

**Editorial Notes**

## REFERENCES IN TEXT

The date of the enactment of this section, referred to in subsec. (c)(1)(B), (2)(A), is the date of enactment of Pub. L. 109–58, which was approved Aug. 8, 2005.

The Clean Air Act, referred to in subsec. (c)(3), is act July 14, 1955, ch. 360, 69 Stat. 322, which is classified generally to chapter 85 (§7401 et seq.) of Title 42, The Public Health and Welfare. For complete classification of this Act to the Code, see Short Title note set out under section 7401 of Title 42 and Tables.

## AMENDMENTS

2008—Subsec. (c)(1)(B). Pub. L. 110–343, §209(a)(1), substituted “January 1, 2014” for “January 1, 2012”.

Subsec. (c)(1)(F). Pub. L. 110–343, §209(a)(2), substituted “January 1, 2010” for “January 1, 2008” wherever appearing.

Subsec. (d). Pub. L. 110–343, §209(b)(1), inserted “, or directly from shale or tar sands” after “(as defined in section 45K(c))”.

Subsec. (e)(2). Pub. L. 110–343, §209(b)(2), inserted “shale, tar sands, or” before “qualified fuels”.

**Statutory Notes and Related Subsidiaries**

## EFFECTIVE DATE OF 2008 AMENDMENT

Pub. L. 110–343, div. B, title II, §209(c), Oct. 3, 2008, 122 Stat. 3840, provided that: “The amendments made by this section [amending this section] shall apply to property placed in service after the date of the enactment of this Act [Oct. 3, 2008].”

## EFFECTIVE DATE

Pub. L. 109–58, title XIII, §1323(c), Aug. 8, 2005, 119 Stat. 1015, provided that: “The amendments made by this section [enacting this section and amending sections 263, 312, and 1245 of this title] shall apply to properties placed in service after the date of the enactment of this Act [Aug. 8, 2005].”

**§ 179D. Energy efficient commercial buildings deduction****(a) In general**

There shall be allowed as a deduction an amount equal to the cost of energy efficient commercial building property placed in service during the taxable year.

**(b) Maximum amount of deduction****(1) In general**

The deduction under subsection (a) with respect to any building for any taxable year shall not exceed the excess (if any) of—

(A) the product of—

- (i) the applicable dollar value, and
- (ii) the square footage of the building, over

(B) the aggregate amount of the deductions under subsections (a) and (f) with respect to the building for the 3 taxable years immediately preceding such taxable year (or, in the case of any such deduction allowable to a person other than the taxpayer, for any taxable year ending during the 4-taxable-year period ending with such taxable year).

**(2) Applicable dollar value**

For purposes of paragraph (1)(A)(i), the applicable dollar value shall be an amount equal to \$0.50 increased (but not above \$1.00) by \$0.02 for each percentage point by which the total

annual energy and power costs for the building are certified to be reduced by a percentage greater than 25 percent.

**(3) Increased deduction amount for certain property****(A) In general**

In the case of any property which satisfies the requirements of subparagraph (B), paragraph (2) shall be applied by substituting “\$2.50” for “\$0.50”, “\$.10” for “\$.02”, and “\$5.00” for “\$1.00”.

**(B) Property requirements**

In the case of any energy efficient commercial building property, energy efficient building retrofit property, or property installed pursuant to a qualified retrofit plan, such property shall meet the requirements of this subparagraph if—

(i) installation of such property begins prior to the date that is 60 days after the Secretary publishes guidance with respect to the requirements of paragraphs (4)(A) and (5), or

(ii) installation of such property satisfies the requirements of paragraphs (4)(A) and (5).

**(4) Prevailing wage requirements****(A) In general**

The requirements described in this subparagraph with respect to any property are that the taxpayer shall ensure that any laborers and mechanics employed by the taxpayer or any contractor or subcontractor in the installation of any property shall be paid wages at rates not less than the prevailing rates for construction, alteration, or repair of a similar character in the locality in which such property is located as most recently determined by the Secretary of Labor, in accordance with subchapter IV of chapter 31 of title 40, United States Code.

**(B) Correction and penalty related to failure to satisfy wage requirements**

Rules similar to the rules of section 45(b)(7)(B) shall apply.

**(5) Apprenticeship requirements**

Rules similar to the rules of section 45(b)(8) shall apply.

**(6) Regulations**

The Secretary shall issue such regulations or other guidance as the Secretary determines necessary to carry out the purposes of this subsection, including regulations or other guidance which provides for requirements for recordkeeping or information reporting for purposes of administering the requirements of this subsection.

**(c) Definitions**

For purposes of this section—

**(1) Energy efficient commercial building property**

The term “energy efficient commercial building property” means property—

(A) with respect to which depreciation (or amortization in lieu of depreciation) is allowable,

(B) which is installed on or in any building which is—

- (i) located in the United States, and
- (ii) within the scope of Reference Standard 90.1,

(C) which is installed as part of—

- (i) the interior lighting systems,
- (ii) the heating, cooling, ventilation, and hot water systems, or
- (iii) the building envelope, and

(D) which is certified in accordance with subsection (d)(5) as being installed as part of a plan designed to reduce the total annual energy and power costs with respect to the interior lighting systems, heating, cooling, ventilation, and hot water systems of the building by 25 percent or more in comparison to a reference building which meets the minimum requirements of Reference Standard 90.1 using methods of calculation under subsection (d)(1).

**(2) Reference Standard 90.1**

The term “Reference Standard 90.1” means, with respect to any property, the more recent of—

(A) Standard 90.1-2007 published by the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America, or

(B) the most recent Standard 90.1 published by the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America for which the Department of Energy has issued a final determination and which has been affirmed by the Secretary, after consultation with the Secretary of Energy, for purposes of this section not later than the date that is 4 years before the date such property is placed in service.

**(d) Special rules**

**(1) Methods of calculation**

The Secretary, after consultation with the Secretary of Energy, shall promulgate regulations which describe in detail methods for calculating and verifying energy and power consumption and cost with respect to any property, based on the provisions of the most recent California Nonresidential Alternative Calculation Method Approval Manual which has been affirmed by the Secretary, after consultation with the Secretary of Energy, for purposes of this section not later than the date that is 4 years before the date such property is placed in service.

**(2) Computer software**

**(A) In general**

Any calculation under paragraph (1) shall be prepared by qualified computer software.

**(B) Qualified computer software**

For purposes of this paragraph, the term “qualified computer software” means software—

- (i) for which the software designer has certified that the software meets all proce-

dures and detailed methods for calculating energy and power consumption and costs as required by the Secretary,

(ii) which provides such forms as required to be filed by the Secretary in connection with energy efficiency of property and the deduction allowed under this section, and

(iii) which provides a notice form which documents the energy efficiency features of the building and its projected annual energy costs.

**(3) Allocation of deduction by certain tax-exempt entities**

**(A) In general**

In the case of energy efficient commercial building property installed on or in property owned by a specified tax-exempt entity, the Secretary shall promulgate regulations or guidance to allow the allocation of the deduction to the person primarily responsible for designing the property in lieu of the owner of such property. Such person shall be treated as the taxpayer for purposes of this section.

**(B) Specified tax-exempt entity**

For purposes of this paragraph, the term “specified tax-exempt entity” means—

(i) the United States, any State or political subdivision thereof, any possession of the United States, or any agency or instrumentality of any of the foregoing,

(ii) an Indian tribal government (as defined in section 30D(g)(9)) or Alaska Native Corporation (as defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602(m)),<sup>1</sup> and

(iii) any organization exempt from tax imposed by this chapter.

**(4) Notice to owner**

Each certification required under this section shall include an explanation to the building owner regarding the energy efficiency features of the building and its projected annual energy costs as provided in the notice under paragraph (2)(B)(iii).

**(5) Certification**

**(A) In general**

The Secretary shall prescribe the manner and method for the making of certifications under this section.

**(B) Procedures**

The Secretary shall include as part of the certification process procedures for inspection and testing by qualified individuals described in subparagraph (C) to ensure compliance of buildings with energy-savings plans and targets. Such procedures shall be comparable, given the difference between commercial and residential buildings, to the requirements in the Mortgage Industry National Accreditation Procedures for Home Energy Rating Systems.

**(C) Qualified individuals**

Individuals qualified to determine compliance shall be only those individuals who are

<sup>1</sup>So in original. Another closing parenthesis probably should precede the comma.

recognized by an organization certified by the Secretary for such purposes.

**(e) Basis reduction**

For purposes of this subtitle, if a deduction is allowed under this section with respect to any energy efficient commercial building property, the basis of such property shall be reduced by the amount of the deduction so allowed.

**(f) Alternative deduction for energy efficient building retrofit property**

**(1) In general**

In the case of a taxpayer which elects (at such time and in such manner as the Secretary may provide) the application of this subsection with respect to any qualified building, there shall be allowed as a deduction for the taxable year which includes the date of the qualifying final certification with respect to the qualified retrofit plan of such building, an amount equal to the lesser of—

(A) the excess described in subsection (b) (determined by substituting “energy use intensity” for “total annual energy and power costs” in paragraph (2) thereof), or

(B) the aggregate adjusted basis (determined after taking into account all adjustments with respect to such taxable year other than the reduction under subsection (e)) of energy efficient building retrofit property placed in service by the taxpayer pursuant to such qualified retrofit plan.

**(2) Qualified retrofit plan**

For purposes of this subsection, the term “qualified retrofit plan” means a written plan prepared by a qualified professional which specifies modifications to a building which, in the aggregate, are expected to reduce such building’s energy use intensity by 25 percent or more in comparison to the baseline energy use intensity of such building. Such plan shall provide for a qualified professional to—

(A) as of any date during the 1-year period ending on the date on which the property installed pursuant to such plan is placed in service, certify the energy use intensity of such building as of such date,

(B) certify the status of property installed pursuant to such plan as meeting the requirements of subparagraphs (B) and (C) of paragraph (3), and

(C) as of any date that is more than 1 year after the date on which the property installed pursuant to such plan is placed in service, certify the energy use intensity of such building as of such date.

**(3) Energy efficient building retrofit property**

For purposes of this subsection, the term “energy efficient building retrofit property” means property—

(A) with respect to which depreciation (or amortization in lieu of depreciation) is allowable,

(B) which is installed on or in any qualified building,

(C) which is installed as part of—

- (i) the interior lighting systems,
- (ii) the heating, cooling, ventilation, and hot water systems, or

(iii) the building envelope, and

(D) which is certified in accordance with paragraph (2)(B) as meeting the requirements of subparagraphs (B) and (C).

**(4) Qualified building**

For purposes of this subsection, the term “qualified building” means any building which—

(A) is located in the United States, and

(B) was originally placed in service not less than 5 years before the establishment of the qualified retrofit plan with respect to such building.

**(5) Qualifying final certification**

For purposes of this subsection, the term “qualifying final certification” means, with respect to any qualified retrofit plan, the certification described in paragraph (2)(C) if the energy use intensity certified in such certification is not more than 75 percent of the baseline energy use intensity of the building.

**(6) Baseline energy use intensity**

**(A) In general**

For purposes of this subsection, the term “baseline energy use intensity” means the energy use intensity certified under paragraph (2)(A), as adjusted to take into account weather.

**(B) Determination of adjustment**

For purposes of subparagraph (A), the adjustments described in such subparagraph shall be determined in such manner as the Secretary may provide.

**(7) Other definitions**

For purposes of this subsection—

**(A) Energy use intensity**

The term “energy use intensity” means the annualized, measured site energy use intensity determined in accordance with such regulations or other guidance as the Secretary may provide and measured in British thermal units.

**(B) Qualified professional**

The term “qualified professional” means an individual who is a licensed architect or a licensed engineer and meets such other requirements as the Secretary may provide.

**(8) Coordination with deduction otherwise allowed under subsection (a)**

**(A) In general**

In the case of any building with respect to which an election is made under paragraph (1), the term “energy efficient commercial building property” shall not include any energy efficient building retrofit property with respect to which a deduction is allowable under this subsection.

**(B) Certain rules not applicable**

**(i) In general**

Except as provided in clause (ii), subsection (d) shall not apply for purposes of this subsection.

**(ii) Allocation of deduction by certain tax-exempt entities**

Rules similar to subsection (d)(3) shall apply for purposes of this subsection.

**(g) Inflation adjustment**

In the case of a taxable year beginning after 2022, each dollar amount in subsection (b) shall be increased by an amount equal to—

(1) such dollar amount, multiplied by

(2) the cost-of-living adjustment determined under section 1(f)(3) for the calendar year in which the taxable year begins, determined by substituting “calendar year 2021” for “calendar year 2016” in subparagraph (A)(ii) thereof.

Any increase determined under the preceding sentence which is not a multiple of 1 cent shall be rounded to the nearest cent.

**(h) Regulations**

The Secretary shall promulgate such regulations as necessary—

(1) to take into account new technologies regarding energy efficiency and renewable energy for purposes of determining energy efficiency and savings under this section, and

(2) to provide for a recapture of the deduction allowed under this section if the plan described in subsection (c)(1)(D) is not fully implemented.

(Added Pub. L. 109–58, title XIII, §1331(a), Aug. 8, 2005, 119 Stat. 1020; amended Pub. L. 109–432, div. A, title II, §204, Dec. 20, 2006, 120 Stat. 2945; Pub. L. 110–343, div. B, title III, §303, Oct. 3, 2008, 122 Stat. 3845; Pub. L. 113–295, div. A, title I, §158(a), Dec. 19, 2014, 128 Stat. 4022; Pub. L. 114–113, div. Q, title I, §190(a), title III, §341(a), (b), Dec. 18, 2015, 129 Stat. 3075, 3113; Pub. L. 115–123, div. D, title I, §40413(a), Feb. 9, 2018, 132 Stat. 151; Pub. L. 115–141, div. U, title IV, §401(a)(54), Mar. 23, 2018, 132 Stat. 1186; Pub. L. 116–94, div. Q, title I, §131(a), Dec. 20, 2019, 133 Stat. 3232; Pub. L. 116–260, div. EE, title I, §102(a)–(c), Dec. 27, 2020, 134 Stat. 3039, 3040; Pub. L. 117–169, title I, §13303(a), (c), Aug. 16, 2022, 136 Stat. 1947, 1952.)

**INFLATION ADJUSTED ITEMS FOR CERTAIN YEARS**

*For inflation adjustment of certain items in this section, see Revenue Procedures listed in a table under section 1 of this title.*

**Editorial Notes****AMENDMENTS**

2022—Subsec. (b). Pub. L. 117–169, §13303(a)(1), amended subsec. (b) generally. Prior to amendment, text read as follows: “The deduction under subsection (a) with respect to any building for any taxable year shall not exceed the excess (if any) of—

“(1) the product of—

“(A) \$1.80, and

“(B) the square footage of the building, over

“(2) the aggregate amount of the deductions under subsection (a) with respect to the building for all prior taxable years.”

Subsec. (c)(1)(D). Pub. L. 117–169, §13303(a)(2), (5)(B)(i), substituted “subsection (d)(5)” for “subsection (d)(6)”, “25 percent” for “50 percent”, and “subsection (d)(1)” for “subsection (d)(2)”.

Subsec. (c)(2). Pub. L. 117–169, §13303(a)(3), substituted “the more recent of—

“(A) Standard 90.1–2007 published by the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America, or

“(B) the most recent”

for “the most recent”.

Subsec. (c)(2)(B). Pub. L. 117–169, §13303(a)(4), inserted “for which the Department of Energy has issued a final determination and” before “which has been affirmed” and substituted “4 years” for “2 years” and “such property is placed in service” for “that construction of such property begins”.

Subsec. (d). Pub. L. 117–169, §13303(a)(5)(A), redesignated pars. (2) to (6) as (1) to (5), respectively, and struck out former par. (1) which provided for a partial allowance for a deduction.

Subsec. (d)(1). Pub. L. 117–169, §13303(c), substituted “not later than the date that is 4 years before the date such property is placed in service” for “not later than the date that is 2 years before the date that construction of such property begins”.

Subsec. (d)(2)(A). Pub. L. 117–169, §13303(a)(5)(B)(ii), substituted “paragraph (1)” for “paragraph (2)”.

Subsec. (d)(3). Pub. L. 117–169, §13303(a)(6), amended par. (3) generally. Prior to amendment, text read as follows: “In the case of energy efficient commercial building property installed on or in property owned by a Federal, State, or local government or a political subdivision thereof, the Secretary shall promulgate a regulation to allow the allocation of the deduction to the person primarily responsible for designing the property in lieu of the owner of such property. Such person shall be treated as the taxpayer for purposes of this section.”

Subsec. (d)(4). Pub. L. 117–169, §13303(a)(5)(B)(iii), substituted “paragraph (2)(B)(iii)” for “paragraph (3)(B)(iii)”.

Subsec. (f). Pub. L. 117–169, §13303(a)(5)(B)(iv), (7), added subsec. (f) and struck out former subsec. (f) which related to interim rules for lighting systems.

Subsec. (g). Pub. L. 117–169, §13303(a)(8)(A), (B), in introductory provisions, substituted “2022” for “2020” and struck out “or subsection (d)(1)(A)” after “subsection (b)”.

Subsec. (g)(2). Pub. L. 117–169, §13303(a)(8)(C), substituted “2021” for “2019”.

Subsec. (h)(2). Pub. L. 117–169, §13303(a)(5)(B)(v), struck out “or (d)(1)(A)” after “subsection (c)(1)(D)”.

2020—Subsec. (c)(1)(B)(ii), (D). Pub. L. 116–260, §102(c)(1)(A), substituted “Reference Standard 90.1” for “Standard 90.1–2007”.

Subsec. (c)(2). Pub. L. 116–260, §102(c)(1)(B), amended par. (2) generally. Prior to amendment, text read as follows: “The term ‘Standard 90.1–2007’ means Standard 90.1–2007 of the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America (as in effect on the day before the date of the adoption of Standard 90.1–2010 of such Societies).”

Subsec. (d)(2). Pub. L. 116–260, §102(c)(2), substituted “with respect to any property, based on the provisions of the most recent California Nonresidential Alternative Calculation Method Approval Manual which has been affirmed by the Secretary, after consultation with the Secretary of Energy, for purposes of this section not later than the date that is 2 years before the date that construction of such property begins” for “, based on the provisions of the 2005 California Nonresidential Alternative Calculation Method Approval Manual”.

Subsecs. (g), (h). Pub. L. 116–260, §102(a), (b), added subsec. (g), redesignated former subsec. (g) as (h), and struck out former subsec. (h). Prior to amendment, text of subsec. (h) read as follows: “This section shall not apply with respect to property placed in service after December 31, 2020.”

2019—Subsec. (h). Pub. L. 116–94 substituted “December 31, 2020” for “December 31, 2017”.

2018—Subsec. (d)(1)(B). Pub. L. 115–141 substituted “such that” for “which”.

Subsec. (h). Pub. L. 115–123 substituted “December 31, 2017” for “December 31, 2016”.

2015—Subsec. (c)(1)(B)(ii), (D). Pub. L. 114–113, §341(a), substituted “Standard 90.1–2007” for “Standard 90.1–2001”.

Subsec. (c)(2). Pub. L. 114–113, §341(b)(1), amended par. (2) generally. Prior to amendment, text read as follows: “The term ‘Standard 90.1–2001’ means Standard

90.1-2001 of the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America (as in effect on April 2, 2003).”

Subsec. (f)(1). Pub. L. 114-113, §341(b)(2), (3), substituted “Table 9.5.1” for “Table 9.3.1.1”, “Table 9.6.1” for “Table 9.3.1.2”, and “Standard 90.1-2007” for “Standard 90.1-2001”.

Subsec. (f)(2)(C)(i). Pub. L. 114-113, §341(b)(2), substituted “Standard 90.1-2007” for “Standard 90.1-2001”.

Subsec. (h). Pub. L. 114-113, §190(a), substituted “December 31, 2016” for “December 31, 2014”.

2014—Subsec. (h). Pub. L. 113-295 substituted “December 31, 2014” for “December 31, 2013”.

2008—Subsec. (h). Pub. L. 110-343 substituted “December 31, 2013” for “December 31, 2008”.

2006—Subsec. (h). Pub. L. 109-432 substituted “2008” for “2007”.

#### Statutory Notes and Related Subsidiaries

##### EFFECTIVE DATE OF 2022 AMENDMENT

Pub. L. 117-169, title I, §13303(d), Aug. 16, 2022, 136 Stat. 1952, provided that:

“(1) IN GENERAL.—Except as otherwise provided in this subsection, the amendments made by this section [amending this section and section 312 of this title] shall apply to taxable years beginning after December 31, 2022.

“(2) ALTERNATIVE DEDUCTION FOR ENERGY EFFICIENT BUILDING RETROFIT PROPERTY.—Subsection (f) of section 179D of the Internal Revenue Code of 1986 (as amended by this section), and any other provision of such section solely for purposes of applying such subsection, shall apply to property placed in service after December 31, 2022 (in taxable years ending after such date) if such property is placed in service pursuant to qualified retrofit plan (within the meaning of such section) established after such date.”

##### EFFECTIVE DATE OF 2020 AMENDMENT

Pub. L. 116-260, div. EE, title I, §102(d), Dec. 27, 2020, 134 Stat. 3040, provided that: “The amendments made by this section [amending this section] shall apply to property placed in service after December 31, 2020.”

##### EFFECTIVE DATE OF 2019 AMENDMENT

Pub. L. 116-94, div. Q, title I, §131(b), Dec. 20, 2019, 133 Stat. 3232, provided that: “The amendment made by subsection (a) [amending this section] shall apply to property placed in service after December 31, 2017.”

##### EFFECTIVE DATE OF 2018 AMENDMENT

Pub. L. 115-123, div. D, title I, §40413(b), Feb. 9, 2018, 132 Stat. 151, provided that: “The amendment made by this section [amending this section] shall apply to property placed in service after December 31, 2016.”

##### EFFECTIVE DATE OF 2015 AMENDMENT

Pub. L. 114-113, div. Q, title I, §190(b), Dec. 18, 2015, 129 Stat. 3075, provided that: “The amendment made by subsection (a) [amending this section] shall apply to property placed in service after December 31, 2014.”

Pub. L. 114-113, div. Q, title III, §341(c), Dec. 18, 2015, 129 Stat. 3113, provided that: “The amendments made by this subsection [probably means this section, amending this section] shall apply to property placed in service after December 31, 2015.”

##### EFFECTIVE DATE OF 2014 AMENDMENT

Pub. L. 113-295, div. A, title I, §158(b), Dec. 19, 2014, 128 Stat. 4022, provided that: “The amendment made by this section [amending this section] shall apply to property placed in service after December 31, 2013.”

##### EFFECTIVE DATE

Pub. L. 109-58, title XIII, §1331(d), Aug. 8, 2005, 119 Stat. 1024, provided that: “The amendments made by

this section [enacting this section and amending sections 263, 312, 1016, 1245, and 1250 of this title] shall apply to property placed in service after December 31, 2005.”

#### § 179E. Election to expense advanced mine safety equipment

##### (a) Treatment as expenses

A taxpayer may elect to treat 50 percent of the cost of any qualified advanced mine safety equipment property as an expense which is not chargeable to capital account. Any cost so treated shall be allowed as a deduction for the taxable year in which the qualified advanced mine safety equipment property is placed in service.

##### (b) Election

###### (1) In general

An election under this section for any taxable year shall be made on the taxpayer’s return of the tax imposed by this chapter for the taxable year. Such election shall specify the advanced mine safety equipment property to which the election applies and shall be made in such manner as the Secretary may by regulations prescribe.

###### (2) Election irrevocable

Any election made under this section may not be revoked except with the consent of the Secretary.

##### (c) Qualified advanced mine safety equipment property

For purposes of this section, the term “qualified advanced mine safety equipment property” means any advanced mine safety equipment property for use in any underground mine located in the United States—

(1) the original use of which commences with the taxpayer, and

(2) which is placed in service by the taxpayer after the date of the enactment of this section.

##### (d) Advanced mine safety equipment property

For purposes of this section, the term “advanced mine safety equipment property” means any of the following:

(1) Emergency communication technology or device which is used to allow a miner to maintain constant communication with an individual who is not in the mine.

(2) Electronic identification and location device which allows an individual who is not in the mine to track at all times the movements and location of miners working in or at the mine.

(3) Emergency oxygen-generating, self-rescue device which provides oxygen for at least 90 minutes.

(4) Pre-positioned supplies of oxygen which (in combination with self-rescue devices) can be used to provide each miner on a shift, in the event of an accident or other event which traps the miner in the mine or otherwise necessitates the use of such a self-rescue device, the ability to survive for at least 48 hours.

(5) Comprehensive atmospheric monitoring system which monitors the levels of carbon monoxide, methane, and oxygen that are present in all areas of the mine and which can detect smoke in the case of a fire in a mine.