



Ames Procedural Requirements

APR 8715.1

Effective Date: 9/7/2017

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COMPLIANCE IS MANDATORY

Ames Health and Safety Manual

APR 8715.1, Chapter 42 Ames Procedural Requirements for Safety Lanes, Barricades, Hazard Labeling and Posting

Change Log

Status Baseline/Revisions/ Cancellations	Date	Description
1	9/19/2011	Updated 1700.1 to 8715.1
2	9/7/2017	Added Change History and Preface to Chapter. Updated chapter to reflect changes in ANSI/NEMA Z535.2-2011 Standard.

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Preface

P.1 PURPOSE

This directive provides policy and procedures for Safety Lanes, Barricades, Hazard Labeling and Posting at Ames Research Center.

P.2 APPLICABILITY

This directive applies to all Ames employees, Ames contractors, sub-contractors and grantees as specified in their contracts or grants; and to other organizations (i.e., commercial partners, other Federal agencies, international parties, and Ames tenants) as specified and described in written operating agreements.

P.3 AUTHORITY

NPR 8715.3, NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)

P.4 Applicable Documents and Forms

- a. ANSI/NEMA Z535.1-2006 (R2011)
- b. ANSI/NEMA Z535.2-2011
- c. ASME A13.1 – 2007 (R2013)

P.5 MEASUREMENT/VERIFICATION

Agency triennial audit and Ames Safety Accountability Program (formerly Ames Annual Voluntary Protection Program (VPP) self-inspections).

P.6 CANCELLATION !

APR 8715.1, Chapter 42, effective date 9/19/2011.

/S/ !

Eugene Tu !
Center Director !

42.1 Responsibilities

42.1.1 Safety Division shall:

- a. !Provide technical safety evaluations of the work areas at the request of the supervisor.
- b. Maintain oversight of hazard assessment activities, safe work procedures, and employee training.
- c. !Provide specialized safety consulting on an as-requested basis.
- d. Periodically review and revise this chapter as appropriate.

42.1.2 Facilities Engineering Branch (JCE) shall:

Reflect the requirements of this chapter when planning and implementing new or modified facilities work at Ames.

42.1.3 Plant Engineering Branch (JCM) shall:

Maintain or upgrade pipe paint colors and markings and other hazard warnings to meet the requirements of this chapter whenever maintenance work causes markings to be effected.

42.1.4 Supervisors shall:

- a. !Complete a workplace assessment to determine what hazards are present, or are likely to be present, for all operations.
- b. Identify hazards that require barricading or posting as described in this chapter.
- c. !Ensure personnel are trained to identify hazards and recognized and honor barricades and warning signs.
- d. Post hazard warnings in accordance with the requirements of this chapter.
- e. !Replace posted hazard warnings that are illegible.
- f. ! Remove posted hazard warnings that are no longer applicable to the location where they are posted.

42.1.5 Employees shall:

- a. Read and observe the safety requirements delineated in this chapter.
- b. Report any existing or potential safety hazards to the supervisors.
- c. Seek supervisor guidance on safety related questions.
- d. Obey safety signs, barricades, and warnings.

42.2 Safety Lanes and Barricades

42.2.1 Safety lanes and safe-access lanes are typically floor markings that identify safe passage through or out of shops, warehouses, and similar locations. They also identify access lanes to control panels and emergency equipment, which shall be kept clear and unobstructed.

42.2.2 They shall be clearly marked with either yellow or yellow-and-black striped lines, or by plastic tape affixed to the floor.

42.2.3 Barricades are used to identify and deny access to hazardous areas. The following precautions are to be taken:

- a. Excavations, breaks in roads or floors, and similar conditions shall be barricaded to prevent injury to personnel and reduce the possibility of damage to equipment and vehicles.
- b. Barricades shall be provided with appropriate flashing lights during nighttime hours and periods of reduced visibility.
- c. Barricades shall be placed far enough in advance of the actual working area to prevent traffic congestion.
- d. Signs (such as "Road Closed," "Aisle Blocked," "Detour," etc.) shall be used in conjunction with barricades.
- e. Breakaway links shall be used in all chains that barricade an area in order to permit ready access by fire fighting personnel and equipment.
- f. Such chains shall be identified by the "international orange" color.
- g. Work performed at heights can jeopardize persons at floor level as a result of falling objects. Such floor-level areas shall be barricaded.

h. Areas where ladders, scaffolding, or staging are being used shall also be barricaded as a protection against falling objects.

42.3 Hazard Labeling and Posting

42.3.1 General Labeling and Posting

42.3.1.1 All employees shall comply with posted warnings and instructions.

42.3.1.2 Any new safety signs or replacement signs purchased shall follow the font, color, format, and work requirements of ANSI/NEMA Z535.2-2011 (42.3.1.4)

42.3.1.3 In locations where other languages are used, consideration shall be given to provide messages in those languages as appropriate.

42.3.1.4 Labels and posting are used to identify safety hazards and provide instructions. The font, color, format, and work requirements of ANSI/NEMA Z535.2-2011 shall be used to convey safety-related information on signs. Types of safety signs are as follows (see Appendix B Examples for use of color).

a. Hazard alerting – The signal word shall always be located in a distinctive panel located in the uppermost portion of the safety sign preceded by the safety alert symbol. (See Figure 1 for safety alert symbols). All three of the following hazard alerting signal words shall be in sans serif letters in upper case only.

1. DANGER – Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

(a) Danger signs shall have the signal word “DANGER” in safety white letters on a rectangular safety red background placed at the top of the sign preceded by the safety alert symbol.

(b) The message panel below shall be in black letters on a white background, or white letters on a black background.

(c) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white back ground

2. WARNING – Indicates a hazardous situation that, if not avoided, could result in death or serious injury

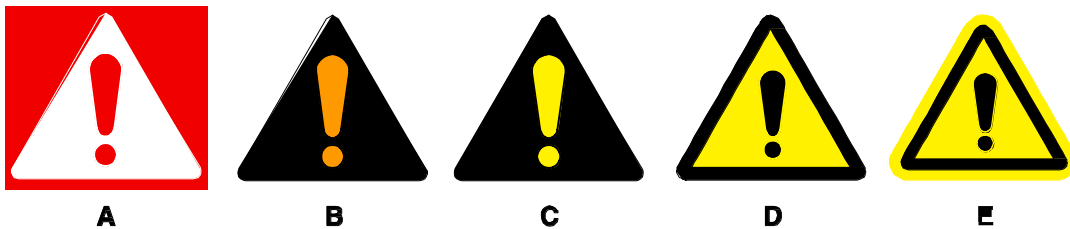
(a) Warning signs shall have the signal word “WARNING” in black letters on a rectangular orange background placed at the top of the sign preceded by the safety alert symbol.

(b) The message panel below shall be in black letters on a white background or white letters on a black background.

(c) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white back ground

3. CAUTION – Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. !

- (a) Caution signs shall have the signal word “CAUTION” in black letters on a rectangular yellow background placed at the top of the sign preceded by the safety alert symbol.
- (b) The message panel below shall be in black letters on a white background or white letters on a black background.
- (c) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white background.



- (A) for use with DANGER signal word; (safety white triangle, safety red exclamation mark, safety red background)
- (B) for use with WARNING signal word; (safety black triangle, safety orange exclamation mark)
- (C) for use with CAUTION signal word; (safety black triangle, safety yellow exclamation mark)
- (D) and (E) for use with DANGER, WARNING, or CAUTION signal words; ([D] is a safety yellow triangle with a safety black border and safety black exclamation mark; [E] is a safety yellow triangle with a safety black exclamation mark and a safety yellow border around a safety black band)

NOTE—(D) and (E) are provided to allow for consistency with certain ISO standards such as ISO 3864-1 and ISO 3864-2.

Figure 1
The Safety Alert Symbol
(Figure 1 from ANSI Z535.2-2011)

Note: The Height of the safety alert symbol shall be equal to or exceed the signal word letter Height and located on the same horizontal line.

- b. NOTICE – Indicates information considered important but not hazard-related. The safety alert symbol shall not be used with this signal word. NOTICE is typically the choice of signal word for messages relating to practices not related to personal injury, property damage, security, sanitation and housekeeping rules. The word CAUTION is no longer used in this classification of sign.

- (1) Notice signs shall have the signal word "NOTICE" in white italic sans serif upper case only letters on a safety blue background on a rectangular field.
- (2) No other signal word or symbol shall be used within this distinctive shape and color arrangement.
- (3) The message panel below shall be in black letters on a white background or white letters on a black background.
- (4) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white back ground

c. Safety instructions or similar words: indicates a type of safety sign where specific safety-related instructions or procedures are described. The safety alert symbol shall not be used with this classification of sign.

- (1) Signs containing safety instructions or procedures shall use the signal words SAFETY INSTRUCTIONS or SAFETY PROCEDURES. More definitive signal words are encouraged, where practical (e.g., SAFE SHUTDOWN PROCEDURE, BOILER SHUTDOWN PROCEDURE, LOCKOUT PROCEDURE).
- (2) The signal word or words shall be in white letters on a safety green background on a rectangular field.
- (3) This distinctive panel shall appear in the uppermost portion of this sign.
- (4) Signal words that are not in accordance with the definition given in ANSI/NEMA Z535.2-2011 shall not be used and these include DANGER, WARNING, and CAUTION.
- (5) The message panel below shall be in black letters on a white background or white letters on a black background.
- (6) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white back ground

d. Safety equipment location sign identifies the direction to, or location of, safety equipment (e.g., first aid equipment, emergency eyewash, safety shower). The safety alert symbol shall not be used with this classification of sign.

- (1) Where multiple safety items are at the same location, SAFETY EQUIPMENT shall be used as the signal words.
- (2) Signs indicating the location of safety equipment (except firefighting equipment) shall use definitive signal words, such as EYEWASH.
- (3) The signal word or words shall be in white letters on a safety green back ground on a rectangular field.
- (4) This distinctive panel shall appear in the uppermost portion of this sign.
- (5) Signal words that are not in accordance with the definition given in ANSI/NEMA Z535.2-2011 shall not be used and these include DANGER, WARNING, and CAUTION.
- (6) The message panel if used shall be in black letters on a white background or white letters on a black background.
- (7) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white background.

e. Fire safety equipment location signs identifies the direction to, or location of, fire safety equipment. The safety alert symbol shall not be used with this classification of sign.

(1) When used, the signal word or words shall be in safety white letters on a safety red background.

(2) This distinctive panel shall appear in the uppermost portion of this sign.

(3) Signal words that are not in accordance with the definition given in ANSI/NEMA Z535.2-2011 shall not be used and these include DANGER, WARNING, and CAUTION.

(4) The message panel if used shall be either black letters on a white background or white letters on a black background.

(5) Safety Symbol when used in the symbol panel shall have a safety black symbol on a safety white background.

f. Fire safety signs do not have a signal word. The message panel shall be safety red letters on a safety white background in either a square or rectangular field.

42.3.2 Sign Placement

42.3.2.1 Signs shall be so placed to alert and inform the viewer in sufficient time to take appropriate evasive actions to avoid the potential harm from the hazard.

42.3.2.2 Safety signs shall be so placed that they are legible, non-distracting, and not hazardous in themselves.

42.3.2.3 Safety signs shall not be located in areas where they may be removed by the motion of the hazardous device, or rendered ineffective by situational conditions of the hazard.

42.3.2.4 The alerting devices shall not be blocked by moveable panels such as doors, windows, racks, gates, etc.

42.3.3 Pipe Labeling

42.3.3.1 Because of the potential hazards associated with pipe transfer systems, piping shall be labeled accurately as to the contents and intended direction of flow. The 2007 edition of ASME A13.1 (R2013), Scheme for Identification of Piping Systems, is adopted.

42.3.3.2 Table 1 - Piping and Utility Line Labeling Color Scheme summarizes the Ames color scheme. Designers and facility managers shall refer to ASME A13.1 – 2007 (R2013) standard for additional details.

42.3.3.3 Directional flow arrows and other piping symbols shall utilize the color codes shown above.

42.3.3.4 Insulated piping where the outside surface is a non-ASME color shall use color-coded labels from the ANSI/NEMA Z535.1 – 2006 (R2011) Safety Color Code.

42.3.3.5 Labels shall be applied in locations visible from the ground and close to valve systems.

42.3.3.6 Labels shall also be applied at appropriate intervals along the piping run.

42.3.3.7 Labeling and color-coding of the Center’s vacuum systems are not mandatory under this policy. Labeling is encouraged for traceability or aesthetics at the discretion of the designer or facility manager.

42.3.3.8 Previously specified radioactive markers are acceptable if already installed or until existing supplies are depleted.

42.3.3.9 Pipe paint colors, markings and other hazard warnings to meet requirements of this chapter shall be upgraded when construction or maintenance cause new piping to be installed or existing markings to be effected.

Service	Background Color	Letter Color	Sample
Fire quenching fluids	Safety Red	White	LETTERS
Toxic and corrosive fluids	Safety Orange	Black	LETTERS
Flammable fluids	Safety Yellow	Black	LETTERS
Chemically active or toxic	Safety Yellow	Black	LETTERS
Temp > 140°	Safety Yellow	Black	LETTERS
Gas pressure > 150 psig	Safety Yellow	Black	LETTERS
Liquid pressure > 500 psig	Safety Yellow	Black	LETTERS
Radioactive	Safety Yellow	Black	LETTERS
Combustible fluids	Safety Brown	White	LETTERS
Potable, cooling, boiler feed	Safety Green	White	LETTERS
Other water	Safety Green	White	LETTERS
Liquid or liquid admixture	Safety Green	White	LETTERS
Gas or gaseous admixture	Safety Blue	White	LETTERS
Compressed Air	Safety Blue	White	LETTERS
Not used at Ames	Safety Purple	White	LETTERS
Not used at Ames	Safety white	Black	LETTERS
Not used at Ames	Safety Gray	White	LETTERS
Not used at Ames	Safety Black	White	LETTERS

42.3.4 Method of Identification – Legend

42.3.4.1 This Standard considers a legend to be primary and explicit for identification of contents.

42.3.4.2 Positive identification of the contents of a piping system shall be by lettered legend, giving the name of the contents in full or abbreviated form.

42.3.4.3 Arrows shall be used to indicate direction of flow.

42.3.4.4 Flow can be in both directions, arrows in both directions shall be displayed.

42.3.4.5 Contents shall be identified by a legend with sufficient additional details such as temperature, pressure, etc., as are necessary to identify the hazard.

42.3.4.6 Legends shall be brief, informative, pointed, and simple for greatest effectiveness.

42.3.4.7 Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches, and where pipes pass through walls or floors; and at intervals on straight pipe runs sufficient for identification.

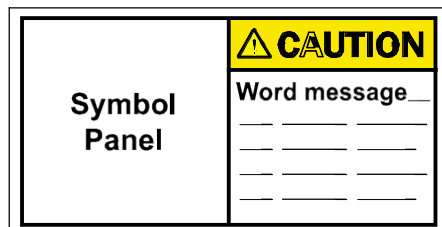
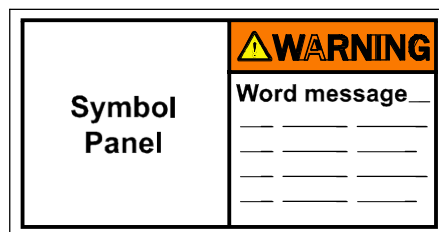
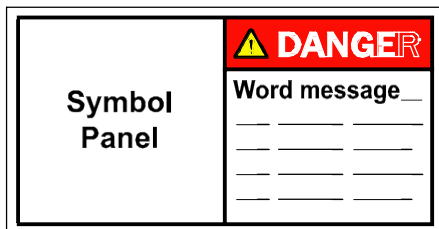
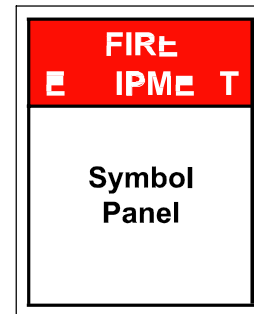
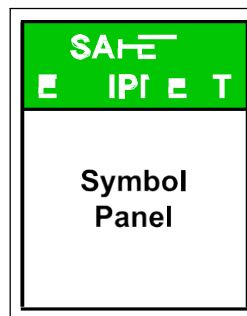
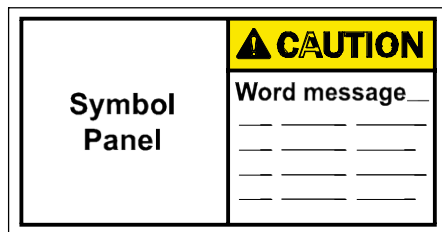
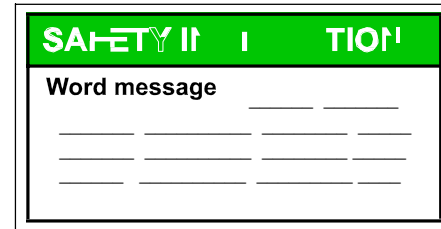
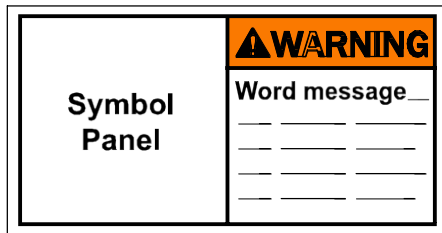
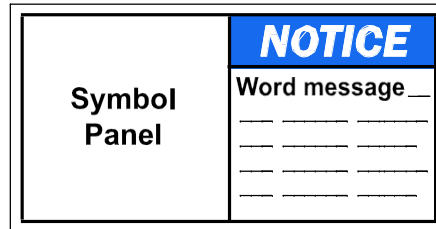
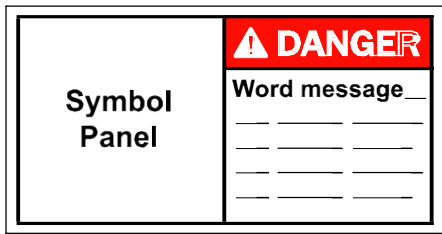
42.3.4.8 Identification shall be accomplished by stenciling, the use of tape, or markers.

42.3.4.9 In any situation, the number and location of identification markers shall be based on the particular piping system.

APPENDIX A. Acronyms

ANSI	American National Standards Institute
APR	Ames Procedural Requirement
ASME	American Society of Mechanical Engineers
NPR	NASA Procedural Requirement

APPENDIX B. Examples of Use of Color (ANSI Z535.2-2011) !



Signal Word Panel:
DANGER – White Lettering/
 Red Background
WARNING – Black Lettering/
 Orange Background
CAUTION – Black Lettering/

NOTICE – White Italic
 Lettering/ Blue Background
SAFETY INSTRUCTIONS:
 White Lettering/Green Background
SAFETY EQUIPMENT: White
 Lettering/Green Background
FIRE EQUIPMENT: White
 Lettering/Red Background
FIRE SAFETY: Word Message
 Red Lettering/White Background

**Safety Alert
 Symbol:**
 See Figure 1
 for Options

Word Messages:
 Black Lettering on
 White Background
 (or)
 White Lettering on
 Black Background