National Fire Protection Association
1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • www.nfpa.org

MEMORANDUM

TO: NFPA Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases

FROM: Joanne Goyette

DATE: February 3, 2011

SUBJ: NFPA 654 Proposed TIA No. 1020 **PRELIMINARY FINAL TC BALLOT RESULTS**

According to 5.4 in the NFPA Regs, the preliminary final results show this TIA **IS** achieving the ¾ majority vote needed on both Question 1 (**Technical Merit**) and Question 2 (**Emergency Nature**).

29 **Eligible to Vote**
1 **Not Returned** (D. Guaricci)

Technical Merit:

0 Abstentions
27 Agree (P. Hart, J. Koch, E. Ural, and S. Rodgers, w/comment)
1 Disagree (B. Chastain)

Emergency Nature:

0 Abstentions
27 Agree (E. Ural, w/comment)
1 Disagree (B. Chastain)

There are two criteria necessary to pass ballot [(1) affirmative ¾vote and (2) simple majority].

(1) The number of affirmative votes needed for the report to be published is **21**.
(29 eligible to vote - 1 not returned - 0 abstentions = 28 × 0.75 = 21)

(2) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required. This is the calculation for simple majority:
[29 eligible ÷ 2 = 14.5 = **(15)**]

Final ballot comments are attached for your review. Ballots received from alternate members are not included, unless the ballot from the principal member was not received.

Attachments

TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1020

To Revise Sections 6.1, 6.2.3, and 11.2.3 to the 2006 Edition of NFPA 654,
Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

Question 1: I agree with the **TECHNICAL MERITS** of the Proposed TIA to revise Sections 6.1, 6.2.3, and 11.2.3.

_____ **AGREE** ___✓___ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Please see attached explanation of Negative ballot related to "Technical Merits".

Question 2: I agree that the subject is of an **EMERGENCY NATURE.**

_____ **AGREE** ___✓___ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Please see attached explanation of Negative ballot related to "Emergency Nature"

J. Brice Chastain
Signature

J. Brice Chastain
Name (Please Print)

17 January 2011
Date

Please return the ballot on or before **Tuesday, January 18, 2011.**

PLEASE RETURN TO:
Joanne Goyette, Technical Projects Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169 **FAX: (617) 984-7110** **E-mail: jgovette@nfpa.org**

Georgia-Pacific (B. Chastain) NFPA 654 TIA No. 1020 Letter Ballot – Explanation of Negative Vote for Technical Merits

After performing a detailed analysis of the TIA, technical issues associated with low density dusts are apparent. This is the primary basis for my negative vote. An explanation follows.

Through simple math, it can be shown that when applying the total volume of dust accumulations criteria per NFPA 654 TIA 1020, Section 6.1.1.3(b) and assuming an even dust distribution over the entire area, the critical depth (in inches) at which a deflagration hazard is deemed to exist is independent of area. (See spreadsheet equations and rationale provided to the TC by email on 13Jan11)

More importantly, those dusts with low bulk density (<7.5 pounds per cubic foot, pcf) are unfairly penalized anytime the critical dust build-up is calculated at slightly above the 1/64 inch "trace" dust criterion.

When considering areas less than 20,000 sq.ft., it can be shown that when the bulk density = 7.5 pounds per cubic foot (pcf), the build-up from a total volume approach [per Section 6.1.1.3(b)] is $1/64^{th}$ of an inch. Per Section 6.1.1.1, a deflagration hazard would not be deemed to exist since the dust build up is <= $1/64^{th}$ of an inch.

However, if we considered a slightly lighter less dense dust, say 7.499 pcf, build-up from a total volume approach [per Section 6.1.1.3(b)] is $1/63^{rd}$ of an inch. Per Section 6.1.1.1, a deflagration hazard would be deemed to exist since the dust build up is >$1/64^{th}$ of an inch even though the bulk density is $1/1000^{th}$ less than the threshold criterion at which a deflagration hazard would not be deemed to exist.

Per the "Layer Depth Criterion" (LDC) for the 7.499 dust, the LDC is 5/16ths of an inch (reasonable). Yet its critical depth (D) in deflagration hazard determination (if dust were spread across the room) is $1/63^{rd}$ of an inch or 20 times less.

If I understand correctly, the $1/64^{th}$ of an inch threshold was essentially taken as one-half of the 1/32" threshold and is a threshold that reaches the limit of practical field measurement. The latter is based on heavier, 75-pcf dust, per Annex D of 654. If so, then 75 pcf dust enjoys a factor of 10 when considering whether or not a deflagration hazard exists per its calculated critical depth (i.e., $1/64^{th}$ inch divided by its critical depth, or 1/64" / 1/640"). Further, the 75-pcf dust's Critical Depth threshold is 50% of the LDC.

Lighter dusts have not been given the same "waiver". For the 7.499 pcf dust, its Critical Depth threshold is just 5% (0.05) of its LDC!

Since the 75 pcf dust enjoys a factor of 0.50 (50%), it appears all other dusts should have the same benefit. This discrepancy could easily be corrected by applying 50% of the calculated LDC when determining the lower threshold for dust layers that will not be

counted in determining whether an area is or is not a deflagration hazard. However, this discrepancy related to low density dusts (i.e. <7.5 pcf) is not addressed in the TIA.

Secondly, another reason for my negative vote: There does not appear to be any special provision or exemption for temporary upset conditions within the TIA. If the maximum permitted dust volume (LDC x 0.05 x A) is exceeded, regardless of whether due to routine operations or a process upset, that would be deemed a deflagration hazard. If the condition can be prevented from recurring through engineering or administrative controls, that remedial action presumably would be adequate unless perhaps a regulatory authority happened to visit the site at the time the non-compliant conditions existed. If the upset condition is recurring, then the TIA apparently would require deflagration venting of the entire building and possibly fire-resistant clothing for all employees in the building per the criteria in NFPA 2113. Temporary upset conditions are not adequately addressed in the proposed TIA and can be misinterpreted by both the user and regulatory authorities.

The TIA does not clearly address where the dust accumulations are located that could pose a deflagration hazard. With the TIA now proposing users look at and perform "volume measurements," and in the absence of a definition of "accumulation," is the combustible dust inside a closed piece of equipment (e.g., process or storage vessel) or transport vehicle within a facility an accumulation? How about the dust in an open bin or open transport vehicle? How about the dust from an upset condition that is temporarily collected in a dumpster or large corrugated paperboard container (rather than dumped on the floor)? If we exceed the volume threshold (LDC x 0.05 x A) for the dust in all these cases, do we actually intend for users to determine that these areas are dust deflagration hazard areas requiring provisions such as building deflagration venting and flame-resistant clothing?

Without upset conditions and dust accumulation locations (e.g. equipment, open bins/hoppers, spill collection containers, etc.) clearly addressed in the TIA, users will be unduly burdened with proving that these particular situations do not create a deflagration hazard area within the affected facility. If the TIA language is not clear on these situations, users must assume the worst possible interpretation from regulatory authorities.

Georgia-Pacific (B. Chastain) NFPA 654 TIA No. 1020 Letter Ballot – Explanation of Negative Vote for Emergency Nature:

During TC discussions, not one TC member, not even our insurance carriers on the committee, have been able to present one incident worldwide where compliance with the existing NFPA 654 2006 edition or even the 2000 edition has led to one loss as a result of users not applying the two editions' 5% criteria contained in both editions. Not one person is aware of any incident where the 5% area criteria was applied or not applied that lead to a personnel or facility loss. Is this TIA truly of an emergency nature? Where is the reported loss history related to this TIA? There is no loss history reported by TC members or anyone else. Therefore, how can one contend this TIA has any elements of an "emergency nature" that are required considered by NFPA? I cannot; and therefore vote negative for the TIA being of an "Emergency Nature."

TECHNICAL COMMITTEE LETTER BALLOT

PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1020

To Revise Sections 6.1, 6.2.3, and 11.2.3 to the 2006 Edition of NFPA 654,

Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

Question 1: I agree with the **TECHNICAL MERITS** of the Proposed TIA to revise Sections 6.1, 6.2.3, and 11.2.3.

XX **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Typo error exists on pg. 6. See attached. Editorial comments attached to improve the readability and improve understanding.

Question 2: I agree that the subject is of an **EMERGENCY NATURE.**

XX **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

Paul F. Hart
Signature

Paul F. Hart
Name (Please Print)

1/18/2011
Date

Please return the ballot on or before **Tuesday, January 18, 2011.**

PLEASE RETURN TO:
Joanne Goyette, Technical Projects Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169 **FAX: (617) 984-7110** **E-mail: jgoyette@nfpa.org**

Hart Ballot
TIA 1020

Should be '3'

Table A.6.1.1.3 Multiple Accumulation Areas for Example 4

Accumulation Location	Accumulation Area	Average Laye

Hart TIA 1025

6.1.1.1 Those portions of the process and facility where dust accumulations exist shall be evaluated to determine if a dust deflagration hazard exists, unless the dust layer depth is 1/64 in. (0.4 mm) or less or the underlying surface colors are readily discernible.

~~6.1.1.2 The layer depth criterion of 1/32 in. (0.8 mm) shall be permitted to be increased according to equation 6.1.1.2 for materials with bulk density less than 75 lb/ft3 (1200 kg/m3).~~
~~Layer Depth Criterion (in) = Eqn 6.6.1.1.2~~

6.1.1.32 A dust deflagration hazard shall be deemed to exist where dust clouds of a hazardous concentration exist or where any of the following conditions exist:
(1) For buildings or rooms with footprint areas smaller than 20,000 ft2 (1860 m2)
(a) the area of dust accumulations exceeding the layer depth criterion is greater than 5% of the footprint area, or
(b) the total volume of dust accumulations is greater than the layer depth criterion multiplied by 5% of the footprint area.
(2) For buildings or rooms with footprint areas greater than or equal to 20,000 ft2 (1860 m2)
(a) the area of dust accumulations exceeding the layer depth criterion is greater than 1000 ft2 (93 m2), or
(b) the total volume of dust accumulations is greater than the layer depth criterion multiplied by 1000 ft2
(93 m2).

6.1.1.3 The layer depth criterion ~~of~~ shall be 1/32 in. (0.8 mm). It shall be permitted to be increased according to equation 6.1.1.2 for materials with bulk density less than 75 lb/ft3 (1200 kg/m3).
Layer Depth Criterion (in) = Eqn 6.6.1.1.2

Revise all references in document based on renumbering above.

TECHNICAL COMMITTEE LETTER BALLOT

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__X__ **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

I agree, but some of the wording could be improved. There are inconsistencies with the use of "dust" and "combustible dust" and also "dust hazard" and "dust deflagration hazard".

Question 2: I agree that the subject is of an **EMERGENCY NATURE**.

__X__ **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

James F. Koch
Signature

James F. Koch
Name (Please Print)

1/18/11
Date

Please return the ballot on or before **Tuesday, January 18, 2011.**

PLEASE RETURN TO:
Joanne Goyette, Technical Projects Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169 **FAX: (617) 984-7110** **E-mail: jgoyette@nfpa.org**

TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1020
Revise 6.1 and 6.2.3, and 11.2.3 to the 2006 Edition of NFPA 654,
Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

Question 1: I agree with the TECHNICAL MERITS of the Proposed TIA. Please record me as voting:

AGREE

EXPLANATION OF VOTE: There is a big discrepancy between information contained in the main body and in Annex D of the 2006 edition. As a result, some inexperienced users made mistakes and created unsafe conditions in their plants. Alternatively, mal-intentioned users abused this discrepancy.

First of all, the mandatory text of the 2006 edition does not offer an explicit criterion for dust accumulation allowance. Instead, main body merely states in Section 6.2.3.1 "When separation is used to limit the fire or dust explosion hazardous area, the hazardous area shall include areas where dust accumulations exceed 1/32 in. (0.8 mm) or areas where dust clouds of a hazardous concentration exist [...]"

The abusers of this Section are quick to assume a building would not be an explosion hazard if the thickness of the deposits on all the surfaces does not exceed 1/32". The Committee had actually described its intent in the carefully written Annex D of 654-2006, which requires that the area of the 1/32" thick dust accumulations should not exceed the lower of the 5% of the building floor area or 1000 ft2. But, some practitioners chose to turn a blind eye to the Annex.

The revisions proposed with this TIA takes care of this dangerous loophole.

The 2006 edition also confused OSHA. In the instructions for Combustible Dust National Emphasis Program, OSHA wrote *"CSHOs (aka OSHA inspectors) should observe areas of the plant for accumulations of hazardous levels of dust (for example, greater than 1/32 of an inch, which is approximately equal to the thickness of a typical paper clip). Likely areas of dust accumulations within a plant are: structural members, conduit and pipe racks, cable trays, floors, above ceiling on and around equipment (leaks around dust collectors and ductwork.)" "The following information may be gathered during the course of the inspection:" "The dimensions of the room as well as the areas of the dust accumulations of greater than 1/32-inch depth." "Annex D of NFPA 654" "indicates that immediate cleaning is warranted whenever a dust layer of 1/32-inch thickness accumulates over a surface area of at least 5% of the floor area of the facility or any given room. The 5% factor should not be used if the floor area exceeds 20,000 ft2, in which case a 1,000 ft2 layer of dust is the upper limit. Accumulations on overhead beams, joists, ducts, the tops of equipment, and other surfaces should be included when determining the dust coverage area. Even vertical surfaces should be included if the dust is adhering to them. Rough calculations show that the available surface area of bar joists is approximately 5 % of the floor area and the equivalent surface area for steel beams can be as high as 10%. The material in Annex D is an idealized approach based on certain assumptions,*

including uniformity of the dust layer covering the surfaces, a bulk density of 75 lb/ft3, a dust concentration of 0.35 oz/ft 3, and a dust cloud height of 10 ft. Additionally, FM Data Sheet 7-76 contains a formula to determine the dust thickness that may create an explosion hazard in a room, when some of these variables differ."

Therefore, to do his/her job right, the OSHA inspector needs to make layer thickness measurements at many floor and elevated deposit locations, sum up the total surface area where the thickness exceeds 1/32", compare it to the 5% of the floor area, and then apply the FM formula if he deems it necessary.

One OSHA inspector said he makes measurements to estimate the areas of the "dust piles" on the floor or elevated surfaces and ads them up. Permitting thick piles covering less than 5% of the floor area was never the intention of the NFPA 654 Committee, yet the abusers of the 2006 edition can wrongly conclude that this extremely dangerous situation would be permissible.

Question 2: I agree that the subject is of an EMERGENCY NATURE. Please record me as voting:

AGREE

✓

EXPLANATION OF VOTE: Prompt action is required because

(a) The document contains an error or an omission that was overlooked during a regular revision process.

(b) The document contains a conflict within the document or with another NFPA document.

(c) The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard and ameliorate a continuing dangerous condition or situation.

Signature: Erdem Ural

Name (Please Print): Dr. Erdem A. Ural
Date: January 18, 2011

Please return the ballot on or before Tuesday, January 18, 2011.
PLEASE RETURN TO:
Joanne Goyette, Technical Projects AdministratorNFPA
1 Batterymarch Park
Quincy, MA 02169 FAX: (617) 984-7110 E-mail: jgoyette@nfpa.org

TECHNICAL COMMITTEE LETTER BALLOT
PROPOSED TENTATIVE INTERIM AMENDMENT LOG NO. 1020

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__X__ **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

See email for comment. There are some typographical errors in the supplied text.

Question 2: I agree that the subject is of an **EMERGENCY NATURE.**

__X__ **AGREE** _____ **DISAGREE*** _____ **ABSTAIN***

EXPLANATION OF VOTE - Please type or print your comments:

*An explanation must accompany a disagreement or abstaining position.

S. A. Rogers
Signature

Samuel A. Rogers
Name (Please Print)

1/10/11
Date

Please return the ballot on or before **Tuesday, January 18, 2011.**

PLEASE RETURN TO:
Joanne Goyette, Technical Projects Administrator
NFPA
1 Batterymarch Park
Quincy, MA 02169 **FAX: (617) 984-7110** **E-mail: jgoyette@nfpa.org**

Goyette, Joanne

From: Rodgers, Sam (Process Safety) [samuel.rodgers@honeywell.com]
Sent: Monday, January 10, 2011 4:32 PM
To: Goyette, Joanne
Cc: Moreau-Correia, Jeanne; Walker, Nancy
Subject: RE: NFPA 654 Proposed TIA 1020 - Due Tuesday, January 18, 2011
Attachments: 654 TIA.PDF

Joanne,

My prior comment, as indicated in the scanned vote.

In the annex example 5, step 3 below is incorrectly typed. The conversion from ft to inches has an exponent of 2 on the "12 in." as "12 in.^{2}". There should not be an exponent of 2 on this conversion. The calculated volumes are correct. Also the 3rd volume should be labeled "Volume of west end dust = ..."

3. Determine the actual volume of dust
Volume of mezzanine dust = 1500 ft_2* ½ in. *1 ft/12 $in._2$ = 62.5 ft_3
Volume of east end dust = 7500 ft_2 * 1/8 in. * 1 ft/12 $in._2$ = 78.13 ft_3
Volume of east west dust = 150 ft_2 * 1.5 in. * 1 ft/12 $in._2$ = 18.75 ft_3

Sam Rodgers

From: Goyette, Joanne [mailto:jgoyette@NFPA.org]
Sent: Tuesday, January 04, 2011 4:30 PM
To: Goyette, Joanne
Cc: Moreau-Correia, Jeanne; Walker, Nancy
Subject: NFPA 654 Proposed TIA 1020 - Due Tuesday, January 18, 2011

TO: The Technical Committee on Handling and Conveying of Dusts, Vapors, and Gases (HAP-AAA)

Dear Committee Members:

Attached is the Ballot Package for NFPA 654 Proposed TIA 1020. The due date for return of the ballot is **Tuesday, January 18, 2011**. Please fax your ballots to **617-984-7110** or email to jgoyette@nfpa.org.

The ballot and supporting material has also been posted to the HAP-AAA Ecommittee web page under Ballot Information, TIA Ballots. Please note the TC Initial Ballot Package, Circulation, and Final Results have also been posted to your web page.

PLEASE NOTE: Click on the Heading "Ballot Information" first, in order to view materials contained in the folder on the Ecommittee page.

Note: *The return of ballots and attendance at Committee Meetings are required in accordance with the Regulations Governing Committee Projects.*

Thank you,

Joanne Goyette
Technical Projects Administrator