DEPARTMENT OF TRANSPORTATION
MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C. 20590

[4910-60-M]

[Docket No. HM-143; Amdt. Nos. 172-48, 173-124, 174-34, 175-8, 176-7, 177-45]

BLASTING AGENTS

Final Rules

AGENCY: Materials Transportation Bureau, Research and Special Programs Administration, DOT.

ACTION: Final Rule.

SUMMARY: The purpose of this rule is to amend various sections of the regulations to:

1. Add a new shipping name, Blasting agent, n.o.s., a new class, Blasting agent, and a definition and test criteria for blasting agents.
2. Remove the shipping name Nitro carbo nitrate from the regulations and add two entries for Ammonium nitrate fuel oil mixtures.
3. Prescribe packaging requirements for Blasting agents; and
4. Prescribe a label and a placard for Blasting agents.

The inclusion of a blasting agent description and class will contribute to increased safety in transportation because some materials now shipped as nitro carbo nitrates (oxidizing materi-) present a potential explosive zard. Establishing a blasting agent ass will bring the DOT regulations into closer conformity with Mining Enforcement and Safety Administration (MESA) and Bureau of Alcohol, Tobacco, and Firearms (BATF) regulations, which now incorporate definitions of blasting agents.

EFFECTIVE DATE: August 15, 1979; however, shipments may be prepared, offered for transportation, and transported in accordance with these amendments beginning March 15, 1979.

FOR FURTHER INFORMATION CONTACT:

Alan I. Roberts, Associate Director for Hazardous Materials Regulation, Materials Transportation Bureau, 2100 Second Street SW., Washington, D.C. 20590, 202-426-0656.

SUPPLEMENTARY INFORMATION: The Office of Hazardous Materials Operations published a notice of proposed rulemaking under docket HM-143 on November 26, 1976 (41 FR 52083; Notice 76-11). At the request of one of the major producers of nitro carbo nitrates, a public conference was held on September 23, 1977.

The principal drafters of this document are Charles W. Schultz, Technical Services Branch, Office of Hazardous Materials Regulation, and George W. Tenley, Office of the Chief Counsel, Research and Special Programs Administration.

Comments on the notice were received from a total of twenty-one organizations and persons. All comments have been carefully considered and the significant comments are discussed as they apply to the sections appearing in the notice.

Section 172.101 Hazardous Materials Table: One commenter objected to the n.o.s. following the blasting agent description because he said it implies that there are other blasting agents which are specifically named. The Materials Transportation Bureau (MTB) does not agree since it is adding the shipping name, ammonium nitrate-fuel oil mixtures to the table and contemplates that other specific descriptions for blasting agents will be added in the future.

Two commenters said that the description nitro carbo nitrate (NCN) is a more specific name than blasting agent and recommended that the shipping description NCN be retained. The MTB believes that this description should no longer be used since it has been so closely associated with the Oxidizer class for many years and has only been recognized as a description by other agencies because it is contained in the DOT regulations. Also the term is considered so vague that its continued use would cause considerable confusion in light of the new test criteria being adopted in this amendment for classification purposes. In consideration of the fact that a very large volume of the materials to be classed as blasting agents are ammonium nitrate-fuel oil mixtures, a shipping description is being provided for such mixtures, as an alternative to the Blasting agents, n.o.s., description, if they meet the definition and test procedures specified for blasting agents.

Concerning the commenters' argument that such materials be retained in the Oxidizer class, the MTB acknowledges the good shipping experience of these materials in the past. However, they do present a potential explosive hazard, though very insensitive to fire and shock, and this potential risk should be recognized through appropriate classification and resultant labeling and placarding. Therefore, the MTB does not agree that such materials should be retained in the Oxidizer class.

Section 172.411 Explosive A, Explosive B, Explosive C and Blasting Agent labels: One commenter stated that the colors prescribed for the blasting agent label associated these products with explosives. He also said "The label * * * doesn't contain the Hazard Symbol * * * a direct contradiction to OHM's reasoning for symbols as directed in HM 103-112." The MTB considers blasting agents to be very insensitive explosives and, as stated in the preamble to the notice, the reason no symbol is displayed is due to the fact that blasting agents present a much lower level of hazard in terms of their detonation potential than Class A and Class B explosives for which an "exploding bomb" is displayed on the label. This is analogous to the labeling system recommended by the United Nations where no hazard symbol is required on labels for Division 1.5 materials.

Section 172.504 General placarding requirements: Two commenters pointed out that no provisions had been made indicating under what conditions the blasting agent placard will be required. Blasting agents will be placed in Table 2 immediately following Class C explosives.

Section 172.524 Blasting Agents placard: The MTB considers that a BLASTING AGENT placard rather than an OXIDIZER placard is necessary to alert emergency personnel that an explosion is possible if blasting agents are involved in large fires.

Five organizations commented on the proposed placards for blasting agents. The main criticisms were that the placards are too small and of the wrong color and shape. The blasting agent placard is similar in these respects to those required for explosives and it would be incongruous to require a larger placard for a material having less potential hazard than Class A and Class B explosives. If one of the placards for explosives or blasting agents is changed, all would have to be changed, which is beyond the scope of this rulemaking. The MTB, however, will be initiating a proceeding during 1979 to evaluate overall experience with the new placard system adopted under Docket HM-103/112 in 1976 and review all related questions and concerns including those raised in this rulemaking. The Bureau recognizes the concerns raised by those commenters objecting to addition of a new placard. Offsetting this is the fact that virtually all of the proponents of this rulemaking, the shippers of blasting agents, will be required to placard rail cars and freight containers, and will be required to give BLASTING AGENT placards to motor carriers if their ve-

hicles are not equipped with such placards. Also, the Bureau is not making compliance with this amendment mandatory for approximately eight months following its publication to allow sufficient time for the making of necessary adjustments in shipper/carrier programs.

Section 173.86 New explosives and blasting agent definitions; approval and notification: Three commenters objected to placing blasting agents in this section, recommended that the entire section be moved to a new § 173.52a, and that changes be made to the section. While § 173.86 has been located in the part of the regulations governing Class A explosives for many years, it has always been applicable to all classes of explosives. The proposals to move it to another section will be considered in a future rulemaking action involving recodification.

Section 173.96 (now 173.114a) Blasting agents. (a) Definition of blasting agent. Six organizations commented on the proposed definition of a blasting agent.

One commenter stated that the proposed definition was not really a definition because it does not specify physical properties or chemical composition and that a definition should not be based on a negative test. The present definition of nitro carbo nitrate (NCN), to which the commenter apparently does subscribe, also does not specify any physical properties and addresses chemical composition in only the most general terms. The NCN definition also incorporates a negative test—i.e., the material may not detonate when tested with a number 8 blasting cap. The physical properties and chemical compositions of materials which will be included in the blasting agent description are of such great variety that it would be impossible to describe them in a regulation of any reasonable length.

This same commenter objected to the phrase "* * * very little probability of initiation to explosion or of transition from burning to detonation under conditions incident to transportation * * *." It was further stated that "the railroad industry firmly believes that MTB and the commodity manufacturer must be certain that a material will not detonate before it is classed as nondetonable." This appears to be a rather paradoxical comment since his opening comments indicated that the overall proposal "* * * is neither wise nor necessary." Presently, NCNs are transported as oxidizing materials and are known to be detonable under certain conditions. They are designed to function by detonation and would be of no commercial value if they were nondetonable.

Two commenters objected to the fact that the definition did not include a prohibition against ingredients which are explosives as defined in the regulations. The MTB believes that such a prohibition is neither necessary nor desirable. There are many explosive formulations, which contain no explosive ingredients, which are far more hazardous than those containing such ingredients. An obvious example of this is explosives composed of chlorates and organic materials compared with commercial dynamite which contains nitroglycerin. The former are so hazardous and unpredictable that they are no longer produced as commercial explosives in the United States while dynamite has been used commercially for many years and is still being used in some applications.

Several commenters were concerned that the ingredients in blasting agents containing explosives might separate out during storage. Any separation of components of the blasting agents which occurs in the packaging is a localized change in composition and character of the material and the product may not be offered for transportation unless it has been established that the separation will not result in an increased level of hazard.

One commenter expressed concern about the behavior of blasting agents containing explosive ingredients in a fire. The rule requires that the largest commercial package (up to 200 kg) be subjected to a fire test. Any instability under these conditions should be detected in this test.

Four commenters objected to placing blasting agents in § 173.96 which is under the heading CLASS B EXPLOSIVES; DEFINITIONS. The commenters interpreted this as implying that the MTB was considering blasting agents to be similar to Class B explosives. There was no intent by the MTB to relate blasting agents to Class B explosives since such a relationship would be inappropriate in most instances.

One commenter suggested that blasting agents be placed in Subpart E of Part 173. This subpart covers flammable solids, oxidizers and organic peroxides. Another commenter suggested that blasting agents be placed in a new § 173.114a. The MTB believes that the hazards of blasting agents in transportation are more closely associated with those of explosives than with flammable solids and oxidizing materials and is placing the entry in a new § 173.114a until the codification efforts are completed.

Several commenters stated that the proposed definition appeared to restrict blasting agents to those materials used in the mining industry. The definition has been reworded to correct this impression.

Section 173.96(b) (now 173.114a(b)) Tests: There were many comments on the proposed tests. There was almost unanimous objection to the card-gap test. Tests conducted by the manufacturers of blasting agents and by the U.S. Bureau of Mines have demonstrated that the card-gap test described in DOD TB 700-2 (May 19, 1967) is not suitable for most materials which would be described as blasting agents. Tests conducted at the U.S. Bureau of Mines also showed that a meaningful card-gap test, the blasting cap test, and the bullet (projectile) test all gave the same results as far as potential transportation hazards are concerned. Therefore, the rifle bullet test and the card-gap test are being adopted. Tests also established that the lead witness cylinder, presently described in Note 1 to § 173.53 is a more sensitive indicator of detonation than the detonating cord proposed in the notice. Since the use of the detonating cord witness might allow some materials to be classed as blasting agents which would not pass the blasting cap test if a lead witness cylinder were employed, the blasting cap test has been modified to require the lead cylinder witness. Several commenters said that the 500 gram test portion proposed in the thermal sensitivity test is too large for practicable testing. The MTB agrees and has reduced the sample size to 50 grams.

Section 173.96(c)(2) (now 173.114a(c)(2)). There were many objections to the positive statement that blasting agents may not be transported in portable tanks, cargo tanks or tank cars. The MTB believes that this prohibition is necessary for safety in transportation because:

1. The largest package required to be tested in a fire under the rule is 200 kg. The results of a test on this quantity do not necessarily indicate what would happen if a 3000 gallon tank of the same material was involved in a fire. In certain instances, the MTB might want to require additional testing before authorizing the transport of blasting agents in bulk.

2. The initiation to explosion of high energy liquids in bulk is not completely understood. The MTB might require special testing of a highly fluid blasting agent before allowing bulk transport.

Section 174.81 (Amended). This paragraph has been changed to place blasting agents after Class C explosives in the loading and storage table.

Section 175.78 Stowage compatibility of cargo. One commenter noted that there was nothing in the air carrier regulations to prevent blasting agents from being loaded in contact with or close proximity to special fireworks and railroad torpedoes. This prohibition has been added.

Section 175.320 Cargo-only aircraft; only means of transportation.

The table has been amended to replace "oxidizing materials" and "Nitrocarbonitrate" with blasting agent, n.o.s. The reason for this is that nitrocarbonitrates are now classed as oxidizers and the restrictions applying to nitrocarbonitrate must now be applied to blasting agents. This change was overlooked in the notice.

Section 176.83 (a) and (b): A new entry, blasting agents, n.o.s., has been added to Table I under item 17.

Blasting Agents has been added after Explosives C in Table II.

Section 177.848(a): This paragrap[h] has been changed to place blasti[ng] agents after Class C explosives in th[e] loading and storage table.

In consideration of the foregoing, 49 CFR Parts 172, 173, 174, 175, 176 and 177 are amended as follows:

PART 172—HAZARDOUS MATERIALS TABLE AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

1. Section 172.101 is amended by deleting the entry "nitro carbo nitrate," and adding the following entries to read as follows:

§ 172.101 Hazardous Materials Table.

(1)	(2)	(3)	(4)	(5) Packaging		Maximum net quantity in one package		(7) Water shipments		
*/ W/ A	Hazardous materials descriptions and proper shipping names	Hazard class	Labels(s) required (if not excepted)	(a) Exception	(b) Specific requirements	(a) Passenger carrying aircraft or railcar	(b) Cargo only aircraft	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirement
	(Add)									
	Blasting Agent, n.o.s.	Blasting agent	Blasting agent	None	173.114a	Forbidden	100 lb	1, 2	1, 2	
	Ammonium nitrate - fuel oil mixtures see Blasting agent									
	Ammonium nitrate - fuel oil mixtures see High explosive									

2. In § 172.411 the Heading is revised and new paragraphs (c) and (d) are added to read as follows:

§ 172.411 EXPLOSIVE A, EXPLOSIVE B, EXPLOSIVE C, and BLASTING AGENTS labels.

* * * * *

(c) Except for size and color, the BLASTING AGENT label must be as follows:

(d) In addition to complying with § 172.407, the BLASTING AGENT label must be orange. The printing must be black.

3. In § 172.504 Table 2 is amended by adding the following entry immediately following "Class C explosives":

Blasting agents	BLASTING AGENT"

4. Section 172.524 EXPLOSIVES B placard is redesignated § 172.523; a new § 172.524 is added to read as follows:

§ 172.524 BLASTING AGENTS placard.

(a) Except for size and color, the BLASTING AGENTS placard must be as follows:

(b) In addition to meeting the requirements of this part, the BLASTING AGENTS placard must be orange with a ½-inch (12.7 mm) white outer border. The printing must be black.

5. Appendix B to Part 172 is amended by adding a new paragraph (c)(19) to read as follows:

(c) * * *

(19) *BLASTING AGENTS placard.* The words BLASTING AGENTS must be across the center area of the placard and made with letters 1⅞ inches (47.6 mm) high with a 5/16-inch (7.9 mm) stroke.

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

6. In § 173.86 the Heading is revised to read as follows:

§ 173.86 New explosives and blasting agents, definitions; approval and notification.

* * * * *

7. Section 173.114a is added to read as follows:

§ 173.114a Blasting agents.

(a) *Definition of a blasting agent.* A blasting agent is a material designed for blasting which has been tested in accordance with paragraph (b) of this section, and found to be so insensitive that there is very little probability of accidental initiation to explosion or of transition from deflagration to detonation.

(b) *Tests.* Materials which are to be described as Blasting agents, n.o.s. for purposes of transportation, must be tested in accordance with this paragraph.

(1) Blasting cap sensitivity test.

(i) The container used for the blasting agent sample must be cylindrical, having a diameter of 3⅝ inches and a length of 6⅝ inches. The container must provide essentially no confinement.

(ii) The container must be filled with the sample. Solid materials must be packed to the same filling density as they will be packed in the shipping container. The temperature of the sample must be between 70°F. and 75°F. If it is difficult to achieve an appropriate filling density in the test container, e.g., auger packed products, it may be necessary to auger fill a special container for the test.

(iii) The filled container must be placed on a solid lead cylinder 4 inches long by 2 inches diameter which must, in turn, be placed upright on a firm surface.

(iv) A commerical No. 8 fuse blasting cap or electric blasting cap must be inserted in the center of the top of the sample for the full length of the cap. A No. 8 commercial cap means a cap which contains 0.40-0.45 grams of PETN base charge pressed into an aluminum shell with bottom thickness not to exceed 0.03 inches to a specific gravity of not less than 1.4 g/cc and primed with standard weights of primer, in accordance with the manufacturer's specifications.

(v) The blasting cap must be initiated from a safe position.

(vi) If the lead block is compressed ⅛-inch or more, the material is considered to have detonated.

(vii) The test must be conducted three times or until detonation occurs, whichever comes first.

(viii) A material which detonates in any trial may not be described as Blasting agent, n.o.s., for purposes of transportation.

(2) Differential thermal analysis test.

(i) This test must be conducted using a standard, commercially produced, differential thermal analysis instrument or a laboratory-constructed apparatus which gives comparable results.

(ii) The portion of the blasting agent tested must be representative of the complete mixture.

(iii) The test must be conducted three times. If the first exotherm exhibited by the material in any trial is less than 212°F., it may not be described as a Blasting agent n.o.s. for purposes of transportation.

(3) Thermal stability test.

(i) At least 50 grams of the material must be placed in a loosely covered glass vessel and maintained at 167°F. for 48 consecutive hours.

(ii) A material which ignites or evidences decomposition by fumes, discoloration, or other characteristics may not be described as Blasting agent, n.o.s., for purposes of transportation.

(4) Electrostatic sensitivity test.

(i) The apparatus must be designed so that an electrostatic spark can be caused to jump from a pointed electrode to a metal plate which also serves as a sample holder.

(ii) Ten milligrams of material must be used for each test. The portion of the blasting agent tested must be representative of the complete mixture.

(iii) If the test portion flames, smolders, or glows from the spark, the material is considered to have ignited.

(iv) The test must be conducted three times or until ignition occurs, whichever comes first.

(v) A material which ignites in any trial when exposed to a spark of 0.006 joules delivered from a 0.002 to 0.004 micro-farad capacitor may not be described as a Blasting agent, n.o.s., for purposes of transportation.

(5) Impact sensitivity test.

(i) Impact tests must be conducted in the Bureau of Explosives Impact Tester.

(ii) The tests must be run on ten milligram samples. The test portions must be representative of the complete mixture.

(iii) The drop height used in all trials must be ten inches.

(iv) The test must be conducted ten times or until an explosion occurs, whichever comes first. An explosion is evidenced by flame or flame and noise. The production of smoke alone is not evidence of explosion.

(v) A material which explodes in any trial may not be described as Blasting agent, n.o.s., for purposes of transportation.

(6) Fire test.

(i) The largest package (not to exceed 200 kg) of each type to be offered for transportation must be placed on incombustible supports and subjected to a fire.

(ii) The fuel used may be kerosene-soaked wood, flammable or combustible liquid, or flammable gas.

(iii) The fire shall be large enough to engulf the bottom of the package. The flames must reach at least half way up on all sides.

(iv) The duration of the fire must be such as to cause the material in the package to burn or fume off completely, except for substances such as the oxides of aluminum or iron which are incombustible.

(v) Explosion is evidenced by a loud noise and the projection of fragments from the fire area.

(vi) This test must be conducted at least once.

(vii) Any material which explodes in this test may not be described as Blasting agent, n.o.s., for purposes of transportation.

(c) *Packaging for blasting agents.* (1) Each package of blasting agents when prepared for shipment must comply with the applicable requirements of § 173.24 and pass one of the following tests:

(i) Rigid packages (e.g., boxes and drums), prepared as for shipment, must be capable of withstanding a four-foot drop onto solid concrete so as to strike the most vulnerable point on the package without rupture or any loss of contents.

(ii) Non-rigid packages (e.g., tubes and bags), prepared as for shipment, must be capable of withstanding three four-foot drops onto solid concrete without rupture or any loss of contents.

(3) Blasting agents shall not be transported in portable tanks, cargo tanks, or tank cars except in accordance with the terms of specific exemptions issued by the Office of Hazardous Materials Regulation.

(d) See §§ 174.81, 176.80, and 177.848 of this subchapter for loading requirements.

§ 173.182 [Amended]

8. In § 173.182 paragraph (a) is amended by deleting "nitro carbo nitrate (see Note 1)" in the fourth and fifth lines from the end of the paragraph; Note 1 and paragraph (c) are deleted.

PART 174—CARRIAGE BY RAIL

§ 174.81 [Amended]

9. In § 174.81 paragraph (a) Table is amended by adding "Blasting agent" as the first entry under OTHER HAZARDOUS MATERIALS and placing an "X" in the columns headed, "Initiating and primary explosives," and "Fireworks, special or railway torpedoes." Note e following the table is amended by striking the words "nitrocarbonitrate" in the first line and replacing with "blasting agent, n.o.s."

PART 175—CARRIAGE BY AIRCRAFT

10. Section 175.78 The present text is designated paragraph (a); paragraph (b) is added to read as follows:

§ 175.78 Stowage compatibility of cargo.

* * * * *

(b) No person may stow a package of blasting agents, n.o.s., on an aircraft next to, or in a position that will allow contact with, a package of special fireworks or railway torpedoes.

11. In § 175.320 paragraph (a), the Table is amended by revising the following entries:

§ 175.320 Cargo-only aircraft; only means of transportation.

(a) * * *

Material description	Class	Conditions
Gasoline	Flammable liquid	Permitted in metal drums having rated capacities of 55 gal. or less. May not be transported in the same aircraft with materials classed as class A, B, or C explosives, blasting agents, corrosive materials or oxidizing materials. Permitted in installed tanks each having a capacity of more than 110 gal. subject to the conditions specified in paragraph (c) of this section.
High explosives	Class A explosives	Limited to explosives to be used for blasting. Permitted only when no other cargo is aboard the aircraft or when being transported in the same aircraft with an authorized shipment of any 1 or more of the following materials to be used for blasting: Blasting agent, n.o.s. Cordeau detonant fuse. Propellant explosive (solid) class B (water gels only). Propellant explosive (liquid) class B (water gels only).
Oil, n.o.s.; petroleum oil; or petroleum oil, n.o.s.	.....	.....
	Flammable liquid	Permitted in metal drums having rated capacities of 55 gal. or less. May not be transported in the same aircraft with materials classed as class A, B, or C explosives, blasting agents, corrosive materials, or oxidizing materials. Permitted in installed tanks each having a capacity of more than 110 gal. subject to the conditions specified in para. (c) of this section.

PART 176—CARRIAGE BY VESSEL

§ 176.83 [Amended]

12. In § 176.83 paragraph (c)(3)(ii), Table I is amended by adding a new number 17 to read as follows: "17 Blasting agents." An "X" is added in column 3, and column 10 opposite entry number 17. Table II is amended by changing the third line to read: "Explosives C, Blasting Agents"; the remainder of the columns remain the same.

13. Subpart J Heading is revised to read as follows:

Subpart J—Detailed Requirements for Flammable Solids, Oxidizers, Organic Peroxides, and Blasting Agents

14. In § 176.410 the Heading and paragraph (a)(1) are revised; the introductory text of paragraphs (c), (d), and (e) and paragraph (e)(1) are amended by deleting the words "nitro carbo nitrate" and adding "blasting agents" in place thereof:

§ 176.410 Blasting agents and ammonium nitrate.

(a) * * *

(1) Blasting agents.

* * * * *

15. In § 176.415 the Heading is revised; paragraphs (a)(2), (c)(1) and (c)(2) are amended by deleting "nitro carbo nitrate" and inserting "blasting agents" in place thereof:

§ 176.415 Permit requirements for blasting agents and certain ammonium nitrates.

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PART 177—CARRIAGE BY PUBLIC HIGHWAY

§ 177.848 [Amended]

16. In § 177.848 paragraph (a) Table is amended by adding "Blasting agents" as the last entry under Class C Explosives and placing an "X" in the columns headed, "Initiating and primary explosives * * *," and "Fireworks, special or railway torpedoes." Note e following the table is amended by striking the words "nitro carbo nitrate" in the first line and replacing with "blasting agent, n.o.s."

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53(e).)

NOTE.—The Materials Transportation Bureau has determined that this final rule will not result in a major economic impact under the terms of Executive Order 12044 and DOT implementing procedures (43 FR 9582). A regulatory evaluation is available in the docket.

Issued in Washington, D.C., on November 30, 1978.

L. D. SANTMAN
Director, Materials Transportation Bureau.

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