

December 13, 2006

In The Matter of
Phelps Dodge Bagdad, Inc.
Phelps Dodge Bagdad, Inc. Mine
I.D. No. 02-00137

PETITION FOR MODIFICATION

Docket No. M-2005-005-M

On August 2, 2005, a petition was filed by Phelps Dodge Bagdad, Inc., seeking a modification of the application of 30 C.F.R. § 56.6309(b) to its Phelps Dodge Bagdad, Inc., Mine ("Bagdad Mine") located in Bagdad, Yavapai County, Arizona. The Petitioner alleged that the alternative method outlined in the petition would at all times guarantee no less than the same measure of protection for miners as afforded by the standard.

Standard 56.6309 Fuel oil requirements for ANFO, provides:

- (a) Liquid hydrocarbon fuels with flash points lower than that of No. 2 diesel oil (125 degrees Fahrenheit) shall not be used to prepare ammonium nitrate-fuel oil, except that diesel fuels with flash points no lower than 100 degrees Fahrenheit may be used at ambient air temperatures below 45 degrees Fahrenheit.
- (b) Waste oil, including crankcase oil, shall not be used to prepare ammonium nitrate-fuel oil.

MSHA investigators conducted an investigation relevant to the merits of the petition and filed a report of their findings with the Administrator for Metal and Nonmetal Mine Safety and Health. After a careful review of the entire record, including the petition and MSHA's investigative report, a Proposed Decision and Order ("PDO") was issued on June 2, 2006, granting a modification of the application of 30 C.F.R. 56.6309(b) to the Bagdad Mine. During the review period for the PDO, on June 21, 2006 a Bagdad Mine official contacted MSHA asking that technical clarifications be made in the requirements of the granted Petition. After reviewing these comments, this PDO substantially incorporates the suggested clarifications.

FINDING OF FACT AND CONCLUSION OF LAW

The alternative method approved in the June 2, 2006, Order uses a blending plant which mixes recycled oil and diesel fuel oil on demand (as required) basis. There is no blended oil tank at the site. The system incorporates three tanks: one containing diesel fuel and two containing recycled filtered oil. When a recycled oil tank is full, the tank is

secured to prevent any recycled oil from being added until it is almost empty. The alternative method set forth in this revised PDO will, at all times, guarantee no less than

the same measure of protection afforded miners under 30 C.F.R. § 56.6309(b) by ensuring that only waste oils meeting certain conditions will be mixed with diesel fuel and prills to form an ammonium nitrate fuel oil (ANFO) blasting agent. Compliance with this PDO entitles Phelps Dodge Bagdad, Inc., to a modification of the application of 30 C.F.R. § 56.6309(b) to its Bagdad Mine.

ORDER

Wherefore, pursuant to the authority delegated by the Secretary of Labor to the Administrator for Metal and Nonmetal Mine Safety and Health and pursuant to Section 101(c) of the Federal Mine Safety and Health Act of 1977, 30 U.S.C. § 811(c), it is ordered that a modification of the application of 30 C.F.R. § 56.6309(b) to the Bagdad Mine, as it pertains to utilizing recycled oil in preparing ANFO blasting agents is hereby:

GRANTED, conditioned upon compliance with the following requirements:

1. Only used waste petroleum-based, lubrication oil from diesel equipment at the Bagdad Mine shall be used for blending with diesel fuel and conventional prills to create ANFO.
2. Prior to storage in tank(s), the used oil shall be filtered to ensure that it has no larger particle size than 150 microns. Once filtered, the "used oil" becomes "recycled oil."
3. The recycled oil shall not be modified by heating, the addition of additives, or in any other way that could change the relevant properties of the recycled oil. High viscosity oils of 90 weight (90W) or above shall be restricted to less than 10% of the total quantity of the recycled oil.
4. The following tests for ethylene glycol and water shall be conducted on each tank of recycled oil:
 - (a) The recycled oil shall be checked for the presence of ethylene glycol and water prior to blending with the diesel fuel. If present, water or ethylene glycol shall be drained prior to mixing the recycled oil with the diesel fuel.
 - (b) Tests for ethylene glycol and water content shall be made by drawing a sample from the recycled oil tank at no less than 30 day intervals. If either substance is observed by vision or tests of the recycled oil, use of the recycled oil shall be discontinued until the ethylene glycol and/or water is drained from the recycled oil.

5. The recycled oil shall not exceed 50% of the mixture, by volume, when blended with diesel fuel.
6. A representative sample blend of a tank of recycled oil shall be prepared and subjected to the following tests. The tests shall represent the entire tank of recycled oil as long as no additional recycled oil or other substances are added to the tank. Also, any alteration of the blend ratio of recycled oil to diesel requires a new series of tests.
 - (a) The Petitioner shall conduct one test for: (1) sensitivity of the blended oil mixture and ammonium nitrate prills to a No. 8 strength USA detonator in accordance with UN Test 15.4.1 test 5(a) which is attached; and (2) cap sensitivity using a Number 8 USA cap as the detonator which shall be the standard for this test.
 - (b) A flash point test shall be conducted of the mixture using the open or closed cup ASTM method. The mixture shall have a minimum flash point of 100° Fahrenheit when the ambient air temperature is below 45° Fahrenheit. A minimum flash point of 125° Fahrenheit shall be maintained if the ambient air temperature is above 45° Fahrenheit.
7. A sample of each tank of recycled oil shall be called "blended oil" when blended with diesel fuel. The mixture will be tested in accordance with the following provisions:
 - (a) Viscosity tests of the blended oil mixture shall be taken at ambient outside temperatures before it is mixed with prills. Use of the blended oil shall be suspended when it becomes too viscous to obtain proper absorption, at least six (6) percent fuel by weight, in the prills. Additional non-recycled oil may be added to the blended oil and thoroughly mixed to obtain the proper absorption;
 - (b) During the first thirty (30) days of blended oil use in the ANFO mixture, the Petitioner shall perform one "glass jar test" a day for each truck used that day to load drill holes for blasting to ensure that the oil has been appropriately absorbed. A copy of the "glass jar test" procedure and guidelines is attached to this order.
 - (c) If the results of the "glass jar" tests performed during the initial 30-day period in Paragraph 7(b) fall within the parameters set forth in the attachment and are satisfactory to MSHA, one "glass jar test" for each tank of recycled oil shall be performed by the Petitioner thereafter. If unsatisfactory results occur, the MSHA District Manager shall be notified to determine if additional tests will be required.
8. A log shall be maintained at the Bagdad Mine for three (3) years following final use of the recycled or blended oil. The log shall be made available to MSHA

representatives and the miners' representative upon request. The following information shall be recorded in the log:

- (a) The date and quantity (in gallons) of recycled oil transferred to the recycled oil tank;
- (b) Condition No. 5 - the ratio of diesel fuel to recycled oil, the blending date, and the quantity (in gallons) of each ingredient;
- (c) Conditions No. 6 (a), (b) - sensitivity and blended oil/prill mixing test results including whether or not the sample detonated; test results in degrees Fahrenheit;
- (d) Conditions No. 7(a), (b) - viscosity test and absorption test results; "glass jar" test results; and
- (e) "Load" and "shot" reports using the blended oil and diesel fuel mixture, the date(s) of loading, the date(s) of blasting, quantities of ANFO or emulsions used, weather conditions, detonation methods, borehole size(s), the use of plastic hole liners, and the number and location of any misfires within the round (shot).

Applicable revisions or appropriate changes to the MSHA 30 C.F.R. Part 48 training plan regarding the conditions in this PDO shall be submitted to the MSHA District Manager for review and approval prior to training plan implementation by the Petitioner.

/s/ Felix A. Quintana

Felix A. Quintana
Administrator for Metal and Nonmetal
Mine Safety and Health

SECTION 15

UN Test 15 M-2005-005-M

TEST SERIES 5

15.1 Introduction

15.1.1 The results from three types of series 5 tests are used to answer the question "Is it a very insensitive explosive substance with a mass explosion hazard?" (box 21 of figure 10.3). The test types are:

- type 5 (a) - a shock test to determine the sensitivity to intense mechanical stimulus;
- type 5 (b) - thermal tests to determine the tendency of transition from deflagration to detonation; and
- type 5 (c) - a test to determine if a substance, when in large quantities, explodes when subjected to a large fire.

15.1.2 The question in box 21 is answered "No" if a "+" is obtained in any of the three test types i.e. a candidate for Division 1.5 should pass a test of each type.

15.2 Test methods

The test methods currently used are listed in table 15.1.

Table 15.1: TEST METHODS FOR TEST SERIES 5

Test code	Name of Test	Section
5 (a)	Cap sensitivity test */	15.4.1
5 (b) (i)	French DDT test	15.5.1
5 (b) (ii)	USA DDT test */	15.5.2
5 (b) (iii)	Deflagration to detonation test	15.5.3
5 (c)	External fire test for Division 1.5 */	15.6.1

*/ Recommended test

A test of each type should be performed.

15.3 Test conditions

15.3.1 As the density of the substance has an important effect on the results from type 5 (a) and 5 (b) tests, the density should be determined. The sample mass and density should always be recorded.

15.3.2 The tests should be performed at ambient temperature unless the substance is to be transported under conditions where it may change its physical state or density.

15.4 Series 5 type (a) test prescription

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UN Test 15 M-2005-005-M

15.4.1 Test 5 (a): Cap sensitivity test

15.4.1.1 Introduction

This shock test is used to determine the sensitiveness of a substance to intense mechanical stimulus.

15.4.1.2 Apparatus and materials

The experimental set up for the cap sensitivity test is shown in figures 15.4.1.1 and 15.4.1.2 and consists of a cardboard tube of minimum diameter 80 mm and length 160 mm with a maximum wall thickness of 1.5 mm, closed at the base with a membrane just sufficient to retain the sample. The intense mechanical stimulus is provided by a standard detonator (see appendix 1) inserted centrally in the top of the explosive in the tube to a depth equal to its length. Below the tube is the witness, which consists of a 1.0 mm thick 160 x 160 mm steel plate, placed on a steel ring of 50 mm height, 100 mm inner diameter and 3.5 mm wall thickness (see figure 15.4.1.1). Alternatively, a 51 mm diameter, 102 mm long cylinder of common (soft) lead (see figure 15.4.1.2) may be used. The apparatus is placed onto a square shaped steel plate of 25 mm thickness and 152 mm sides.

15.4.1.3 Procedure

The substance under test is filled into the tube in three equal increments. For free-flowing granular substances, the sample is consolidated by allowing the tube to fall vertically through a height of 50 mm after filling each increment. Gel-type substances are carefully packed to prevent adding voids. In all cases, the final density of the explosive in the tube should be as close as possible to its shipping density. For high-density cartridge explosives with a diameter greater than 80 mm, the original cartridge is used. When such original cartridges are inconveniently large for testing, a portion of the cartridge not less than 160 mm long may be cut off and used for testing. In such cases the detonator is inserted into the end in which the substance has not been disturbed by the action of cutting the cartridge. Those explosives whose sensitivity could be temperature dependent should be stored for at least 30 hours at a temperature of 28 - 30°C prior to testing. Explosives containing prilled ammonium nitrate, which have to be transported in regions of high ambient temperatures should be temperature cycled as follows: 25°C → 40°C → 25°C → 40°C → 25°C prior to testing. The tube is placed onto the witness and steel base plate and the standard detonator inserted centrally into the top of the explosive. The detonator is then fired from a safe position and the witness examined. The test is conducted three times unless detonation of the substance occurs.

15.4.1.4 Test criteria and method of assessing results

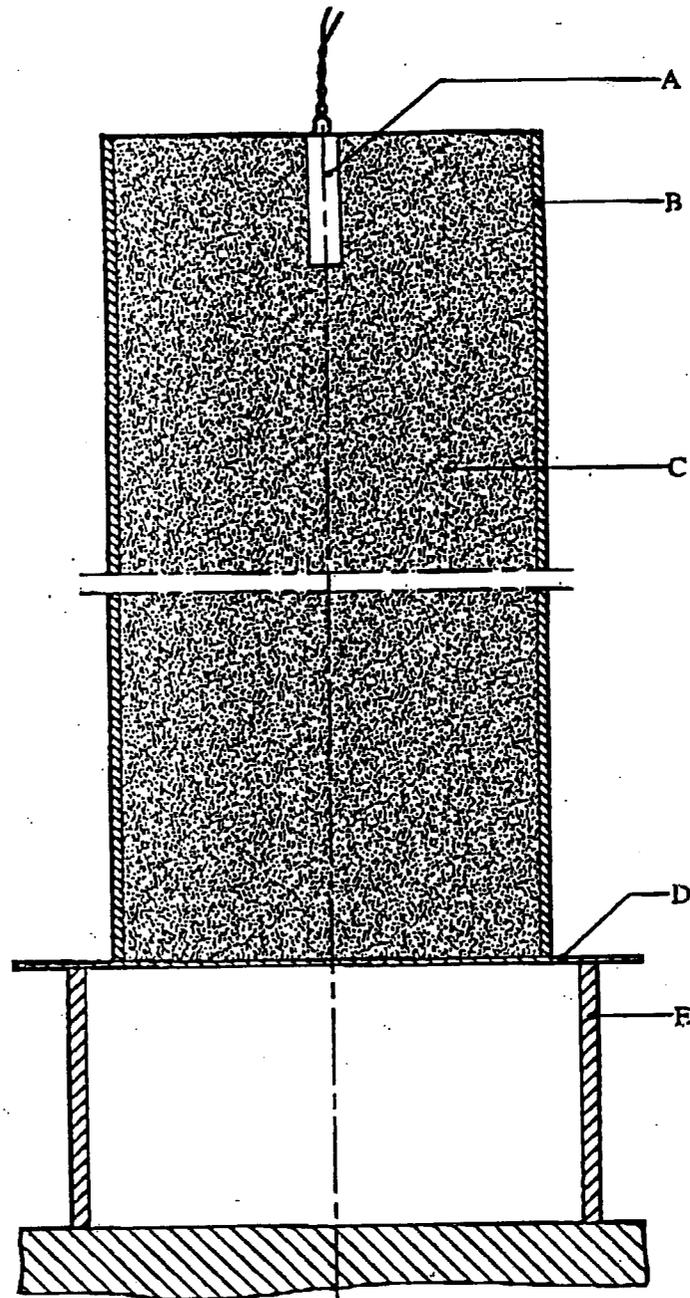
The result is considered "+" and the substance should not be classified in Division 1.5 if in any trial:

- (a) the witness plate is torn or otherwise penetrated (i.e. light is visible through the plate) - bulges, cracks or folds in the witness plate do not indicate cap sensitivity; or
- (b) the centre of the lead cylinder is compressed from its initial length by an amount of 3.2 mm greater.

Otherwise, the result is considered "—".

15.4.1.5 Examples of results

Substance	Density (kg/m ³)	Remarks	Result
Ammonium nitrate prills + fuel oil	840 - 900	Original	—
"	750 - 760	2 temperature cycles	+
Ammonium nitrate + TNT + combustible material	1030 - 1070	Original	+
Ammonium nitrate prills + DNT (on surface)	820 - 830	Original	—
"	800 - 830	30 hours at 40°C	+
Ammonium nitrate + DNT + combustible material	970 - 1030	Original	—
"	780 - 960	Original	+
Ammonium nitrate + combustible material	840 - 950	Original	—
"	620 - 840	Original	+
Ammonium nitrate + alkali nitrate + alkali-earth nitrate + Aluminium + water + combustible material	1300 - 1450	Original	—
"	1130 - 1220	Original	+
Ammonium nitrate + alkali nitrate + nitrate + TNT + Aluminium + water + combustible material	1500	Original	—
"	1130 - 1220	Original	+
Ammonium nitrate/methanol (90/10), prilled			—
Ammonium nitrate/nitromethane, 87/13			+
ANFO (94/6), prills			—
ANFO (94/6), 200 µm			+
TNT, granular			+



(A) Detonator
(C) Test substance
(E) Steel ring

(B) Tube fibreboard spirally wound plys
(D) Witness plate of normal structural steel

Figure 15.4.1.1: CAP SENSITIVITY TEST (using steel witness plate)

ANFO Mixing and Evaluation Test Method

A two jar procedure is used to mix recycled oil with prilled ammonium nitrate (AN) to observe the ammonium nitrate/fuel oil (ANFO) mixture for adequate absorption of the oil into the AN prills. At ambient temperature for which the ANFO mixture will be used, as a minimum 94.0 grams of AN is weighed into a 4 oz. (125 cc) jar and 6.0 grams of oil are placed in an 8 oz. (250 cc) jar. The jars are tall, wide-mouth glass jars selected to fit inside of each other. Each jar is sealed with a screw cap (with an inner seal), and put in a location to reach the ambient temperature for a period of about 6 hours. The oil jar is laid on its side.

After the ambient temperature conditioning indicated above, the oil jar is first rotated in the horizontal position to observe if the oil flows at the ambient test temperature and to coat the jar as much as possible. The AN is then poured into the oil jar, and is capped and shaken vigorously for one minute. In comparison the mixing time in an ANFO truck is about 30 to 45 seconds total for the vertical and horizontal augers. The degree of mixing (in the jar) is judged approximately as good, fair, or bad, depending on the number of prills which remained stuck on the glass by the oil. In a good mix the prills "rub" most of the oil off the glass, and only a few prills and the AN fines remained stuck to the glass. In a fair mix, up to about two square inches (13 cm²) of prills adhered to the glass. In a bad mix, more of the glass area remains covered, so that it is difficult to see inside the jar even with a light source held against the glass.