

Two horizontal bars are present: a long orange bar extending from the left edge of the slide to the right, and a shorter grey bar extending from the right edge of the slide to the left, overlapping the orange bar.

# Integrating ANSI-Compliant RF Signs into Corporate RF Safety Programs

David Maxson

NAB 2004

Q: Does this make its point?



# RF Signs

- ◆ This talk will present
  - Current thinking on RF hazard communication
  - The key points in hazard communication
  - The ANSI standard for signage

## RF Signs

◆ Why Bother?

*Liability* Risk  
Responsibility

# RF Signs

## General Duty Clause OSHAct Section 5(a)(1)

Employers shall provide work which is free from recognized hazards that are causing or are likely to cause death or serious physical harm.

Source: Bob Curtis, OSHA

# General Duty Criteria

At Least One Employee Exposed  
It is a Recognized Serious Hazard  
There Are Feasible Means to Correct  
The Employer Knew (Or should have known with  
reasonable diligence)

Rely heavily on **Consensus Standards**  
**Even if in Conflict with Existing Standards**

Source: Bob Curtis, OSHA

# “Generic” Standards Apply

Hazard Communications

Hazardous Waste & Emergency Response

Construction Safety & Health Plan

Personal Protective Equipment

Lock Out/Tag Out (of Hazardous Energy)

*All of These Could be Cited Based on Violation of  
Consensus Standards*

Source: Bob Curtis, OSHA

# RF Signs

- ◆ ANSI Z535.2

*Environmental and Facility Safety Signs*

- ◆ IEEE/ANSI C95.1

*Safety Levels with Respect to Human  
Exposure to Radio Frequency  
Electromagnetic Fields*

# RF Signs

- ◆ IEEE/ANSI C95.1
  - Human Exposure Limits
  - Two tiers
    - Controlled environments
    - Uncontrolled environments

# RF Signs

- ◆ IEEE/ANSI C95.1
  - Over-exposure does not mean injury will occur

# RF Signs

- ◆ ANSI Z535.2 Sign Standard
  - Signal Words
  - Colors
  - Symbol or Pictorial Panel
  - Word Message Panel

# Signal Words

## ◆ Danger

- Imminently hazardous situation
- If not avoided, will result in death or serious injury
- Limited to the most extreme situations. not for property damage hazards

Source: ANSI Z535.2

# Signal Words

## ◆ Danger

Note: The DANGER signal word is appropriate for signs in the area of, or inside of enclosures containing, a Danger-level hazard.

Source: ANSI Z535.2

# Signal Words

- ◆ Warning
  - Potentially hazardous situation
  - if not avoided, could result in death or serious injury.
  - Not for property damage hazards

# Signal Words

- ◆ Warning

Note: The WARNING signal word is appropriate for signs placed outside of the area of, or on the exterior of the enclosures containing, a Danger-level hazard.

Source: ANSI Z535.2

# Signal Words

## ◆ Caution

- Potentially hazardous situation
- If not avoided, may result in minor or moderate injury.
- Also to alert against unsafe practices that may cause property damage.

# Signal Words

## ◆ Notice

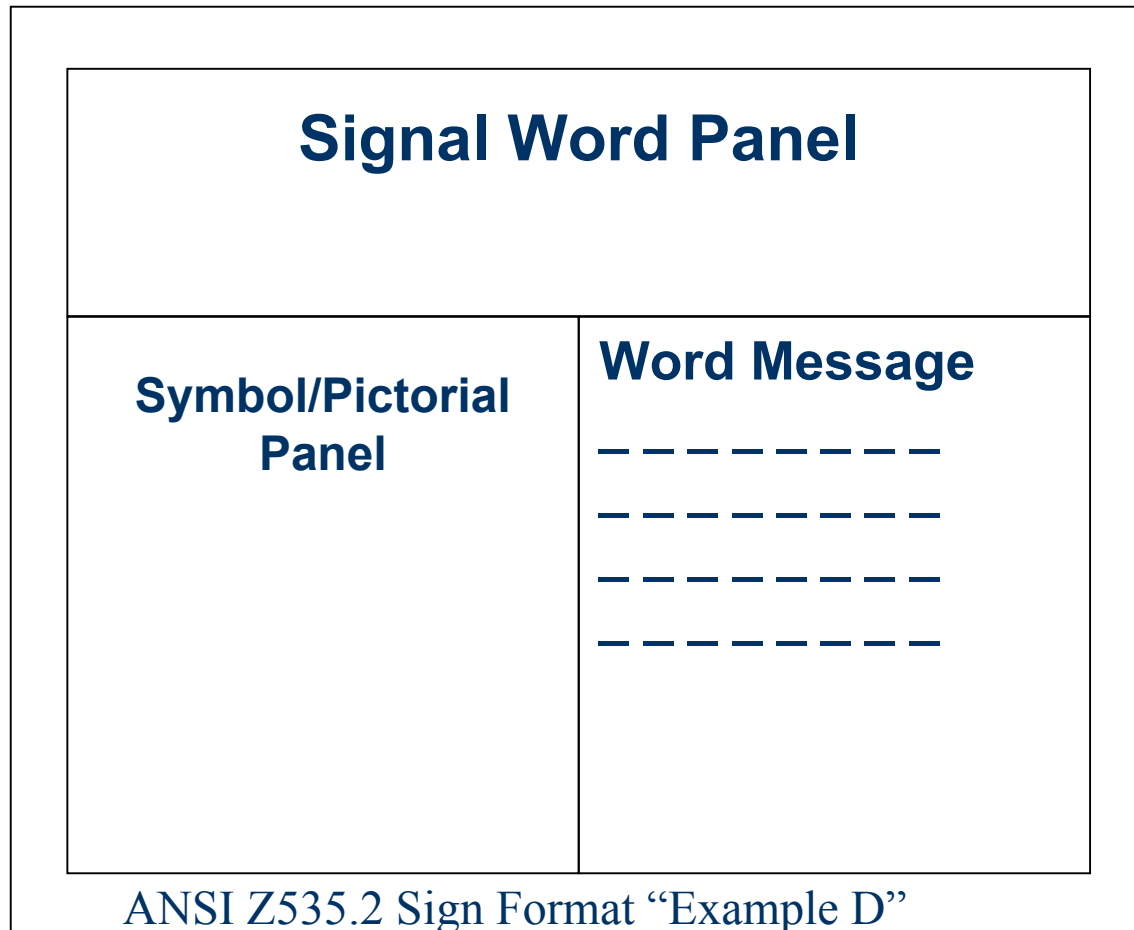
- Statement of company policy
- Directly or indirectly related to the safety of personnel or protection of property.
- Not to be associated directly with a hazard or hazardous situation
- Shall not be used in place of "DANGER," "WARNING," or "CAUTION."

# Colors

## ◆ Colors Have Specific Meaning

- Danger
- Warning
- Caution
- Notice

# Panels



# RF Signs

## ◆ OSHA-Suggested Categories

- 1- No controls to be public compliant
- 2- Controls needed to stay public compliant
- 3- No controls needed to be occupational complaint
- 4- Controls needed to be occupational compliant
- 5- Controls won't be enough

# RF Signs

## ◆ OSHA-Suggested Categories

- Controls involve shielding or time averaging
- 4- Caution for occupational controls needed
- 5- Warning if power-down or protective gear needed
- 5- Danger if protective gear not sufficient

# RF Signs

## ◆ Motorola-suggested categories

### ■ Notice

- Distinguish the boundary between the General Population/Uncontrolled and the Occupational/Controlled areas.

Source: Motorola Specification R-56

# RF Signs

- ◆ Motorola-suggested categories
  - Caution
    - RF controlled areas where RF exposure can exceed the Occupational/Controlled MPE

Source: Motorola Specification R-56

# RF Signs

## ◆ Motorola-suggested categories

### ■ Warning

- Boundary of areas with RF levels substantially above the FCC (occupational) limits ( $>x10$ )

Source: Motorola Specification R-56

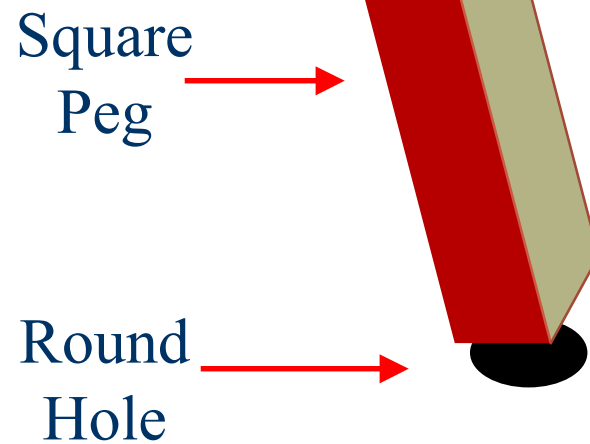
# RF Signs

- ◆ Motorola-suggested categories
  - Motorola does not address the Danger Signal Word

Source: Motorola Specification R-56

# RF Signs

- ◆ Motorola and OSHA interpretations have in common:



# RF Signs

- ◆ Motorola and OSHA interpretations have in common:
  - They try to redefine the ANSI signal words
  - They assume the public needs no caution entering an occupational space (only notice)
  - They apply an arbitrary higher threshold to warning (occ. x 10 or power-down/PPE)

# RF Signs

- ◆ What if...
  - Look at it differently
  - Accept there is no clear dividing line between safety and actual minor injury (caution boundary)
  - Accept there is no clear dividing line between potential minor injury and potential serious injury (warning)

# RF Signs

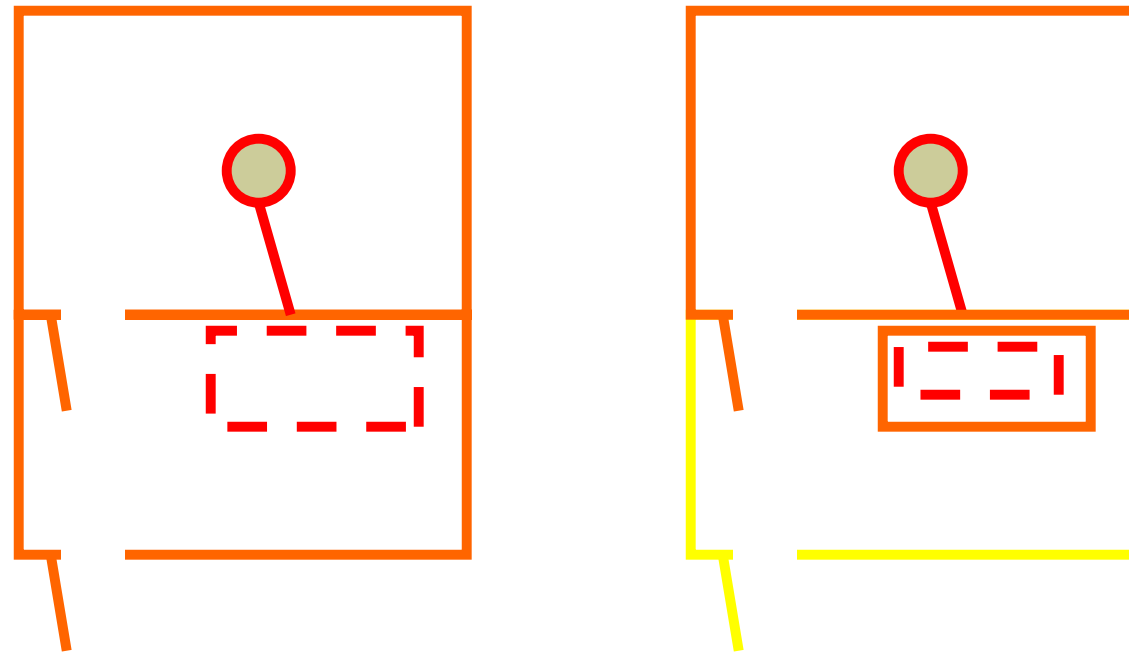
- ◆ What if...
  - Consider a *regulatory risk*
  - Possible harm is presumed
    - Member of public going into occupational exposure without supervision— regulatory risk of minor injury
    - Employed person going into above-occupational exposure without exerting controls—regulatory risk of either minor injury or serious injury depending on context.

# RF Signs

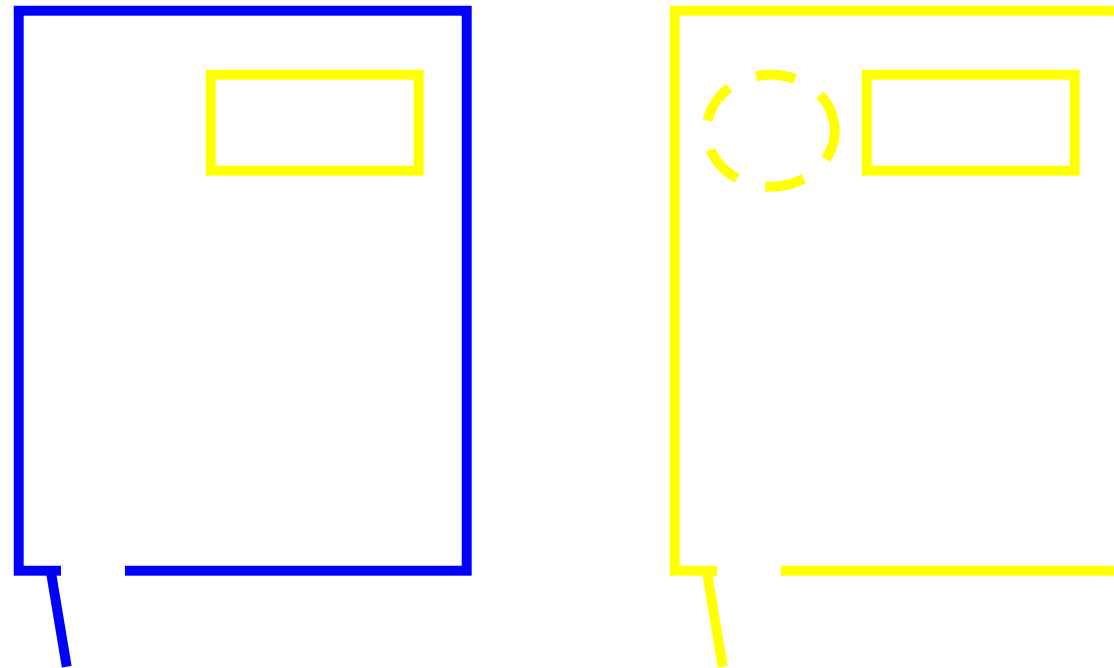
## ◆ Examples

- AM tuning shed (doghouse) with access to fenced tower compound, exposed RF contacts in shed.
- Danger condition inside.
- Warning on outside entrance
- Danger condition at tower
- Warning on doorway to tower

# RF Signs



# RF Signs



# RF Signs

- ◆ The Envelope Method
  - Positive Control
    - Locked area, access policy
  - Passive Control
    - Accessible space, floor paint, flag, sign, unlocked door or gate

# RF Signs

- ◆ The Envelope Method
  - Positive-control spaces must divide public from occupational,
  - Spaces that can exceed public exposure and are Passive-control, must be within a greater Positive-control space.

# RF Signs

- ◆ The Envelope Method
  - Use Caution outside the Positive control envelope when some Passive-control condition inside can exceed either occupational or public limits, depending on context of space.
  - Use Notice outside when there are no Passive-control exposure conditions inside, but visitors or workers should be aware that RF is being generated inside.

# RF Signs

## ◆ Envelope Method

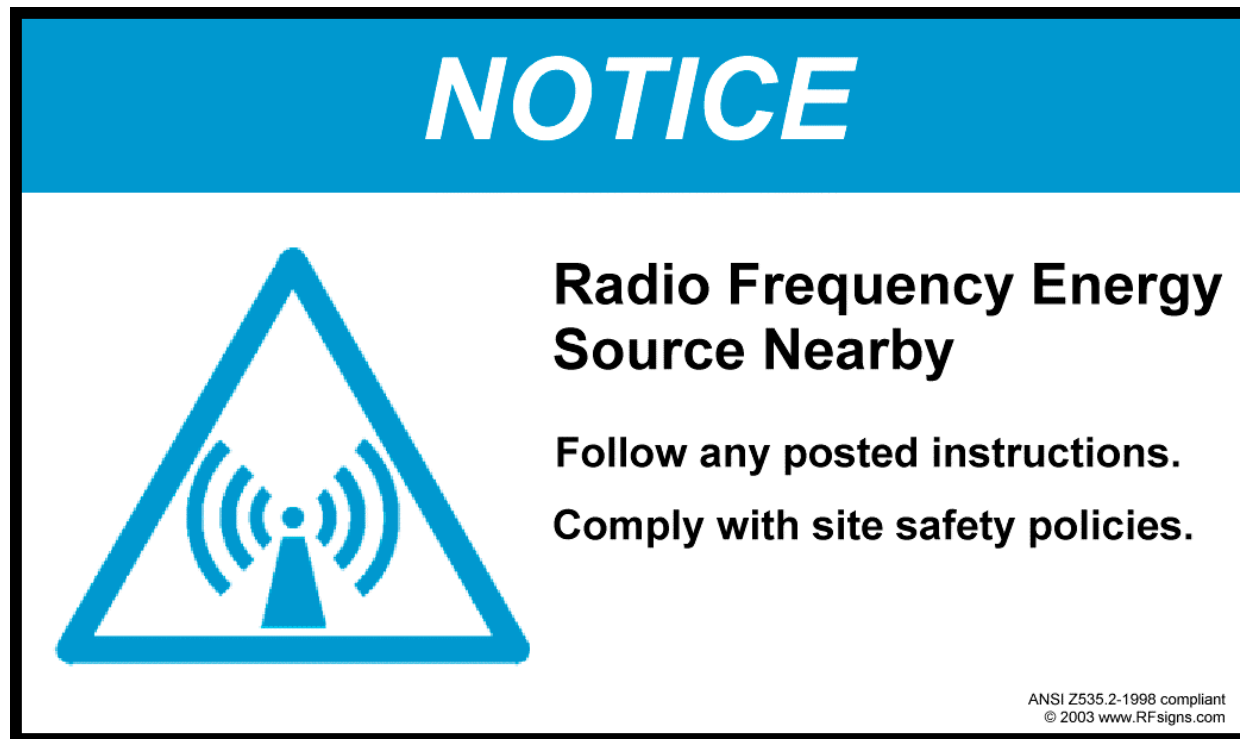
- Use Warning on the access to any envelope that contains a Danger condition somewhere within. Danger conditions are inherently occupational conditions so the Warning envelope should be Positively controlled against public access because the Danger condition within it is exposed.

# RF Signs

- ◆ Message protocol
  - State the hazard
  - State the consequence
  - State the action to take
  
- Put the most important information first

# RF Signs

## ◆ Sign Examples



# RF Signs

## ◆ Sign Examples



# RF Signs

## ◆ Sign Examples



# RF Signs

## ◆ Sign Examples



# RF Signs

## ◆ Sign Examples



# RF Signs

- ◆ Message protocol
  - State the hazard
  - State the consequence
  - State the action to take
  
- Put the most important information first

# RF Signs

## ◆ OSHA RF Protection Programs

Safe, Standard RF Gear

Identify and revisit RF hazards

Control RF Hazard Areas

Implementation of controls and SOP's

RF safety and health training

Employee involvement in S&H Program

Medical surveillance program

Periodic reviews of the program

Adequate authority and resources

# RF Signs

◆Coming Soon!

[rfsigns.com](http://rfsigns.com)