

A photograph of a highwall with a cartoon man on the crest and a worker with a dynamite pack at the base. The cartoon man is standing on the top edge of the highwall, looking down. The worker is at the bottom, wearing a blue hard hat and a white shirt, holding a red dynamite pack. A white wire connects the pack to a bundle of dynamite on the highwall.

# Fall Prevention on Highwalls

**Safe Practices  
Near a  
Highwall Crest**



- **30 CFR Part 56.15005\***

**“Safety Belts and Lines Shall Be Worn When Persons Work Where There Is Danger of Falling....”**

\*The single most common safety violation found in mining deaths: contributed to 37 fatalities 1990-98.



**Other**



**Requirements**

- **Part 56.7003: Drill sites must be inspected for hazards before drilling begins.**
- **Part 56.11001: All working places must have a safe access.\***
- **Part 56.14100: Equipment must be inspected and defects corrected.\*\***
- **Part 56.18002: Working places must be examined for hazards.**
- **Part 56.20003: Working places must be kept clean and orderly.**

\* Second most common violation found at mine fatalities.

\*\*Third most common violation found at mine fatalities.



# Program Objectives

- **Identify Hazards**
- **Provide Solutions**
- **Identify Fall Prevention Priorities**



# What Are the Hazards?

- **Slips/trips/falls**
- **Unstable Ground**
- **Equipment**
- **Unauthorized or Untrained Persons**



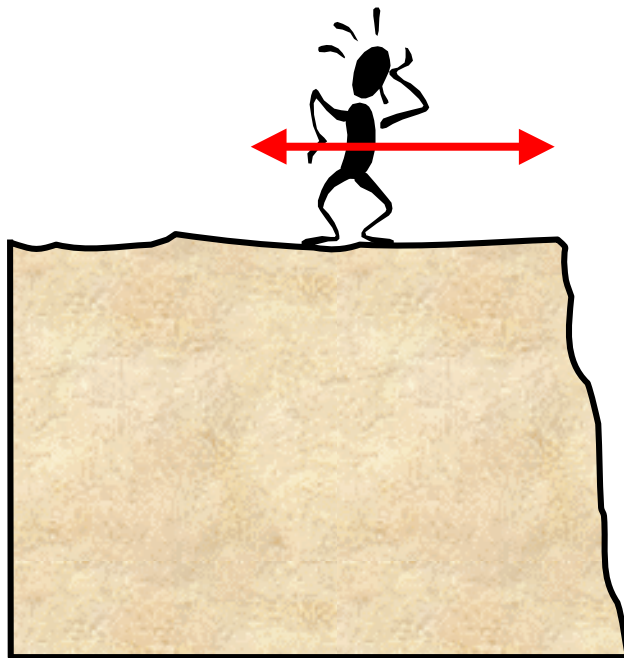
# Slip/Trip/Fall Hazards

- Working Close to Crest
- Bad Weather
- Boreholes
- Cracks
- Clutter

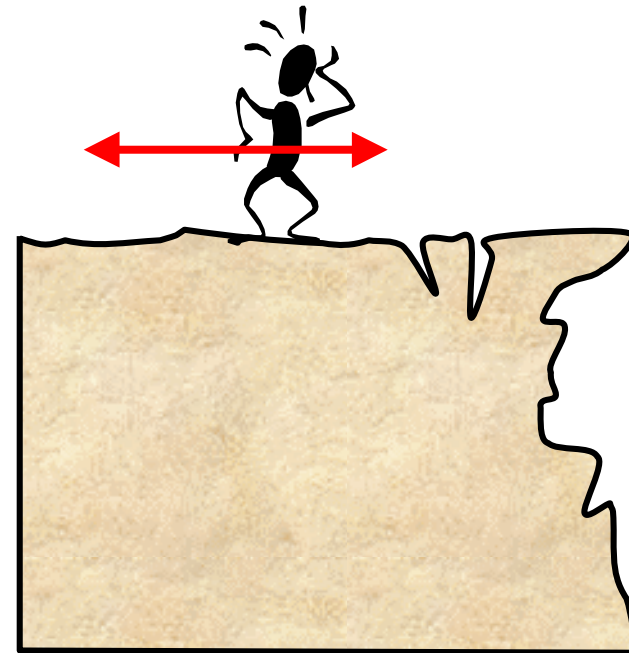
# Working Close to Crest

## The Fall Hazard Zone

- **6 Feet or Less From Stable Crest**



- **6 Feet or Less From Unstable Ground or Footing**



# Working Close to Edge

## – Visual Warnings

- Signs or Tape
- Cones or Boulders
- Paint or Chalk

## – Physical Barriers

- Berms or Boulders
- Handrails
- Fencing
- Cables

## – Belt or Harness and Lanyard

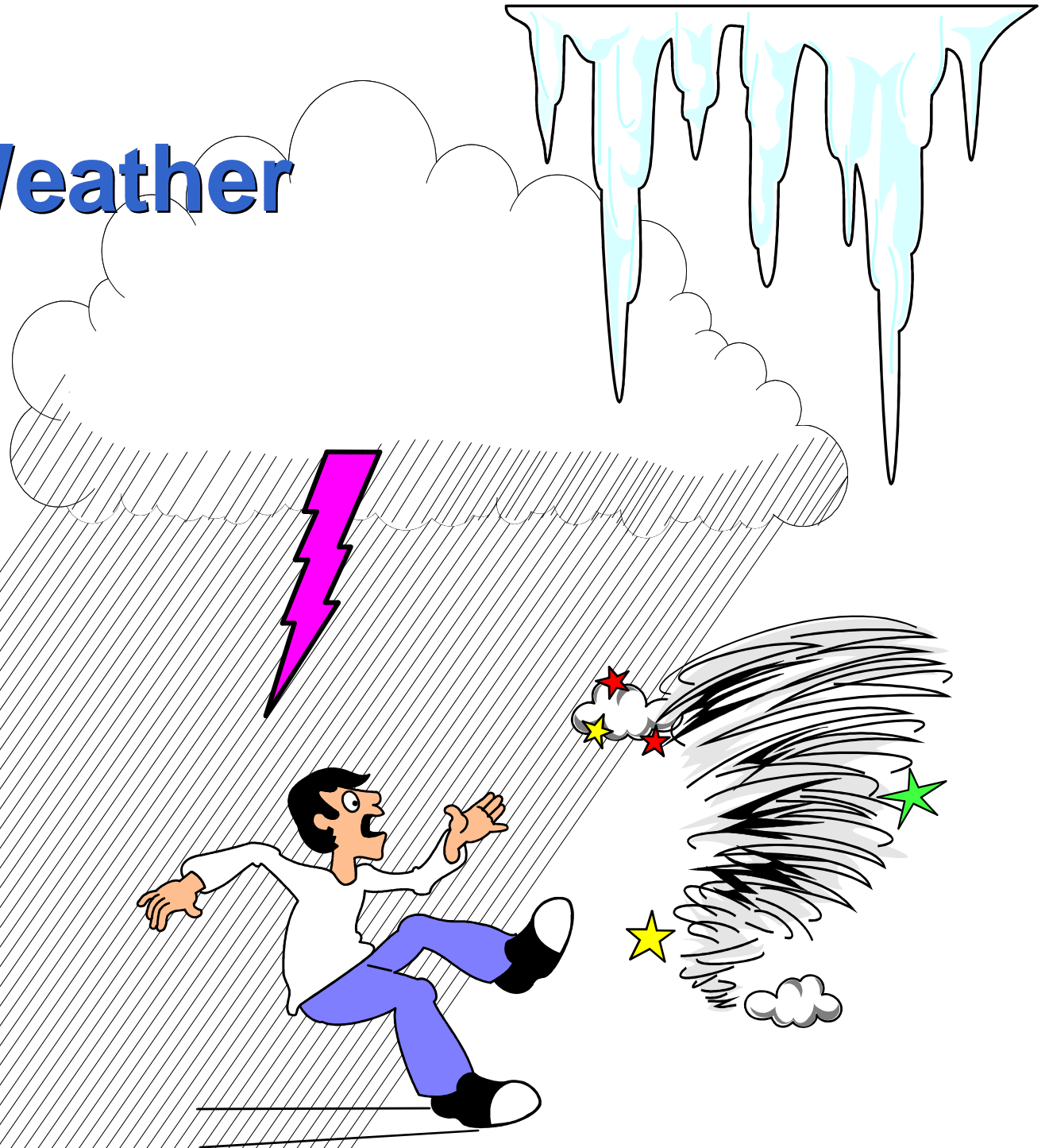
## – Buddy System





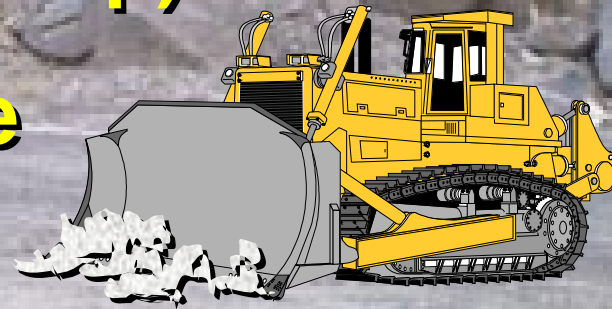
# Bad Weather

- Wind
- Snow
- Ice
- Rain
- Mud
- Fog



# **Bad Weather**

- Rubble (Bench Prep)**
- Proper Footwear**
- Lighting**
- Improve Walking Surfaces**
  - Add Antislip Material**
  - Scrape off Ice or Mud**
- Adjust Scheduling**



# Clutter

## ■ Problems

- Rubble
- Tools and Equipment
- Loading Poles
- Packaging
- Shot Wires, Tubes, or Cord

## ■ Solutions

- Tools and Equipment
  - Essential Equipment Only
  - Properly Maintained Equipment
  - Housekeeping
- Shot Wires, Tubes, or Cord
  - Trim Excess Wire
  - Snug up Tube Connections to Collar
  - Orderly Layout and Hookup



# Boreholes

## Problems

- Cuttings
- Rigid Liners
- Hole Itself

## Solutions

### – Mark Holes

- Flags
- Stakes
- Paint/chalk

### – Cover Holes

### – Trim Rigid Liners



# Cracks

- Awareness and Communication
- Filling
- Marking



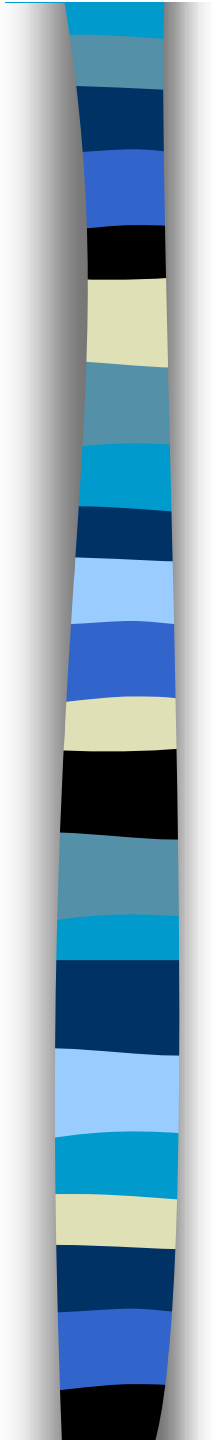
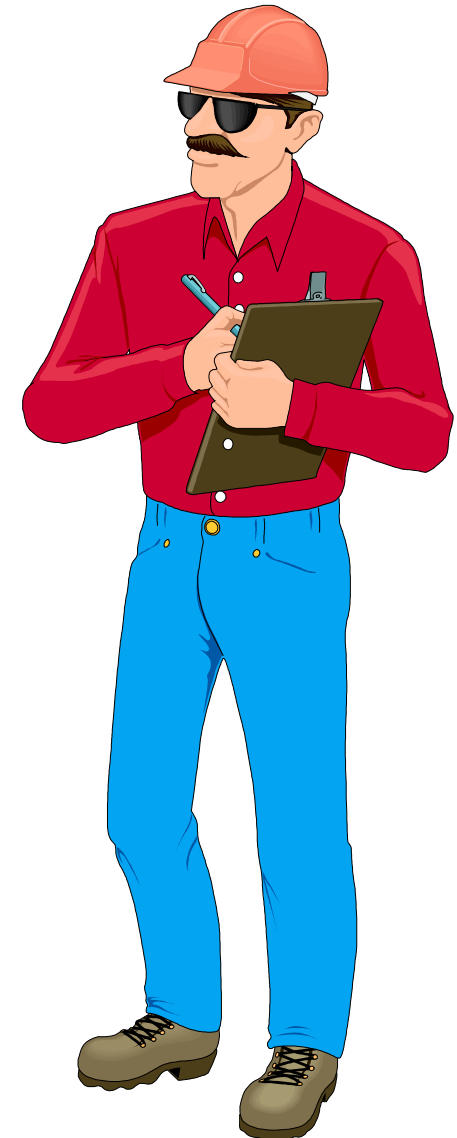


# Unstable Ground Hazards

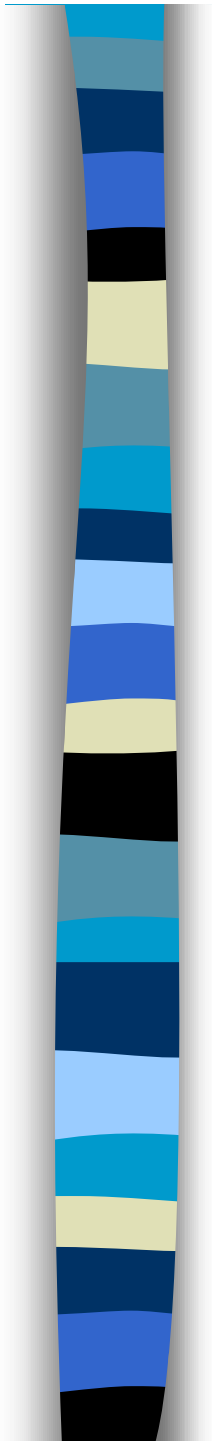
- **Overhangs**
- **Backbreak**
- **Cavities**
- **Sloping Crests**
- **Low Angle Slips**

# Unstable Ground Solutions

- **Use Competent Persons**
- **Examine the Workplace**
  - From Base of Highwall
  - From Bench
- **Profile of Face**
- **Identify Hazardous Area**

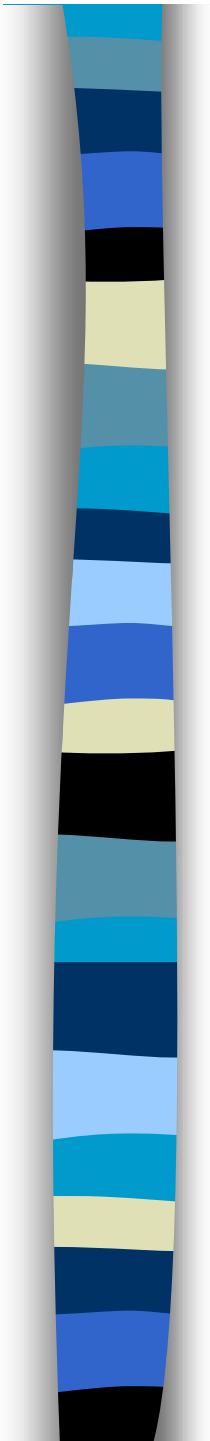
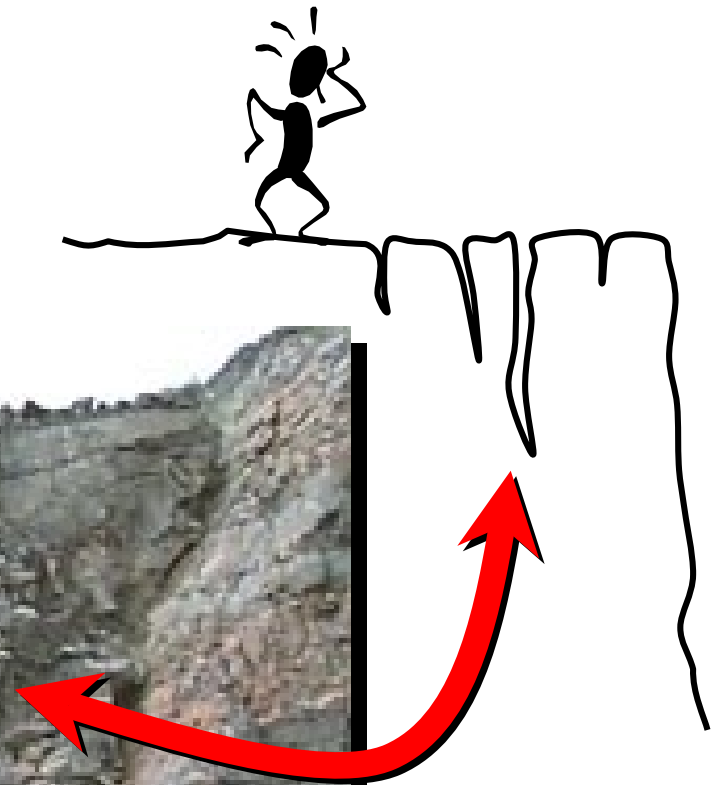


# Overhang





# Backbreak



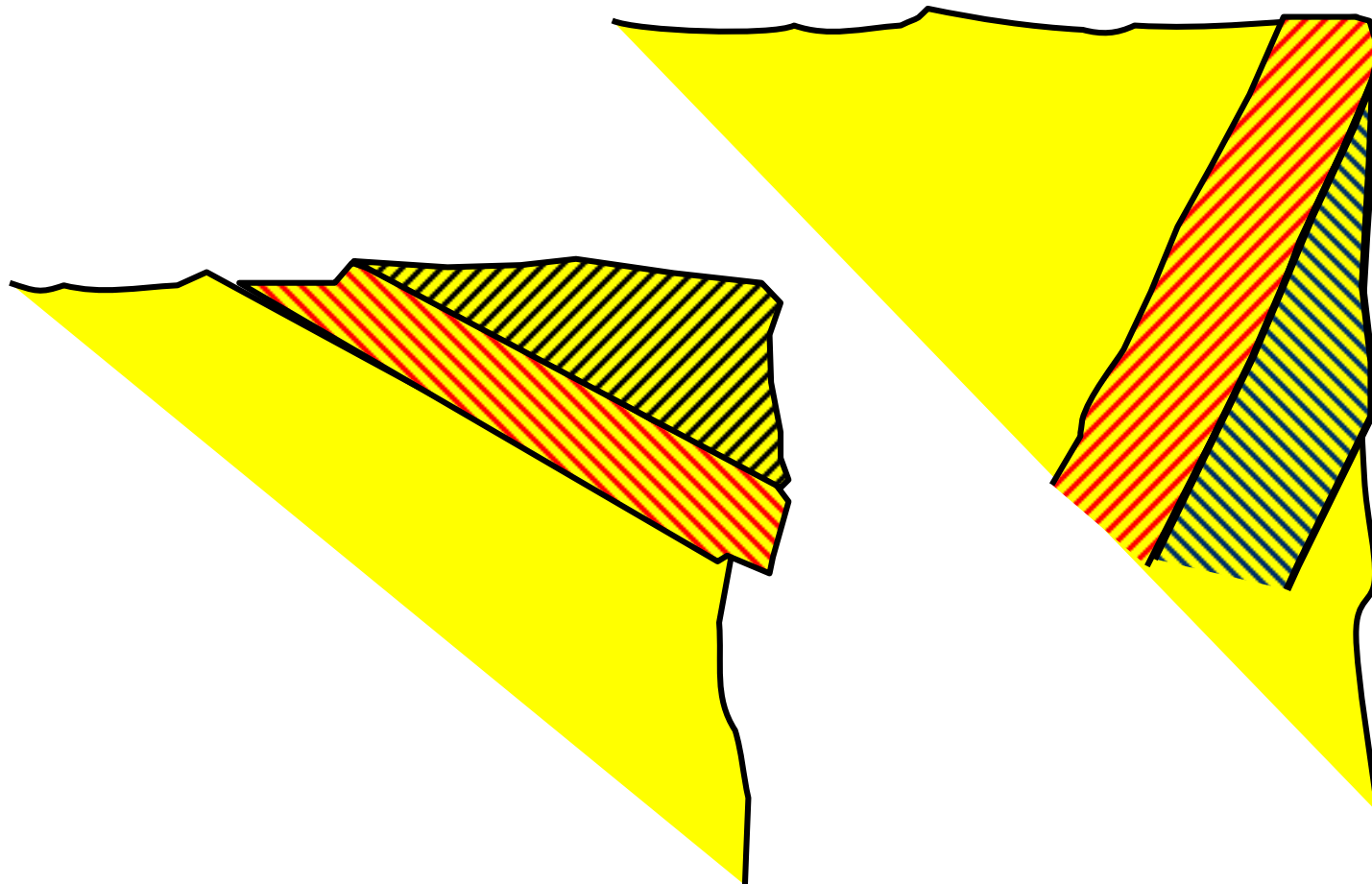
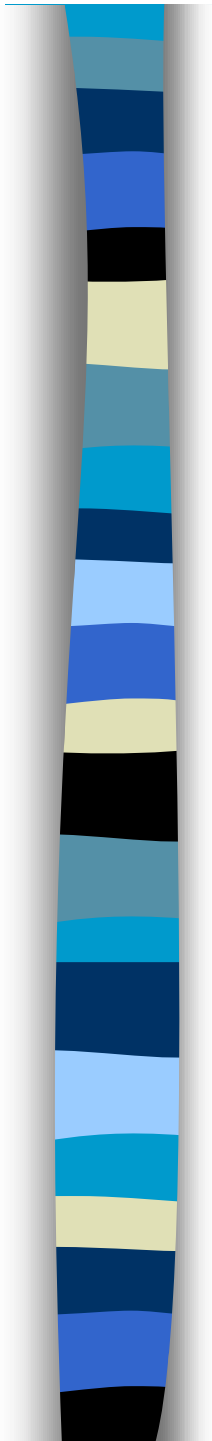
# Cavities



# Sloping Crest



# Slips & Faults

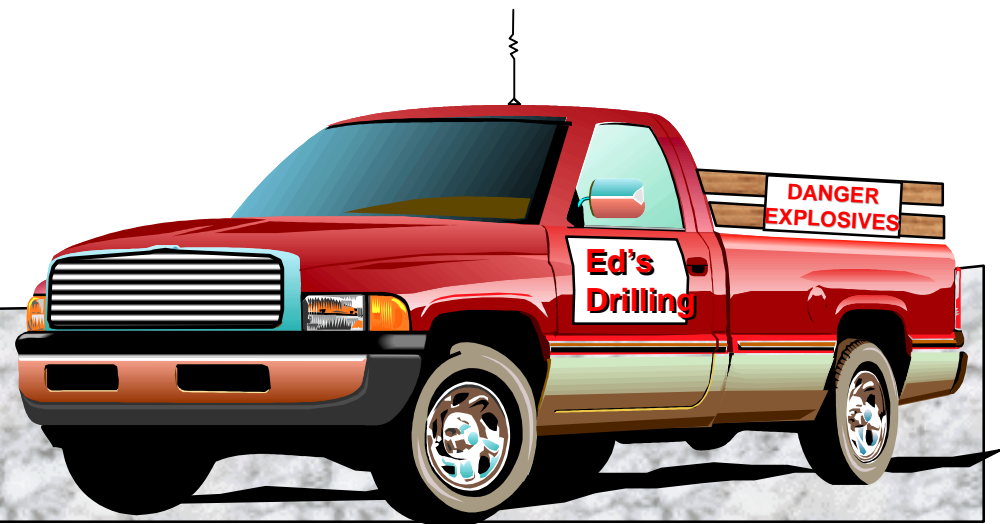


# Equipment Hazards

- **Pushed**  
Over Highwall
- **Pulled**  
Over Highwall
- **Driven**  
Over Highwall

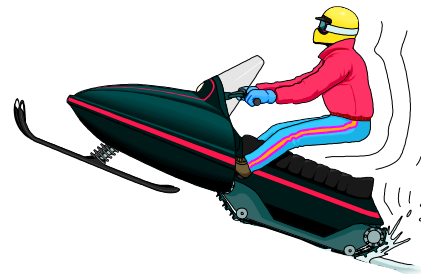
# Solutions

- Plan Job Activities
- Position Equipment and Operate Safely
- Lockout and Tagout
- Inspect and Maintain Equipment



# Unauthorized or Untrained Persons Hazards

- Lack of Knowledge
- Distractions
- Unpredictability



Duh!





# Unauthorized or Untrained Persons - Solutions

## ■ Unauthorized

- Prevent Entry
- Visual Warnings And/or Physical Barriers
- Contact Appropriate Authority

## ■ Untrained

- Give Appropriate Training
- Accompany Untrained Persons



# Fall Prevention Priorities

## 1 Determine Fall Hazard Zone:

- No Physical Barrier and
- 6 Feet or Less From Stable Crest or
- 6 Feet or Less From Unstable Ground or Footing

## 2 Use Fall Prevention

...if **NOT POSSIBLE**...

## 3 Use Fall Arrest



# Fall Prevention

- **Use Physical Barriers**
- **Create Visual Warnings With Physical Barriers**
- **Persons in Fall Hazard Zone Should Use:**
  - **Safety Belts or Harness**
- **Lanyard Should Be Shorter Than Distance From Crest to Tie off Point**





# Fall Arrest (The LAST Resort)

## When You Can Fall Over

- **Harness Preferred**
- **Tie off to Rear D-ring**
- **Use Decelerating or Shock Absorbing Lanyard**

**the Edge**



# Tie Off Anchorage

## ■ Fall Prevention

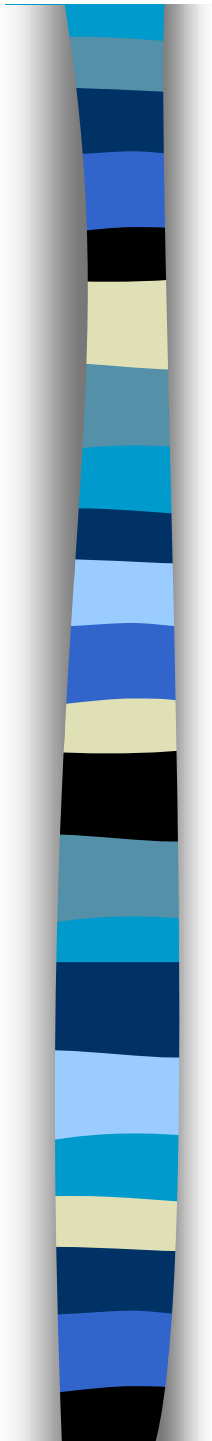
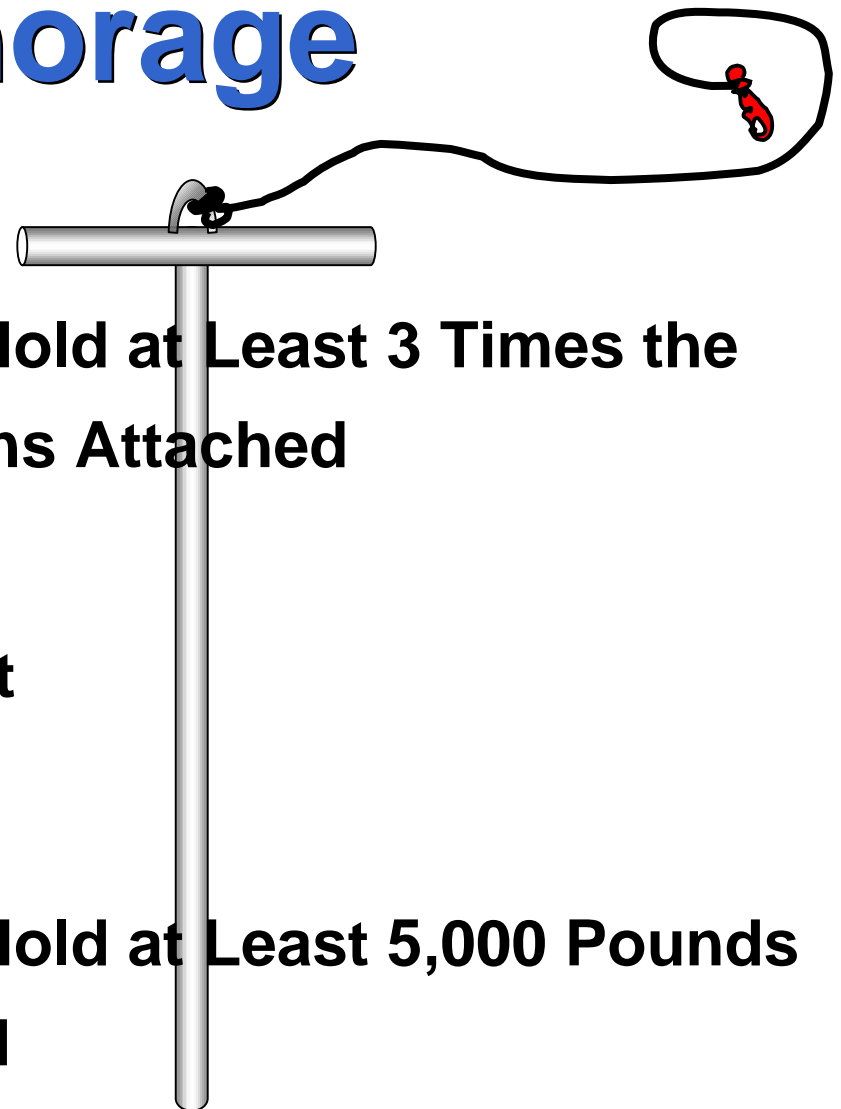
– Anchorage Should Hold at Least 3 Times the Weight of the Persons Attached

- T-bars
- Mobile Equipment

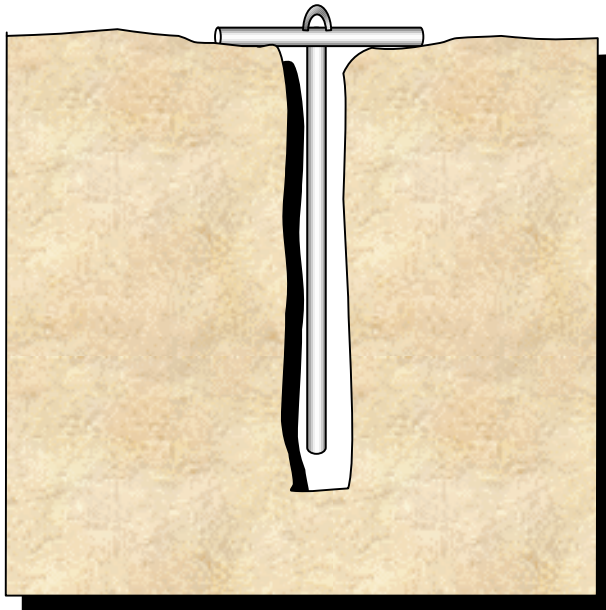
## ■ Fall Arrest

– Anchorage Should Hold at Least 5,000 Pounds Per Person Attached

- Mobile Equipment

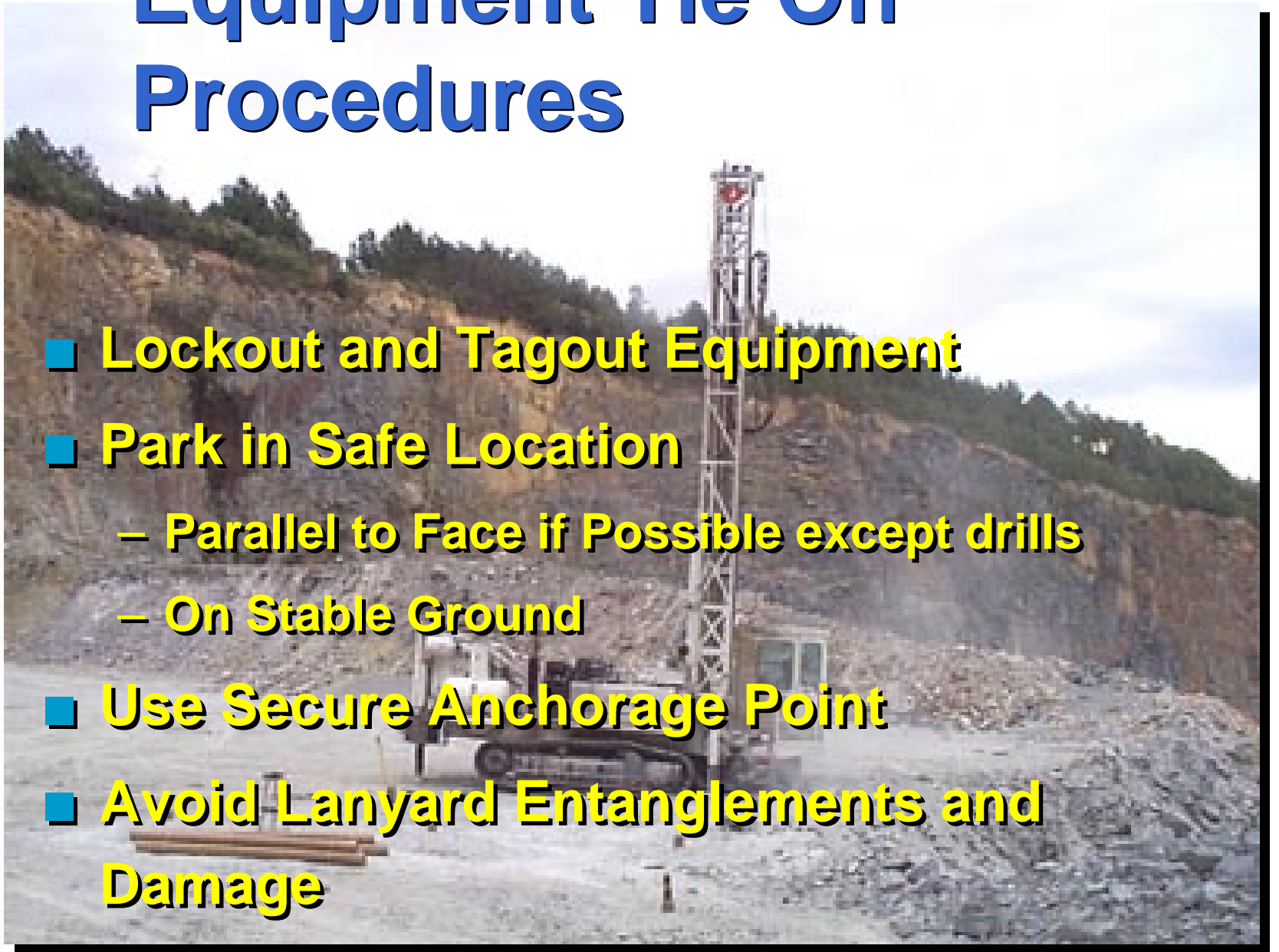


# T-Bars



# Equipment Tie Off Procedures

- **Lockout and Tagout Equipment**
- **Park in Safe Location**
  - Parallel to Face if Possible except drills
  - On Stable Ground
- **Use Secure Anchorage Point**
- **Avoid Lanyard Entanglements and Damage**



# Lockout/tagout



- **Transmission in “Park” or In Gear**
- **Tied off Person has Ignition Key**
- **Parking Brake Engaged**
- **Steering Wheel or Clutch Lock Installed**
- **Wheels Chocked**



# Anchoring for Drillers

- **Drillers should use caution when tying off to a drill. Is there a better alternative?**
- **Never position a drill parallel to the highwall**
- **If you must tie off to a drill, it should be:**
  - **Properly locked/tagged out**
  - OR**
  - **Jacks or outriggers extended**

# Personal Fall Protection Equipment

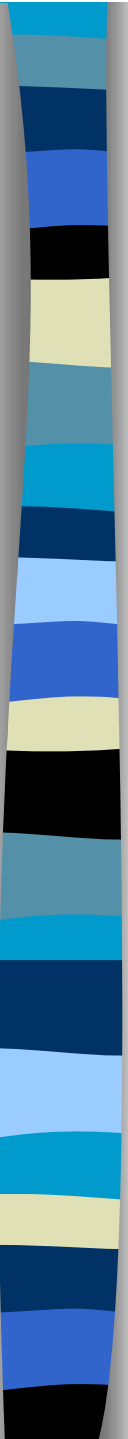
- **Use Equipment That Meets ANSI A10.14 Standard, “Safety Belts, Harnesses, Lanyards & Lifelines”**
- **Train Employees in the Use of:**
  - Harnesses
  - Belts
  - Lanyards
  - Clips, Rings, and Other Accessories
- **Use and Maintain According to Manufacturer’s Instructions**
- **Inspect Equipment Before Each Use**





# Summary

- **Good Judgment and Awareness Are Keys to Working Safely**
- **Continually Examine Your Workplace and Assess Your Fall Hazards**
- **Remember the Fall Hazard Zone**
- **Use Safe Anchorage**
- **Use the Right Equipment According to Manufacturer's Recommendations**





# Disclaimer

**This program has been developed by MSHA and representatives of the mining community for the purpose of providing information on the hazards of working near highwall crests.**

**Because these hazards are site specific and MSHA fall protection standards are performance oriented, this program does not establish official MSHA policy on all possible methods of compliance at every mining operation.**

**Instead, this program provides suggestions and recommendations to the mining industry for educational purposes.**



**MSHA wishes to thank the following organizations for their help in preparing this program.**

■ **Institute of Makers of Explosives**

■ **National Industrial Sand Association**

■ **National Stone Association**

■ **United Steelworkers of America**

■ **Drill & Blast Solutions**

■ **US Silica Company**