures derived from the formula is given in the following table:

Range of visibility (luminous range) of light in nautical miles	Minimum luminous intensity of light in candelas for K = 0.8
D	I
1	0.9
2	4.3
3	12
4	27
5	52
6	94

Note: The maximum luminous intensity of navigation lights should be limited to avoid undue glare. This shall not be achieved by a variable control of the luminous intensity.

9. Horizontal sectors

(a)

(i) In the forward direction, sidelights as fitted on the vessel shall show the minimum required intensities. The intensities shall decrease to reach practical cut-off between 1 degree and 3 degrees outside the prescribed sectors.

(ii) For sternlights and masthead lights and at 22.5 degrees abaft the beam for sidelights, the minimum required intensities shall be maintained over the arc of the horizon up to 5 degrees within the limits of the sectors prescribed in Rule 21. From 5 degrees within the prescribed sectors the intensity may decrease by 50 percent up to the prescribed limits; it shall decrease steadily to reach practical cut-off at not more than 5 degrees outside the prescribed sectors.

(b)

(i) All-round lights shall be so located as not to be obscured by masts, topmasts or structures within angular sectors of more than 6 degrees, except anchor lights prescribed in Rule 30, which need not be placed at an impracticable height above the hull.

(ii) If it is impracticable to comply with paragraph (b)(i) of this section by exhibiting only one all-round light, two all-round lights shall be used suitably positioned or screened so that they appear, as far as practicable, as one light at a distance of one mile.”

(b) A selection of figures derived from the formula is given in Table 84.15(b).

Table 84.15(b)

Range of visibility (luminous range) of light in nautical miles	Minimum luminous intensity of light in candelas for K = 0.8
D	I
1	0.9
2	4.3
3	12
4	27
5	52
6	94

§ 84.17 Horizontal sectors

(a)

(1) In the forward direction, sidelights as fitted on the vessel shall show the minimum required intensities. The intensities shall decrease to reach practical cut-off between 1 and 3 degrees outside the prescribed sectors.

(2) For sternlights and masthead lights and at 22.5 degrees abaft the beam for sidelights, the minimum required intensities shall be maintained over the arc of the horizon up to 5 degrees within the limits of the sectors prescribed in Rule 21. From 5 degrees within the prescribed sectors the intensity may decrease by 50 percent up to the prescribed limits; it shall decrease steadily to reach practical cutoff at not more than 5 degrees outside the prescribed sectors.

(b) All-round lights shall be so located as not to be obscured by masts, topmasts or structures within angular sectors of more than 6 degrees, except anchor lights prescribed in Rule 30, which need not be placed at an impracticable height above the hull, and the all-round white light described in Rule 23(d), which may not be obscured at all.

(c) If it is impracticable to comply with paragraph (b) of this section by exhibiting only one all-round light, two all-round lights shall be used suitably positioned or screened to appear, as far as practicable, as one light at a minimum distance of one nautical mile.

NOTE to paragraph (c): Two unscreened all-round lights that are 1.28 meters apart or less will appear as one light to the naked eye at a distance of one nautical mile.

10. Vertical sectors

(a) The vertical sectors of electric lights as fitted, with the exception of lights on sailing vessels underway shall ensure that:
   (i) at least the required minimum intensity is maintained at all angles from 5 degrees above to 5 degrees below the horizontal;
   (ii) at least 60 percent of the required minimum intensity is maintained from 7.5 degrees above to 7.5 degrees below the horizontal.

(b) In the case of sailing vessels underway the vertical sectors of electric lights as fitted shall ensure that:
   (i) at least the required minimum intensity is maintained at all angles from 5 degrees above to 5 degrees below the horizontal;
   (ii) at least 50 percent of the required minimum intensity is maintained from 25 degrees above to 25 degrees below the horizontal.

(c) In the case of lights other than electric these specifications shall be met as closely as possible.

11. Intensity of non-electric lights

Non-electric lights shall so far as practicable comply with the minimum intensities, as specified in the Table given in Section 8 of this Annex.

§ 84.19 Vertical sectors

(a) The vertical sectors of electric lights as fitted, with the exception of lights on sailing vessels underway and on unmanned barges, shall ensure that:
  (1) At least the required minimum intensity is maintained at all angles from 5 degrees above to 5 degrees below the horizontal;
  (2) At least 60 percent of the required minimum intensity is maintained from 7.5 degrees above to 7.5 degrees below the horizontal.

(b) In the case of sailing vessels underway the vertical sectors of electric lights as fitted shall ensure that:
  (1) At least the required minimum intensity is maintained at all angles from 5 degrees above to 5 degrees below the horizontal;
  (2) At least 50 percent of the required minimum intensity is maintained from 25 degrees above to 25 degrees below the horizontal.

(c) In the case of unmanned barges the minimum required intensity of electric lights as fitted shall be maintained on the horizontal.

(d) In the case of lights other than electric lights these specifications shall be met as closely as possible.

§ 84.21 Intensity of non-electric lights

Non-electric lights shall so far as practicable comply with the minimum intensities, as specified in the Table given in § 84.15.

12. Maneuvering light
Notwithstanding the provisions of paragraph 2(f) of this Annex the maneuvering light described in Rule 34(b) shall be placed in the same fore and aft vertical plane as the masthead light or lights and, where practicable, at a minimum height of 2 meters vertically above the forward masthead light, provided that it shall be carried not less than 2 meters vertically above or below the after masthead light. On a vessel where only one masthead light is carried the maneuvering light, if fitted, shall be carried where it can best be seen, not less than 2 meters vertically apart from the masthead light.

13. High Speed Craft*
(a) The masthead light of high speed craft may be placed at a height related to the breadth of the craft lower than that prescribed in paragraph 2(a)(i) of this annex, provided that the base angle of the isosceles triangles formed by the sidelights and masthead light, when seen in end elevation, is not less than 27°.
(b) On high-speed craft of 50 meters or more in length, the vertical separation between foremast and mainmast light of 4.5 meters is required by paragraph 29(a)(ii) of this annex and may be modified provided that such distance shall not be less than the value determined by the following formula:

$$y = \frac{(a + 17\Psi)C}{1000} + 2$$

where: y is the height of the mainmast light above the foremast light in meters;
a is the height of the foremast light above the water surface in service condition in meters;
Ψ is the trim in service conditions in degrees;
C is the horizontal separation of masthead lights in meters.

14. Approval
The construction of lights and shapes and the installation of lights on board the vessel shall be to the satisfaction of the appropriate authority of the State whose flag the vessel is entitled to fly.

* Refers to the International Code of Safety for High-Speed Craft, 1994 and the International Code of Safety for High-Speed Craft, 2000.

§ 84.23 Maneuvering light

Notwithstanding the provisions of § 84.03(f), the maneuvering light described in Rule 34(b) shall be placed approximately in the same fore and aft vertical plane as the masthead light or lights and, where practicable, at a minimum height of one-half meter vertically above the forward masthead light, provided that it shall be carried not less than one-half meter vertically above or below the after masthead light. On a vessel where only one masthead light is carried the maneuvering light, if fitted, shall be carried where it can best be seen, not less than one-half meter vertically apart from the masthead light.

§ 84.24 High Speed Craft

(a) The masthead light of high speed craft with a length to breadth ratio of less than 3.0 may be placed at a height related to the breadth lower than that precribed in Sec. 84.03(a)(1), provided that the base angle of the isosceles triangle formed by the sidelights and masthead light when seen in end elevation is not less than 27 degrees as determined by the formula in paragraph (b) of this section.

(b) The minimum height of masthead light above sidelights is to be determined by the following formula: Tan 27°=x/y; where Y is the horizontal distance between the sidelights and X is the height of the forward masthead light.

§ 84.25 Approval [Reserved]

—INTERNATIONAL—

ANNEX II -
Additional Signals for Fishing Vessels Fishing in Close Proximity

1. General

The lights mentioned herein shall, if exhibited in pursuance of Rule 26(d), be placed where they can best be seen. They shall be at least 0.9 meter apart but at a lower level than lights prescribed in Rule 26(b)(i) and (c)(i). The lights shall be visible all around the horizon at a distance of at least 1 mile but at a lesser distance than the lights prescribed by these Rules for fishing vessels.

2. Signals for trawlers

(a) Vessels of 20 meters or more in length when engaged in trawling, whether using demersal or pelagic gear, shall exhibit:
  (i) when shooting their nets: two white lights in a vertical line;
  (ii) when hauling their nets: one white light over one red light in a vertical line;
  (iii) when the net has come fast upon an obstruction: two red lights in a vertical line.

(b) Each vessel of 20 meters or more in length engaged in pair trawling shall exhibit:
  (i) by night, a searchlight directed forward and in the direction of the other vessel of the pair;
  (ii) when shooting or hauling their nets or when their nets have come fast upon an obstruction, the lights prescribed in 2(a) above.

(c) A vessel of less than 20 meters in length engaged in trawling, whether using demersal or pelagic gear, or engaged in pair trawling, may exhibit the lights prescribed in paragraphs (a) or (b) of this section, as appropriate.

3. Signals for purse seiners

Vessels engaged in fishing with purse seine gear may exhibit two yellow lights in a vertical line. These lights shall flash alternately every second and with equal light and occultation duration. These lights may be exhibited only when the vessel is hampered by its fishing gear.

—INLAND—

ANNEX II

33 CFR 85

Additional Signals for Fishing Vessels Fishing in Close Proximity

§85.1. General

The lights mentioned herein shall, if exhibited in pursuance of Rule 26(d), be placed where they can best be seen. They shall be at least 0.9 meter apart but at a lower level than lights prescribed in Rule 26(b)(i) and (c)(i) contained in the Inland Navigational Rules Act of 1980. The lights shall be visible all around the horizon at a distance of at least 1 mile but at a lesser distance from the lights prescribed by these Rules for fishing vessels.

§ 85.3 Signals for trawlers

(a) Vessels when engaged in trawling, whether using demersal or pelagic gear, may exhibit:
   (1) When shooting their nets: two white lights in a vertical line;
   (2) When hauling their nets: one white light over one red light in a vertical line;
   (3) When the net has come fast upon an obstruction: two red lights in a vertical line.

(b) Each vessel engaged in pair trawling may exhibit:
   (1) By night, a searchlight directed forward and in the direction of the other vessel of the pair;
   (2) When shooting or hauling their nets or when their nets have come fast upon an obstruction, the lights prescribed in paragraph (a) of this section.

§ 85.5 Signals for purse seiners

Vessels engaged in fishing with purse seine gear may exhibit two yellow lights in a vertical line. These lights shall flash alternately every second and with equal light and occultation duration. These lights may be exhibited only when the vessel is hampered by its fishing gear.

ANNEX III -
Technical Details of Sound Signal Appliances

1. Whistles

(a) Frequencies and range of audibility

The fundamental frequency of the signal shall lie within the range 70-700 Hz. The range of audibility of the signal from a whistle shall be determined by those frequencies, which may include the fundamental and/or one or more higher frequencies, which lie within the range 180-700 Hz (+/- 1%) for a vessel of 20 meters or more in length, or 180-2100Hz (+/- 1%) for a vessel of less than 20 meters in length and which provide the sound pressure levels specified in paragraph 1(c) below.

(b) Limits of fundamental frequencies

To ensure a wide variety of whistle characteristics, the fundamental frequency of a whistle shall be between the following limits:

(i) 70-200 Hz, for a vessel 200 meters or more in length;
(ii) 130-350 Hz, for a vessel 75 meters but less than 200 meters in length;
(iii) 250-700 Hz, for a vessel less than 75 meters in length.

—INLAND—

ANNEX III

33 CFR 86

Technical Details of Sound Signal Appliances

SUBPART A—WHISTLES

§ 86.01 Frequencies and range of audibility

The fundamental frequency of the signal shall lie within the range 70-525 Hz. The range of audibility of the signal from a whistle shall be determined by those frequencies, which may include the fundamental and/or one or more higher frequencies, which lie within the frequency ranges and provide the sound pressure levels specified in § 86.05.

§ 86.03 Limits of fundamental frequencies

To ensure a wide variety of whistle characteristics, the fundamental frequency of a whistle shall be between the following limits:

(a) 70-200 Hz, for a vessel 200 meters or more in length;
(b) 130-350 Hz, for a vessel 75 meters but less than 200 meters in length;
(c) 250-525 Hz, for a vessel less than 75 meters in length.

(c) **Sound signal intensity and range of audibility**
A whistle fitted in a vessel shall provide, in the direction of maximum intensity of the whistle and at a distance of 1 meter from it, a sound pressure level in at least one 1/3-octave band within the range of frequencies 180-700 Hz (+/- 1%) for a vessel of 20 meters or more in length, or 180-2100Hz (+/- 1%) for a vessel of less than 20 meters in length, of not less than the appropriate figure given in the table below.

Length of vessel in meters	1/3-octave band level at 1 meter in dB referred to $2x10^{-5}$ N/m^2	Audibility range in nautical miles
200 or more	143	2
75 but less than 200	138	1.5
20 but less than 75	130	1
Less than 20	120[*1] 115[*2] 111[*3]	0.5

NOTE: The range of audibility in the table above is for information and is approximately the range at which a whistle may be heard on its forward axis with 90 percent probability in conditions of still air on board a vessel having average background noise level at the listening posts (taken to be 68 dB in the octave band centered on 250 Hz and 63 dB in the octave band centered on 500 Hz). In practice the range at which a whistle may be heard is extremely variable and depends critically on weather conditions; the values given can be regarded as typical but under conditions of strong wind or high ambient noise level at the listening post the range may be much reduced.

*1 When the measured frequencies lie within the range 180-450Hz
*2 When the measured frequencies lie within the range 450-800Hz
*3 When the measured frequencies lie within the range 800-2100Hz

§ 86.05 Sound signal intensity and range of audibility

A whistle on a vessel shall provide, in the direction of the forward axis of the whistle and at a distance of 1 meter from it, a sound pressure level in at least one 1/3-octave band of not less than the appropriate figure given in Table 86.05 within the following frequency ranges (± 1 percent):

(a) 130-1200 Hz, for a vessel 75 meters or more in length;

(b) 250-1600 Hz, for a vessel 20 meters but less than 75 meters in length;

(c) 250-2100 Hz, for a vessel 12 meters but less than 20 meters in length.

Table 86.05

Length of vessel in meters	Fundamental frequency range (Hz)	For measured frequencies (Hz)	1/3 octave band level at 1 meter in dB referred to $2x10^{-5}$ N/m^2	Audibility range in nautical miles
200 or more	70-200	130-180 180-250 250-1200	145 143 140	2
75 but less than 200	130-350	130-180 180-250 250-1200	140 138 134	1.5
20 but less than 75	250-525	250-450 450-800 800-1600	130 125 121	1.0
12 but less than 20	250-525	250-450 450-800 800-2100	120 115 111	0.5

NOTE: The range of audibility in the table above is for information and is approximately the range at which a whistle may usually be heard on its forward axis in conditions of still air on board a vessel having average background noise level at the listening posts (taken to be 68 dB in the octave band centered on 250 Hz and 63 dB in the octave band centered on 500 Hz). In practice the range at which a whistle may be heard is extremely variable and depends critically on weather conditions; the values given can be regarded as typical but under conditions of strong wind or high ambient noise level at the listening post the range may be much reduced.

(d) Directional properties

The sound pressure level of a directional whistle shall be not more than 4 dB below the prescribed sound pressure level on the axis at any direction in the horizontal plane within ± 45 degrees of the axis. The sound pressure level at any other direction in the horizontal plane shall be not more than 10 dB below the prescribed sound pressure level on the axis, so that the range in any direction will be at least half the range on the forward axis. The sound pressure level shall be measured in that one-third octave band which determines the audibility range.

(e) Positioning of whistles

When a directional whistle is to be used as the only whistle on a vessel, it shall be installed with its maximum intensity directed straight ahead.

A whistle shall be placed as high as practicable on a vessel, in order to reduce interception of the emitted sound by obstructions and also to minimize hearing damage risk to personnel. The sound pressure level of the vessel's own signal at listening posts shall not exceed 110 dB(A) and so far as practicable should not exceed 100 dB(A).

§ 86.07 Directional properties

The sound pressure level of a directional whistle shall be not more than 4 dB below the sound pressure level specified in § 86.05 in any direction in the horizontal plane within + 45 degrees of the forward axis. The sound pressure level of the whistle in any other direction in the horizontal plane shall not be more than 10 dB less than the sound pressure level specified for the forward axis, so that the range of audibility in any direction will be at least half the range required on the forward axis. The sound pressure level shall be measured in that one-third octave band which determines the audibility range.

§ 86.09 Positioning of whistles

(a) When a directional whistle is to be used as the only whistle on the vessel and is permanently installed, it shall be installed with its forward axis directed forward.

(b) A whistle shall be placed as high as practicable on a vessel, in order to reduce interception of the emitted sound by obstructions and also to minimize hearing damage risk to personnel. The sound pressure level of the vessel's own signal at listening posts shall not exceed 110 dB(A) and so far as practicable should not exceed 100 dB(A).

(f) Fitting of more than one whistle

If whistles are fitted at a distance apart of more than 100 meters, it shall be so arranged that they are not sounded simultaneously.

(g) Combined whistle systems

If due to the presence of obstructions the sound field of a single whistle or of one of the whistles referred to in paragraph 1(f) above is likely to have a zone of greatly reduced signal level, it is recommended that a combined whistle system be fitted so as to overcome this reduction. For the purposes of the Rules a combined whistle system is to be regarded as a single whistle. The whistles of a combined system shall be located at a distance apart of not more than 100 meters and arranged to be sounded simultaneously. The frequency of any one whistle shall differ from those of the others by at least 10 Hz.

§ 86.11 Fitting of more than one whistle
If whistles are fitted at a distance apart of more than 100 meters, they shall not be sounded simultaneously.

§ 86.13 Combined whistle systems
(a) A combined whistle system is a number of whistles (sound emitting sources) operated together. For the purposes of the Rules a combined whistle system is to be regarded as a single whistle. (b) The whistles of a combined system shall:
(1) Be located at a distance apart of not more than 100 meters,
(2) Be sounded simultaneously,
(3) Each have a fundamental frequency different from those of the others by at least 10 Hz, and
(4) Have a tonal characteristic appropriate for the length of vessel which shall be evidenced by at least two-thirds of the whistles in the combined system having fundamental frequencies falling within the limits prescribed in § 86.03, or if there are only two whistles in the combined system, by the higher fundamental frequency falling within the limits prescribed § 86.03.

NOTE: If due to the presence of obstructions the sound field of a single whistle or of one of the whistles referred to in §86.11 is likely to have a zone of greatly reduced signal level a combined whistle system should be fitted so as to overcome this reduction.

2. Bell or gong

(a) Intensity of signal

A bell or gong, or other device having similar sound characteristics shall produce a sound pressure level of not less than 110 dB at a distance of 1 meter from it.

(b) Construction

Bells and gongs shall be made of corrosion-resistant material and designed to give a clear tone. The diameter of the mouth of the bell shall be not less than 300 mm for vessels of 20 meters or more in length. Where practicable, a power-driven bell striker is recommended to ensure constant force but manual operation shall be possible. The mass of the striker shall be not less than 3 percent of the mass of the bell.

3. Approval

The construction of sound signal appliances, their performance and their installation on board the vessel shall be to the satisfaction of the appropriate authority of the State whose flag the vessel is entitled to fly.

§ 86.15 Towing vessel whistles
A power-driven vessel normally engaged in pushing ahead or towing alongside may, at all times, use a whistle whose characteristic falls within the limits prescribed by § 86.03 for the longest customary composite length of the vessel and its tow.

Subpart B—Bell or gong
§ 86.21 Intensity of signal
A bell or gong, or other device having similar sound characteristics shall produce a sound pressure level of not less than 110 dB at 1 meter.

§ 86.23 Construction
Bells and gongs shall be made of corrosion-resistant material and designed to give a clear tone. The diameter of the mouth of the bell shall be not less than 300 mm for vessels of more than 20 meters in length, and shall be not less than 200 mm for vessels of 12 to 20 meters in length. The mass of the striker shall be not less than 3 percent of the mass of the bell. The striker shall be capable of manual operation.

NOTE: When practicable, a power-driven bell striker is recommended to ensure constant force.

Subpart C—Approval
§ 86.31 Approval [Reserved]

ANNEX IV -
Distress Signals

1. The following signals, used or exhibited either together or separately, indicate distress and need of assistance:
   (a) a gun or other explosive signal fired at intervals of about a minute;
   (b) a continuous sounding with any fog-signaling apparatus;
   (c) rockets or shells, throwing red stars fired one at a time at short intervals;
   (d) a signal made by radiotelegraphy or by any other signaling method consisting of the group . . .– – –. . . (SOS) in the Morse Code;
   (e) a signal sent by radiotelephony consisting of the spoken word “Mayday”;
   (f) the International Code Signal of distress indicated by N.C.;
   (g) a signal consisting of a square flag having above or below it a ball or anything resembling a ball;
   (h) flames on the vessel (as from a burning tar barrel, oil barrel, etc.);
   (i) a rocket parachute flare or a hand flare showing a red light;
   (j) a smoke signal giving off orange-colored smoke;
   (k) slowly and repeatedly raising and lowering arms outstretched to each side;
   (l) the radiotelegraph alarm signal;
   (m) the radiotelephone alarm signal;
   (n) signals transmitted by emergency position-indicating radio beacons;
   (o) approved signals transmitted by radiocommunication systems, including survival craft radar transponders.

—INLAND—
ANNEX IV
33 CFR 87
Distress Signals

§ 87.1 Need of assistance
The following signals, used or exhibited either together or separately, indicate distress and need of assistance:
(a) A gun or other explosive signal fired at intervals of about a minute;
(b) A continuous sounding with any fog-signaling apparatus;
(c) Rockets or shells, throwing red stars fired one at a time at short intervals;
(d) A signal made by radiotelegraphy or by any other signaling method consisting of the group . . .– – –. . . (SOS) in the Morse Code;
(e) A signal sent by radiotelephony consisting of the spoken word “Mayday”;
(f) The International Code Signal of distress indicated by N.C.;
(g) A signal consisting of a square flag having above or below it a ball or anything resembling a ball;
(h) Flames on the vessel (as from a burning tar barrel, oil barrel, etc.);
(i) A rocket parachute flare or a hand flare showing a red light;
(j) A smoke signal giving off orange-colored smoke;
(k) Slowly and repeatedly raising and lowering arms outstretched to each side;
(l) The radiotelegraph alarm signal;
(m) The radiotelephone alarm signal;
(n) Signals transmitted by emergency position-indicating radio beacons;
(o) Signals transmitted by radiocommunication systems, including survival craft radar transponders meeting the requirements of 47 CFR 80.1095.
(p) A high intensity white light flashing at regular intervals from 50 to 70 times per minute.

2. The use or exhibition of any of the foregoing signals except for the purpose of indicating distress and need of assistance and the use of other signals which may be confused with any of the above signals is prohibited.
3. Attention is drawn to the relevant sections of the International Code of Signals, the Merchant Ship Search and Rescue Manual and the following signals:
   (a) a piece of orange-colored canvas with either a black square and circle or other appropriate symbol (for identification from the air);
   (b) a dye marker.

§ 87.3 Exclusive use
The use or exhibition of any of the foregoing signals except for the purpose of indicating distress and need of assistance and the use of other signals which may be confused with any of the above signals is prohibited.

§ 87.5 Supplemental signals
Attention is drawn to the relevant sections of the International Code of Signals, the Merchant Ship Search and Rescue Manual, the International Telecommunication Union Radio Regulations, and the following signals:
(a) A piece of orange-colored canvas with either a black square and circle or other appropriate symbol (for identification from the air);
(b) A dye marker.

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ANNEX V
(33 CFR 88) - Pilot Rules

§ 88.01 Purpose and applicability
This Part applies to all vessels operating on United States inland waters and to United States vessels operating on the Canadian waters of the Great Lakes to the extent there is no conflict with Canadian law.

§ 88.03 Definitions
The terms used in this part have the same meaning as defined in the Inland Navigational Rules Act of 1980.

§ 88.05 Copy of Rules
After January 1, 1983, the operator of each self-propelled vessel 12 meters or more in length shall carry on board and maintain for ready reference a copy of the Inland Navigation Rules.

§ 88.09 Temporary exemption from light and shape requirements when operating under bridges
A vessel's navigation lights and shapes may be lowered if necessary to pass under a bridge.

§ 88.11 Law enforcement vessels
(a) Law enforcement vessels may display a flashing blue light when engaged in direct law enforcement or public safety activities. This light must be located so that it does not interfere with the visibility of the vessel's navigation lights.
(b) The blue light described in this section may be displayed by law enforcement vessels of the United States and the States and their political subdivisions.

§ 88.12 Public Safety Activities
(a) Vessels engaged in government sanctioned public safety activities, and commercial vessels performing similar functions, may display an alternately flashing red and yellow light signal. This identification light signal must be located so that it does not interfere with the visibility of the vessel's navigation lights. The identification light signal may be used only as an identification signal and conveys no special privilege. Vessels using the identification light signal during public safety activities must abide by the Inland Navigation Rules, and must not presume that the light or the exigency gives them precedence or right of way.

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(b) Public safety activities include but are not limited to patrolling marine parades, regattas, or special water celebrations; traffic control; salvage; firefighting; medical assistance; assisting disabled vessels; and search and rescue.

§ 88.13 Lights on moored barges

(a) The following barges shall display at night and if practicable in periods of restricted visibility the lights described in paragraph (b) of this section:

(1) Every barge projecting into a buoyed or restricted channel. (2) Every barge so moored that it reduces the available navigable width of any channel to less than 80 meters.

(2) Barges moored in groups more than two barges wide or to a maximum width of over 25 meters.

(3) Every barge not moored parallel to the bank or dock.

(b) Barges described in paragraph (a) of this section shall carry two unobstructed all-round white lights of an intensity to be visible for at least one nautical mile and meeting the technical requirements as prescribed in § 84.15 of this chapter.

(c) A barge or a group of barges at anchor or made fast to one or more mooring bouys or other similar device, in lieu of the provisions of Inland Navigation Rule 30, may carry unobstructed all-round white lights of an intensity to be visible for at least one nautical mile that meet the requirements of § 84.15 of this chapter and shall be arranged as follows:

(1) Any barge that projects from a group formation, shall be lighted on its outboard corners.

(2) On a single barge moored in water where other vessels normally navigate on both sides of the barge, lights shall be placed to mark the corner extremities of the barge.

(3) On barges moored in group formation, moored in water where other vessels normally navigate on both sides of the group, lights shall be placed to mark the corner extremities of the group.

(d) The following are exempt from the requirements of this section:

(1) A barge or group of barges moored in a slip or slough used primarily for mooring purposes.

(2) A barge or group of barges moored behind a pierhead.

(3) A barge less than 20 meters in length when moored in a special anchorage area designated in accordance with § 109.10 of this chapter.

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(e) Barges moored in well-illuminated areas are exempt from the lighting requirements of this section. These areas are as follows:

CHICAGO SANITARY SHIP CANAL

(1) Mile 293.2 to 293.9
(3) Mile 295.2 to 296.1
(5) Mile 297.5 to 297.8
(7) Mile 298 to 298.2
(9) Mile 298.6 to 298.8
(11) Mile 299.3 to 299.4
(13) Mile 299.8 to 300.5
(15) Mile 303 to 303.2
(17) Mile 303.7 to 303.9
(19) Mile 305.7 to 305.8
(21) Mile 310.7 to 310.9
(23) Mile 311 to 311.2
(25) Mile 312.5 to 312.6
(27) Mile 313.8 to 314.2
(29) Mile 314.6
(31) Mile 314.8 to 315.3
(33) Mile 315.7 to 316
(35) Mile 316.8
(37) Mile 316.85 to 317.05
(39) Mile 317.5
(41) Mile 318.4 to 318.9
(43) Mile 318.7 to 318.8
(45) Mile 320 to 320.3
(47) Mile 320.6
(49) Mile 322.3 to 322.4
(51) Mile 322.8
(53) Mile 322.9 to 327.2

CALUMET SAG CHANNEL

(61) Mile 316.5

LITTLE CALUMET RIVER

(71) Mile 321.2
(73) Mile 322.3

CALUMET RIVER

(81) Mile 328.5 to 328.7
(83) Mile 329.2 to 329.4
(85) Mile 330 west bank to 330.2
(87) Mile 331.4 to 331.6
(89) Mile 332.2 to 332.4
(91) Mile 332.6 to 332.8

CUMBERLAND RIVER

(101) Mile 126.8
(103) Mile 191

—INTERNATIONAL—

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§ 88.15 Lights on dredge pipelines

Dredge pipelines that are floating or supported on trestles shall display the following lights at night and in periods of restricted visibility.

(a) One row of yellow lights. The lights must be:

(1) Flashing 50 to 70 times per minute,

(2) Visible all around the horizon,

(3) Visible for at least 2 miles on a clear dark night,

(4) Not less than 1 and not more than 3.5 meters above the water,

(5) Approximately equally spaced, and

(6) Not more than 10 meters apart where the pipeline crosses a navigable channel. Where the pipeline does not cross a navigable channel the lights must be sufficient in number to clearly show the pipeline's length and course.

(b) Two red lights at each end of the pipeline, including the ends in a channel where the pipeline is separated to allow vessels to pass (whether open or closed). The lights must be:

(1) Visible all around the horizon, and

(2) Visible for at least 2 miles on a clear dark night, and

(3) One meter apart in a vertical line with the lower light at the same height above the water as the flashing yellow light.