

An aerial photograph of a center pivot irrigation system. The system consists of a central pivot point with a concrete pad and a motor, from which a long metal arm extends outwards, supported by a series of truss-like structures. The arm is positioned over a large, green agricultural field. The text "Safety Around Irrigation Systems" is overlaid in large white letters at the top of the image. Below the main title, the text "(PART - 1)", "Gregory L. Stark, P.E.", "Biological & Agricultural Engineering Department", and "Texas A&M University College Station, Texas" is also overlaid in white text. The background shows the curved lines of the irrigation system and the lush green crops.

Safety Around Irrigation Systems

(PART - 1)

Gregory L. Stark, P.E.

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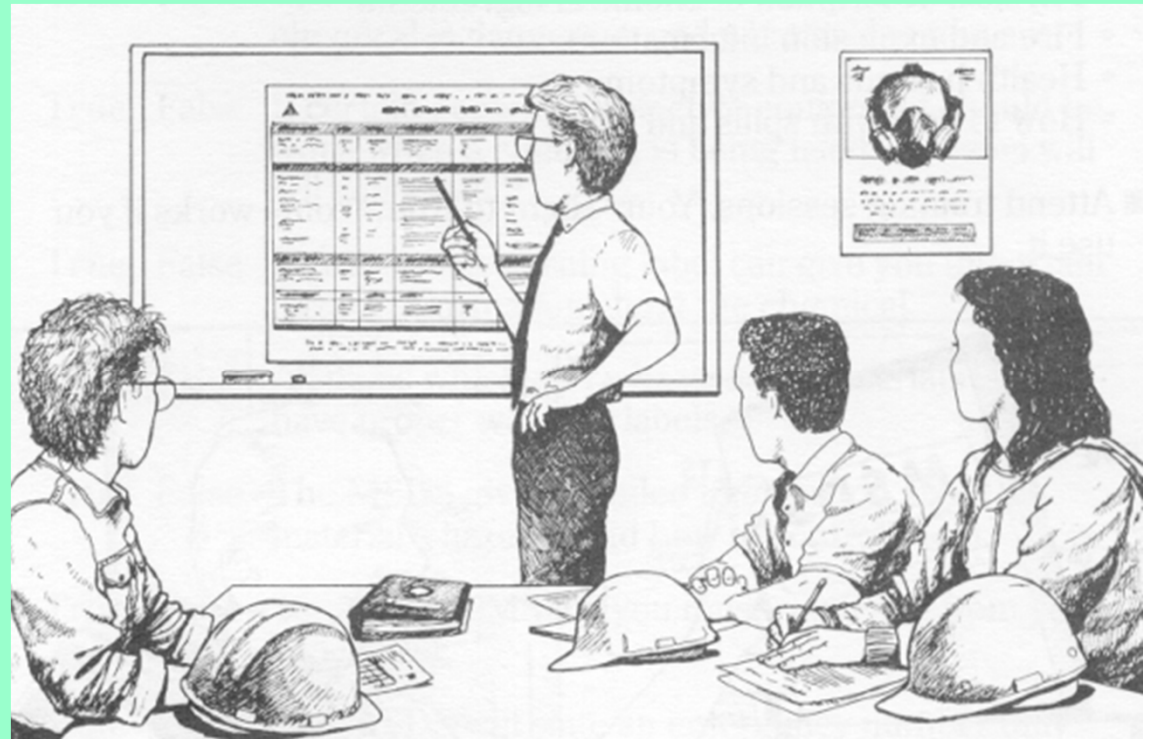
Texas A&M University
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Irrigation Safety

- Just because an irrigation system and related equipment works doesn't necessarily mean it is safe or will fail in a safe manner.
- To ensure safety during operation, maintenance, inspection and testing of systems, employees must be aware of the potential hazards they might be exposed to and understand safe work practices necessary around these systems.

General Safety Training

- General safety training for any type of system involves the following areas:
 - Understanding Equipment and Installation Requirements (What systems look like).
 - Identifying Common Hazards.
 - Understanding Safe and Unsafe Work Practices.
 - Communicating Unsafe Equipment and Installations to Appropriate Entities.



Irrigation System Accidents

- There are different types of potential accidents that can cause injury or death when working on or around irrigation systems including:
 - Electrical Contacts/Accidents
 - Contacts/Entanglements with Moving Parts
 - Chemical Exposures/Poisonings
 - Falls from the System
 - Drowning
 - Physical (Head, Eye, Ear, Hand & Foot) Accidents

Irrigation Systems Contain

- **A Pumping System**
 - One or more pumps generally powered by fossil fuel engines or electric motors.
 - Connects to water distribution system.
- **A Distribution System**
 - Many different types (ditch, gated pipe, center pivots, side-roll, big-gun, etc.), many utilizing electrical powered motors and drive-trains to move the system over/across the field.

Pumping System



Irrigation Problem Areas

- Typical irrigation accidents fall into the following three categories or combinations including:
 - Faulty Equipment and/or Installation by manufacturer, dealer or installer.
 - Equipment/Installation correct but modified or poorly maintained by owner (state of disrepair).
 - Unsafe work practices by individuals during maintenance, repair and testing.

Equipment Design/Installation

- The first link in the chain of irrigation safety is proper equipment design, selection, and installation by manufacturers, equipment dealers, and installers.



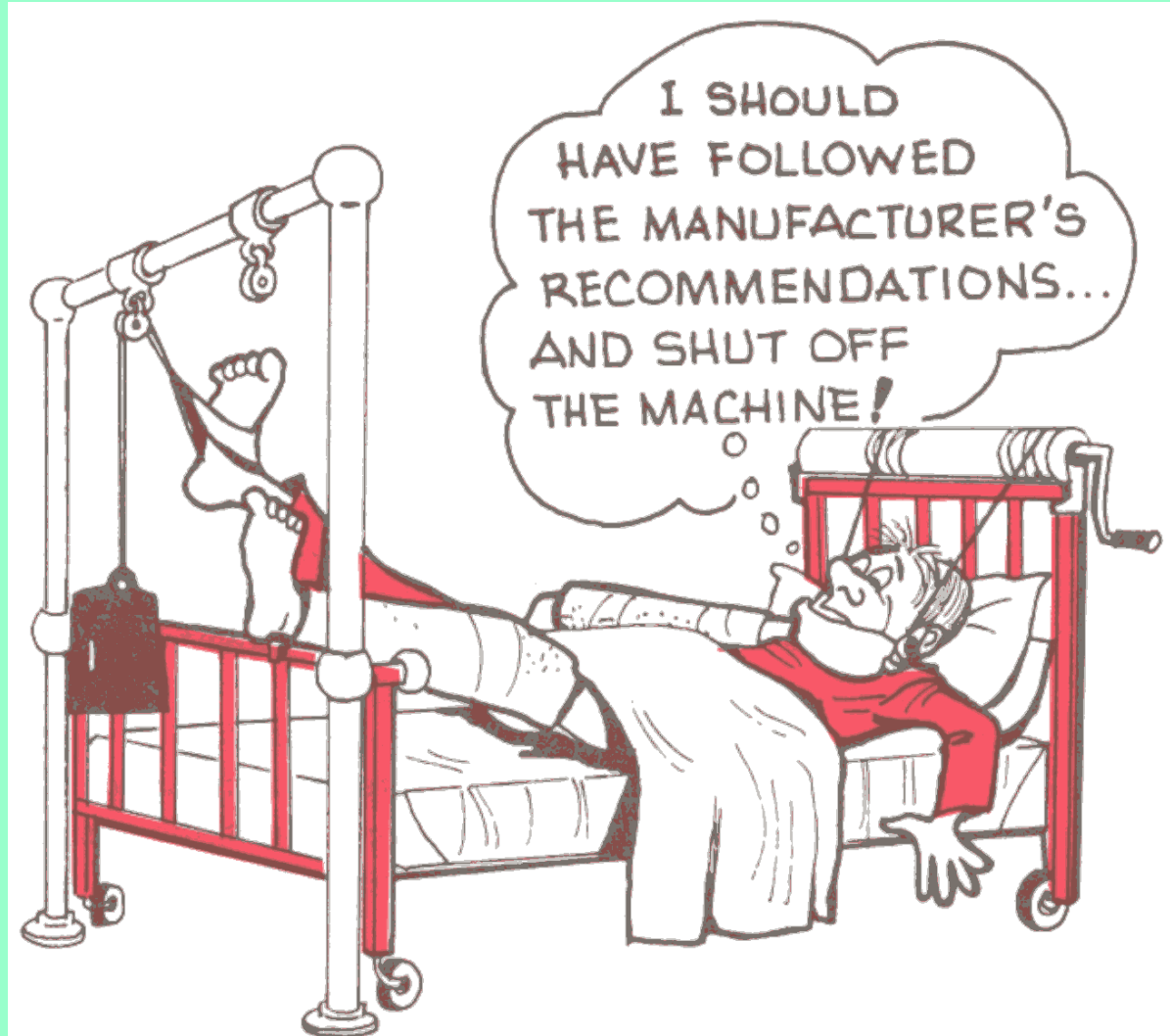
Irrigation System Maintenance

- The second link the the irrigation safety chain involves maintaining properly installed systems in good shape.
 - Many irrigation systems are poorly maintained and fall into states of disrepair.
 - Many systems have been modified or repaired using sub-standard equipment.



Safe Work Practices

- Even if the equipment and installation is correct and the system has been well maintained, people still need to use safe work practices to avoid the normal hazards associated with operation of the equipment.



Irrigation Safety Requirements

- Manufacturers must design equipment to safety standards.
- Dealers must install equipment correctly.
- Owners, Irrigators and Service people must maintain equipment correctly.
- Owners, Irrigators and Technicians must use Safe Work Practices.



Irrigation System Hazards Include:

- Electrical Contacts
 - overhead power line contacts, short circuits, working on energized equipment, lightning strikes.
- Contact/Entanglement with Moving Parts
 - working on energized equipment including PTO's, drivelines, gearboxes, tires, etc.
- Chemical Exposures/Poisonings
 - exposure vs ingestion
- Falls from the System
- Drowning - rivers, lakes, canals, ponds, pits, etc.
- Physical Damage (Head, Eye, Ear, Hand & Foot)

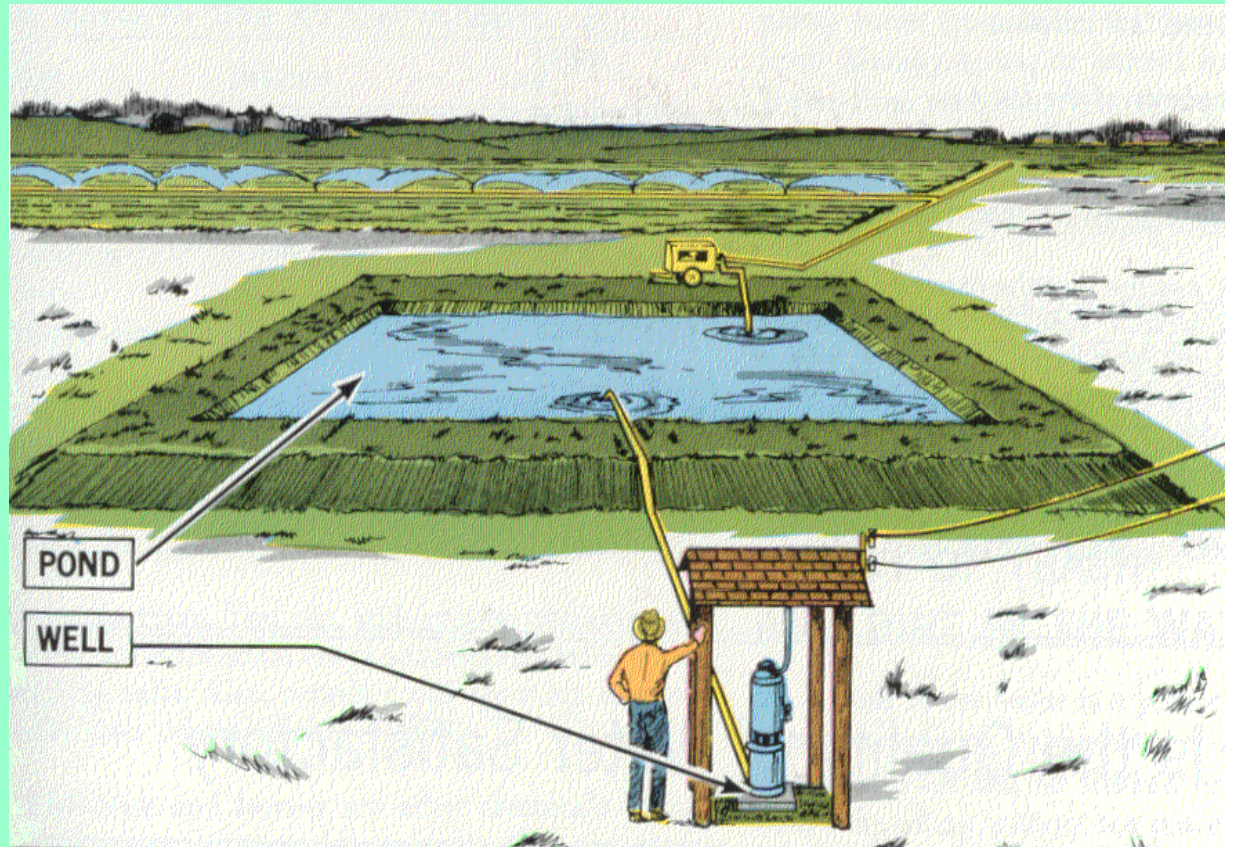
Irrigation Hazard - Drownings

- Drowning are not a common source of irrigation accidents.
- Accidents do occur and the potential for hazard is always there due to the amount of water present with systems pumping from lakes, rivers, streams, ponds, or pits.



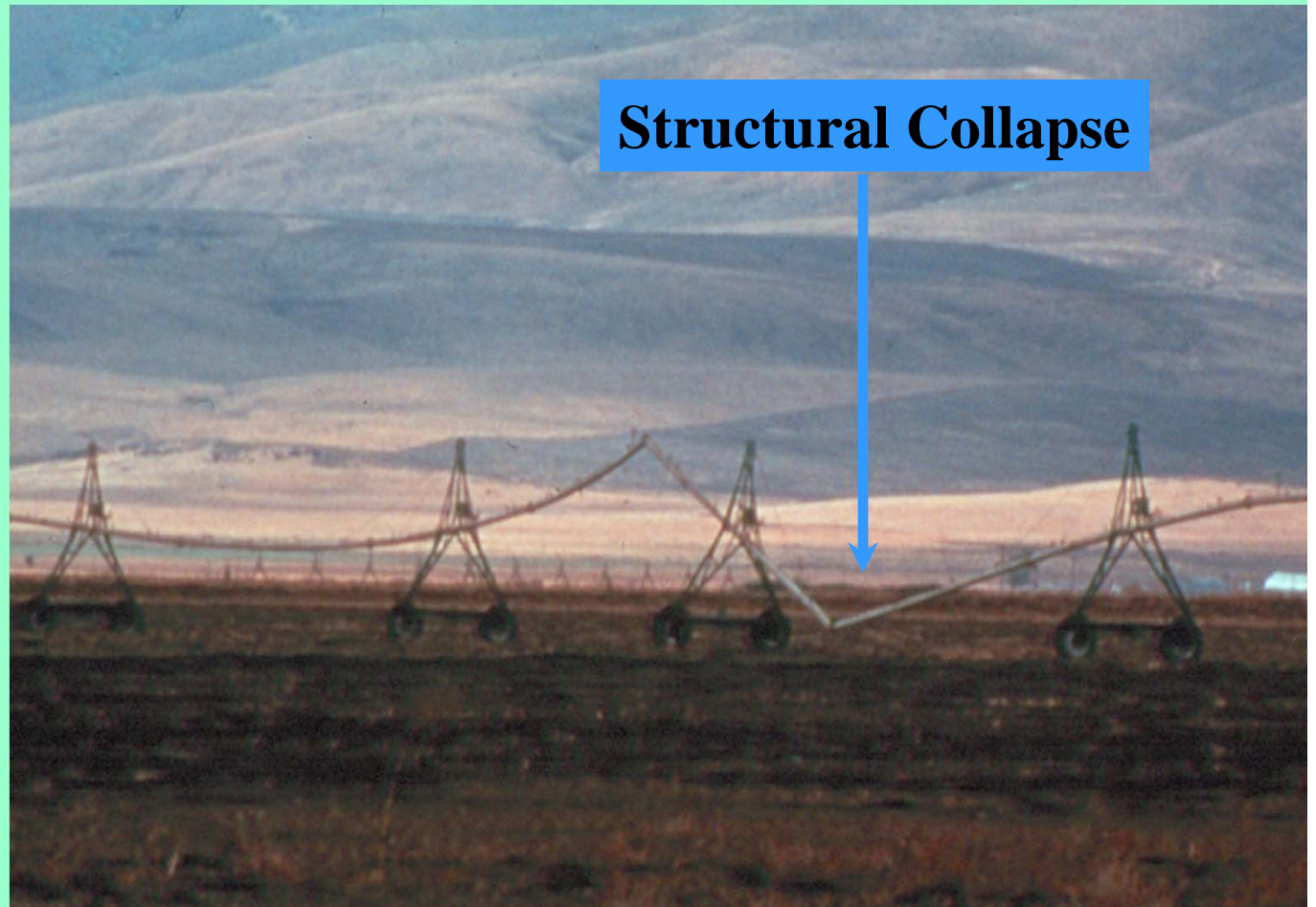
Irrigation Hazard - Drowning

- Most accidents involve falls and slips or recreational activities in water bodies such as rivers, lakes, ponds, or pits used for irrigation.
- Be aware of possible fall and slip hazards when working in the vicinity of bodies of water such as rivers, lakes, ponds, and pits used for irrigation.



Irrigation Hazard - Structural Integrity

- Visually inspect for any signs of loose or missing bolts or visual indications that an irrigation machine is close to a structural collapse before moving the machine or climbing onto the machine.



Irrigation Hazard - Falls

- Many irrigation systems are tall enough that falls from their structure can cause serious injury or death.
- Depending on where a person falls from the system, they may make contact with structural members and other sharp objects during the fall.



Irrigation Hazard - Falls

- There may be enough hand/fooholds for a person to scale/climb up onto the machine but it should not take the place of a ladder or other lift device.
- The metal structure of most self-propelled irrigation machines does not meet the requirements of a safe ladder.



Irrigation Hazard - Falls

- Use a good ladder or stable lift device to perform overhead repair and maintenance on an irrigation machine.
- Ladders can also be dangerous when used in unlevelled, tilled, muddy fields when not anchored properly.

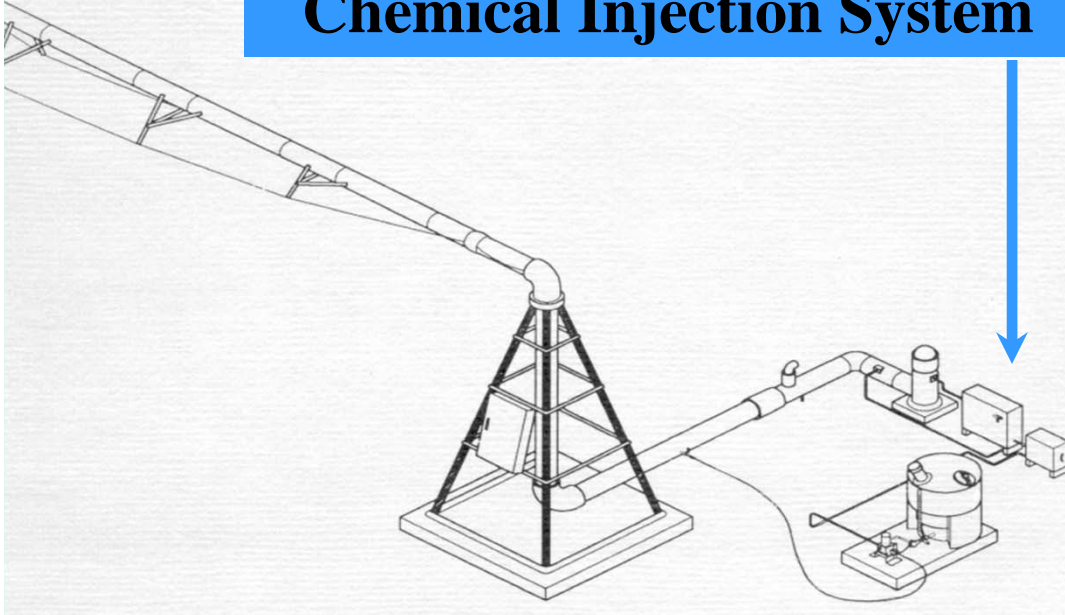


Irrigation Hazard

Chemical Exposure/Poisoning

- Increased use of chemigation/fertigation through irrigation systems has resulted in increased numbers of chemical exposures & poisonings.
- Chemical exposures can be through exposure to system water, standing water, or crops or drinking water from systems used for this purpose.

Chemical Injection System



Irrigation Hazard

Chemical Exposure/Poisoning

- Be careful of exposure to spray systems or crops under them when chemicals or fertilizers have been injected into the water.
- Don't drink from any system used to apply chemicals.
- Avoid areas of obvious chemical spills.

Fertigation/Chemigation Unit



Do you think this water puddle contains chemicals?

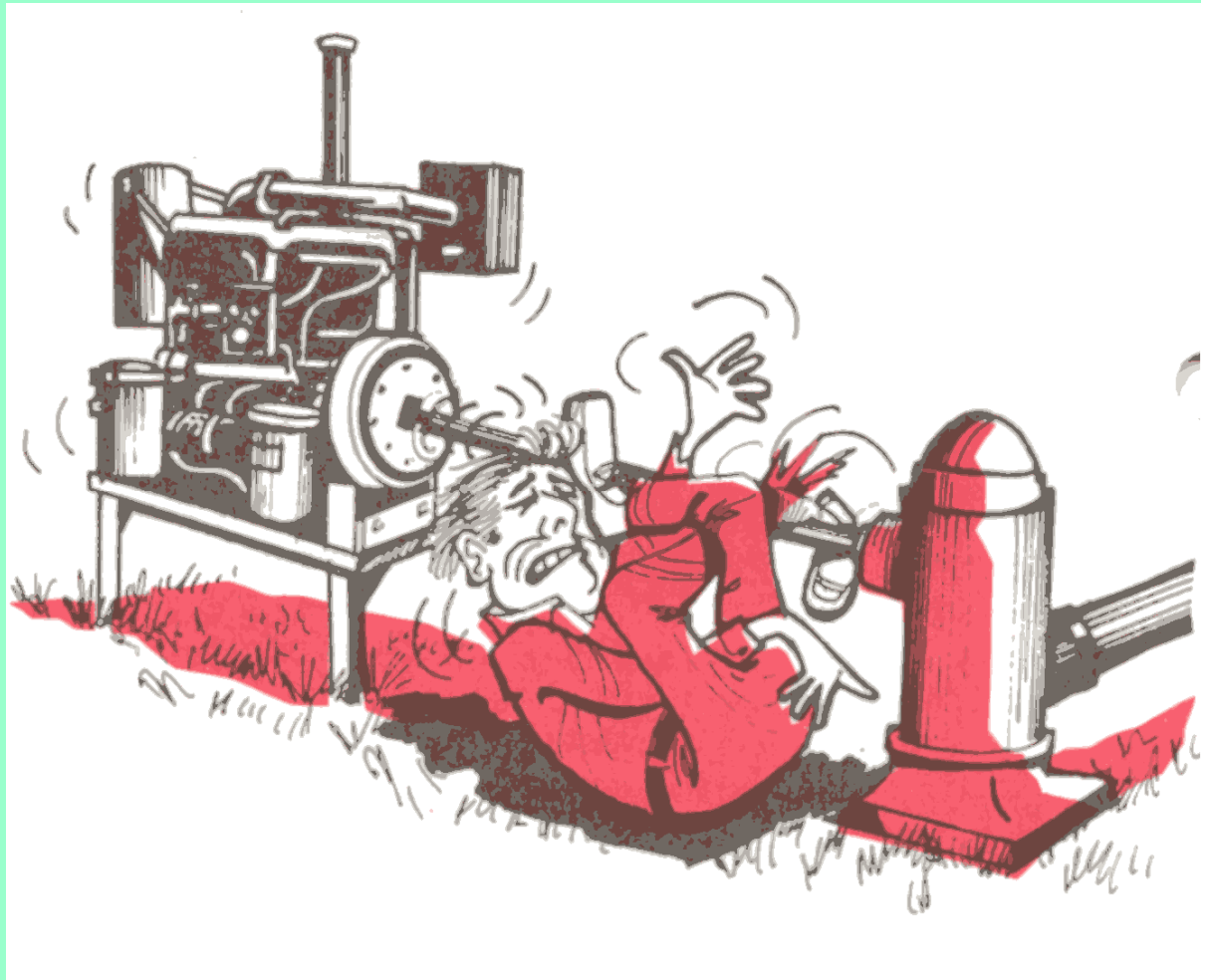
Irrigation Hazard - Water Jets

- Avoid getting your body in contact with high pressure water streams of any type, especially end guns on self-propelled machines.
- High pressure water jets can cause physical harm, especially to eyes, and can also cause falls from irrigation systems.



Irrigation Hazard - Entanglements

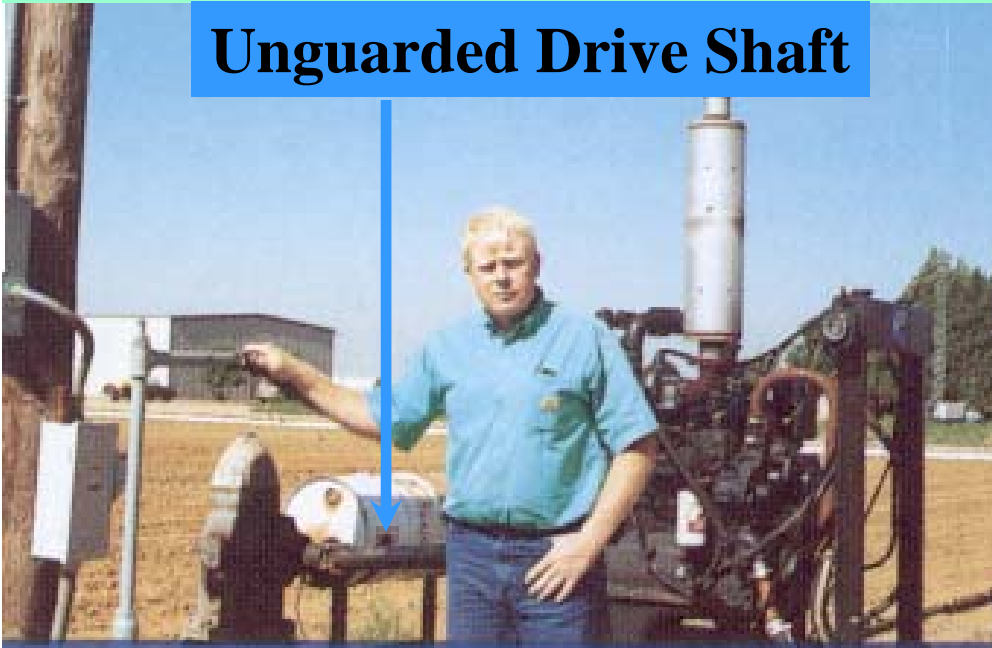
- Do not approach or work around unguarded power take-off shafts, belts and other and other power transmitting devices.
- Alert others in the vicinity and the owners or operators to the hazard.
- Avoid wearing loose clothing or long hair in the vicinity of rotating equipment.



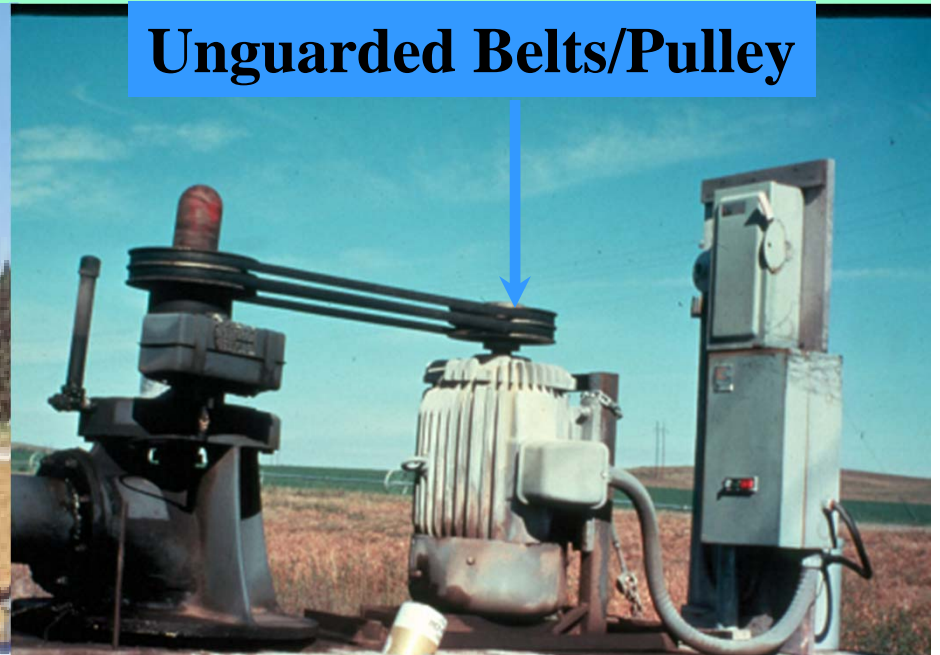
Irrigation Hazard - Entanglements

- Be alert to unguarded power take-off shafts, belts, and other power transmitting devices.
- Replacements and retro-fit guards are available from dealers for older machines.

Unguarded Drive Shaft



Unguarded Belts/Pulley



Irrigation Hazard - Entanglements

- OSHA does not require driveshaft covers on center pivot irrigation machines.
 - Slow rotation speed.
 - Operator is supposed to disconnect the power prior to any maintenance or repair work.
 - Most manufacturer's install them to prevent crop wrappage.



Machine with telescoping driveline covers

Irrigation Hazard - Entanglement

- Industry standards require manufacturers to provide safety signs on motors/equipment that could start automatically to alert personnel performing repair & maintenance to the potential hazard and to shut off power before working on the system.



CAUTION

This machine may start automatically.
Do not service until machine disconnect
is in "OFF" position and locked.

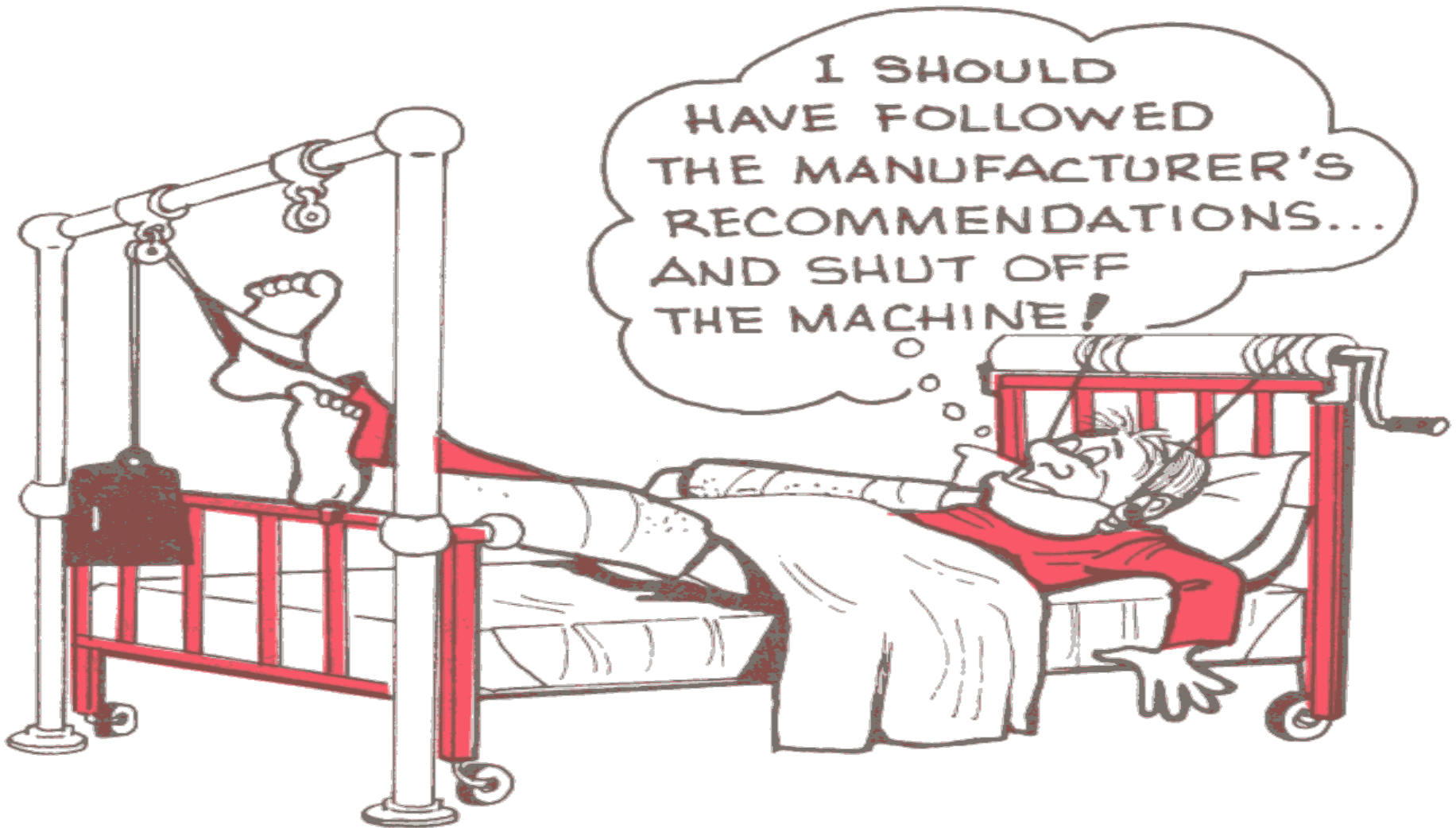
Irrigation Hazard - Entanglements

- Never attempt to remove vegetation or other foreign materials from rotating equipment while it is moving or the equipment is energized.
- ALWAYS shut down the machine for repair or maintenance.



People can suffocate when working on energized equipment and the driveline bolt grabs their coverall sleeve and wraps tight.

Shut Down the System Before Working On It!!!!!!!!!!!!!!



Irrigation Hazard - Run Overs

- Keep vehicles and other equipment out of the paths of self-propelled irrigation machines.
- Many of these machines have excellent traction and can “climb” over and crush fairly large objects like cars, pick-ups, and even small buildings due to their weight.



It's not funny the first time it's your vehicle

Irrigation Hazard - Squeeze Points

- Keep in mind that even if equipment is not run over, you could get squeezed between the system and a fixed piece of equipment it barely misses.



Note location of wheel track to pump

Irrigation Hazard - Fuel Leaks

- Be alert to fuel leaks from storage tanks and fuel lines.
- Sparks from electrical shorts can ignite these fuels or any gas and oil accumulations from leaking storage systems, fuel lines or improper storage containers.

Fuel Storage Tank



**Oil and lubricant storage.
Are most systems this clean???**

Irrigation Hazard - Fuel Ignition

- Gasoline, natural gas and propane all ignite from 2 to 15 percent vapor concentration.
- Be careful around unmarked storage containers because there is a high probability they do not contain what their label indicates.



Irrigation Hazard

Electrical Contacts

- Electrical safety concerns related to irrigation systems are important because:
 - Pumps and other equipment operate in a wet or damp environment increasing the chance of equipment failure if parts become wet.
 - Personnel working around this equipment are often wet or damp so their susceptibility to electric shock is greater.
 - Many of these systems may not have had proper maintenance performed on them over the years.

Irrigation Hazard

Electrical Contact Accidents

- **Faulty Equipment & Wiring Installations & Maintenance.**
- **Unsafe Work Practices**
 - Failure to turn off power before working on system.
- **Lightning**
- **Overhead Power Lines**
 - Irrigation Pipe, Standing on Systems, Spraying Water on Overhead Lines.

Do Water & Electricity Mix?

- They can.....if proper safety precautions are followed.
 - Proper Equipment Selection
 - Proper Installation Methods
 - Proper Maintenance Practices
 - Use of Safe Work Practices



Electrical Safety Goal

- Don't let any part of your body be a path for electricity to flow through you.

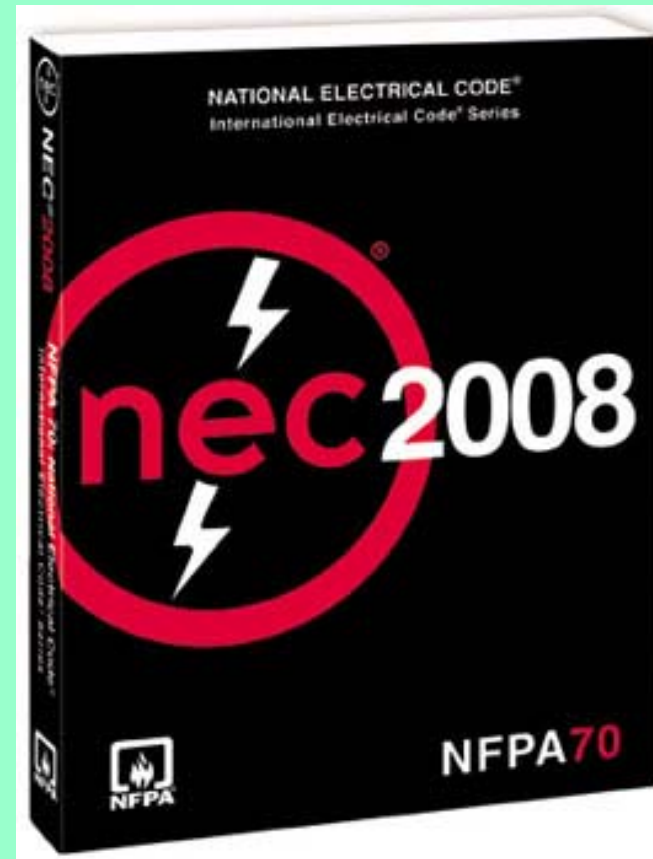


Electrical Wiring Standards

- Many pumping systems and water distribution systems are electrically powered and many irrigation accidents are the result of electrical contacts or not turning off the power.
- Irrigation Systems should be wired to at least the requirements of the National Electrical Code (NEC).

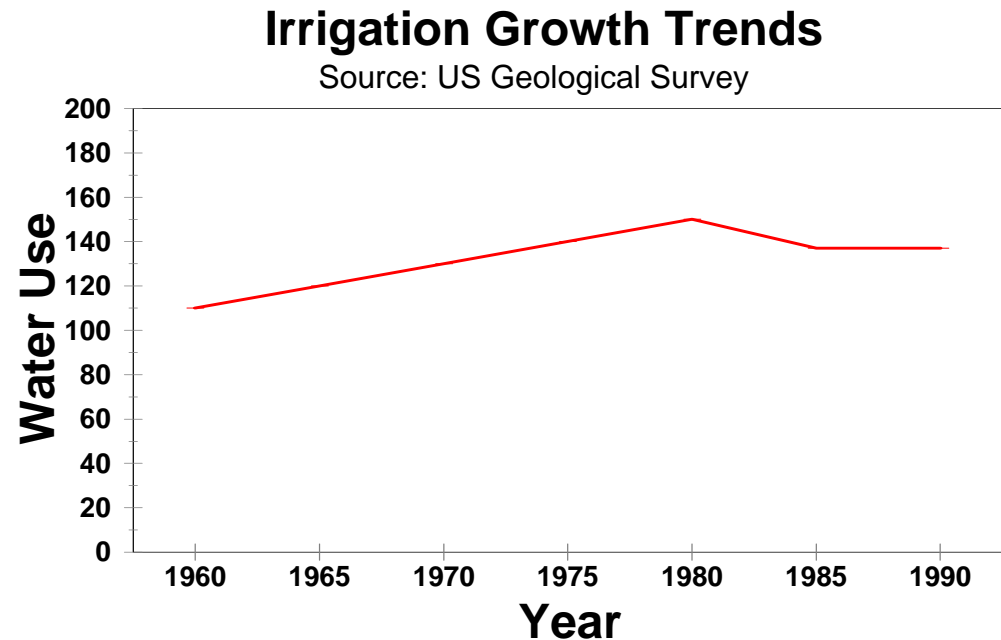
National Electrical Code (NEC)

- The consensus safety standard of the electrical industry:
 - how to install a safe electrical system to electrical utilization equipment of most any kind.
 - A minimum standard... dictates wiring & equipment necessary to be safe, not to work well.



1970's to Early 1980's

- Large growth in irrigation installations.
 - Significant increase in electrical accidents and electrocutions on irrigation systems (pumps & irrigation machines)
 - Electrical grounding of machines found to be horribly inadequate.
 - Development of ASABE Standards S362.2 and S397.2 and addition of Article 675, “Irrigation Machines” in National Electrical Code.



NEC Electrical Requirements

Article 675 - Irrigation Machines

- **Pumps & Irrigation Machines**
 - Must have disconnect switches
 - Must use equipment & enclosures suitable for the conditions (wet, dirty, corrosive, etc.)
 - Must protect wires from physical damage or use “jacketed” irrigation cable
 - Must have circuit and equipment grounding.

Equipment & Installation Problems

- Common unsafe equipment selection, installation & maintenance problems include:
 - No Electrical Disconnect(s) to Turn Off Power
 - Improper Equipment or Installation
 - Improper Electrical Grounding
 - Faulty insulation on wires and power cords



Electrical Disconnects

- Electrically powered irrigation pumps and irrigation machines are both required to have an electrical disconnect switch within sight of and within 50 feet of the equipment that turns off the electrical power to the equipment.
 - Provides a convenient location to shut off the power for safe maintenance and repair of the equipment.



Pumping System Disconnect

- The disconnect switch for the pump should only control the pump motor.
- Equipment such as irrigation machines or fertilizer or chemical injectors should not be supplied from the load side of the pump disconnect through the pump disconnect switch.

Pump Disconnect Switch

Pump Motor



Irrigation Machine Disconnect

- Irrigation machines require a disconnect switch with overcurrent protection (fuses) capable of being locked in the open position at the point of connection of electric power to the machine.



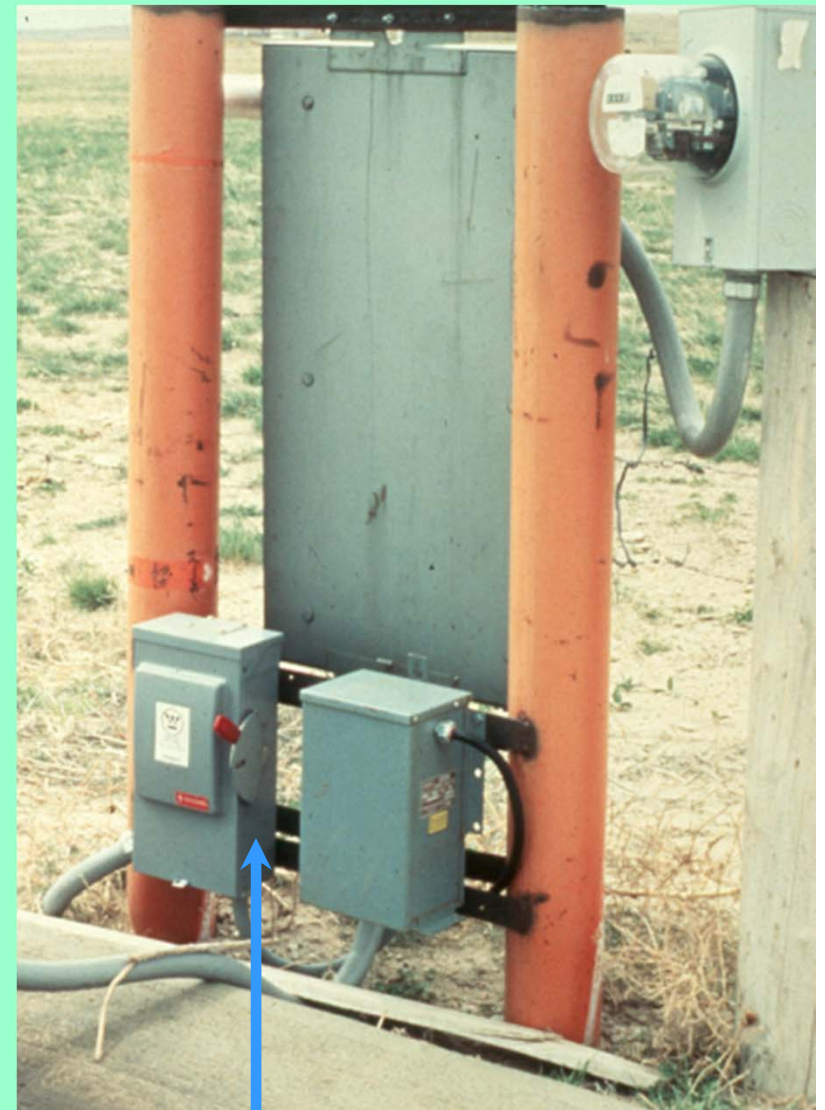
Machine Disconnect Switch

- Most Manufacturers provide this as part of the control panel on the irrigation machine.
- Allows power to be turned off to the entire machine from one location.
- Allows the power to be “locked” off for maintenance & repair.



Switches/Controls

- Should be mounted at a height to prevent the need for kneeling or climbing.
- Handles for disconnects must not be higher than 6.5 feet or lower than 3 feet.
- All switches must be permanently labeled for their function and use.
 - Examples:
 - Pivot
 - Water Pump
 - Injection Pump



Switch Mounted Too Low

Electrical Enclosures/Boxes

- Electrical enclosures and boxes are used to guard operators from live electrical parts (electrical connections, switching mechanisms, etc) in the pump control panel, irrigation machine control panel, and other related electrical devices.
 - Weatherproof or watertight equipment enclosures and boxes for all irrigation systems.
 - Look for holes and openings that allow rodents and/or water and other foreign materials to enter and accumulate in panels and other enclosures.

Electrical Enclosures

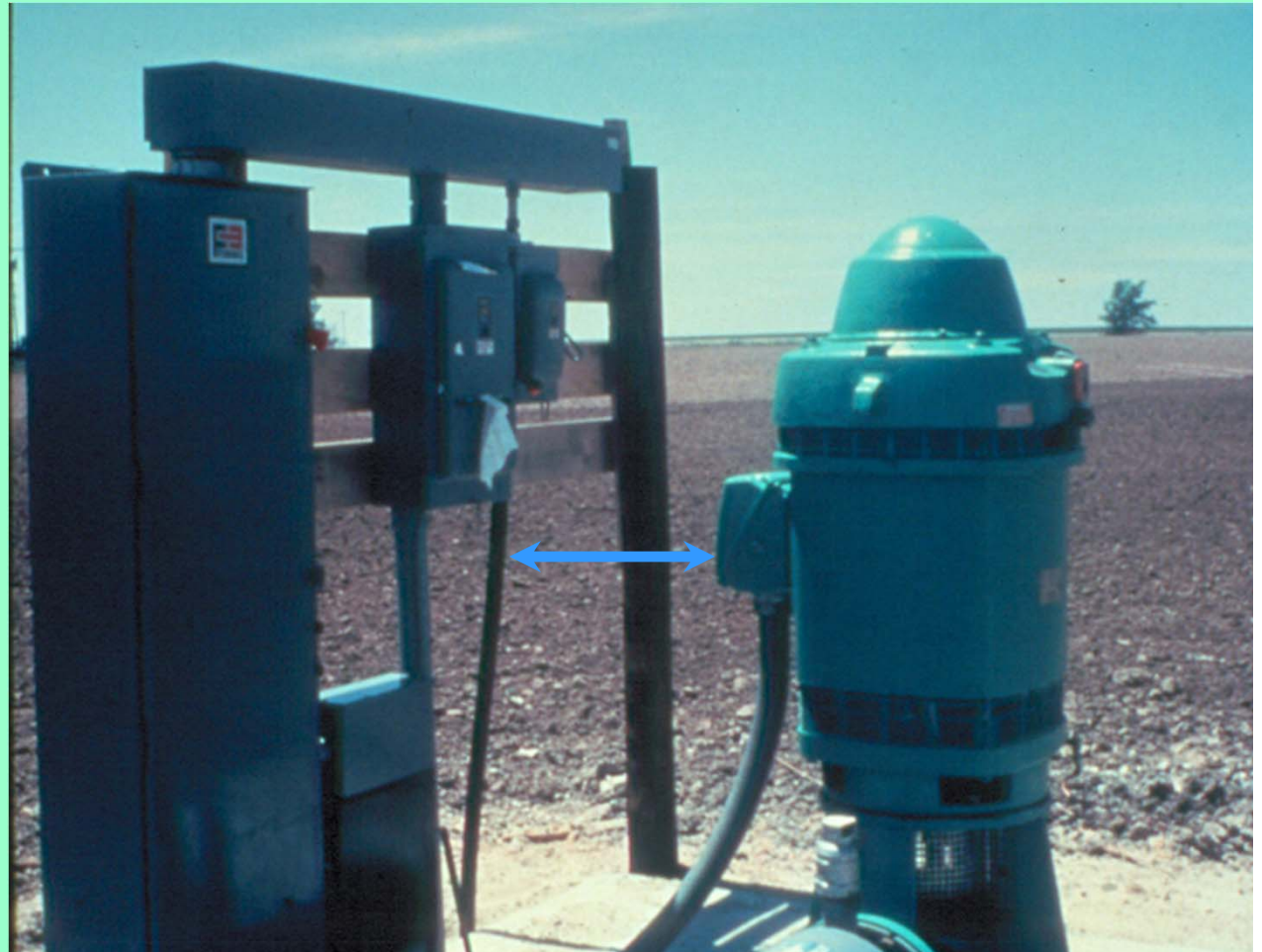
- All electrical enclosures should be suitable for the environmental conditions they are exposed.
- Generally requires “weather-proof” or “water-proof” enclosures.
- Should not have openings that allow water, dirt or rodents.



Weather-proof switch and enclosure
Note: Openings are unsealed and it is not installed at the required height or mounted to a permanent structure.

Inadequate Working Space Around Equipment

- All electrical equipment is required to have specific clear “working space” around it depending on location and voltage.
 - Allows people performing adjustment, repair or maintenance and inspection to do it safely.



Should be at least 30” of clear working space

Inadequate Working Space

- The NEC requires equipment have adequate working space for people to work on it.
 - Mounting height is important.
 - You should never have to bend over, kneel or lay on your back, side or stomach to operate a switch, or other control device.



Door will not open far enough to allow someone to safely replace fuses.

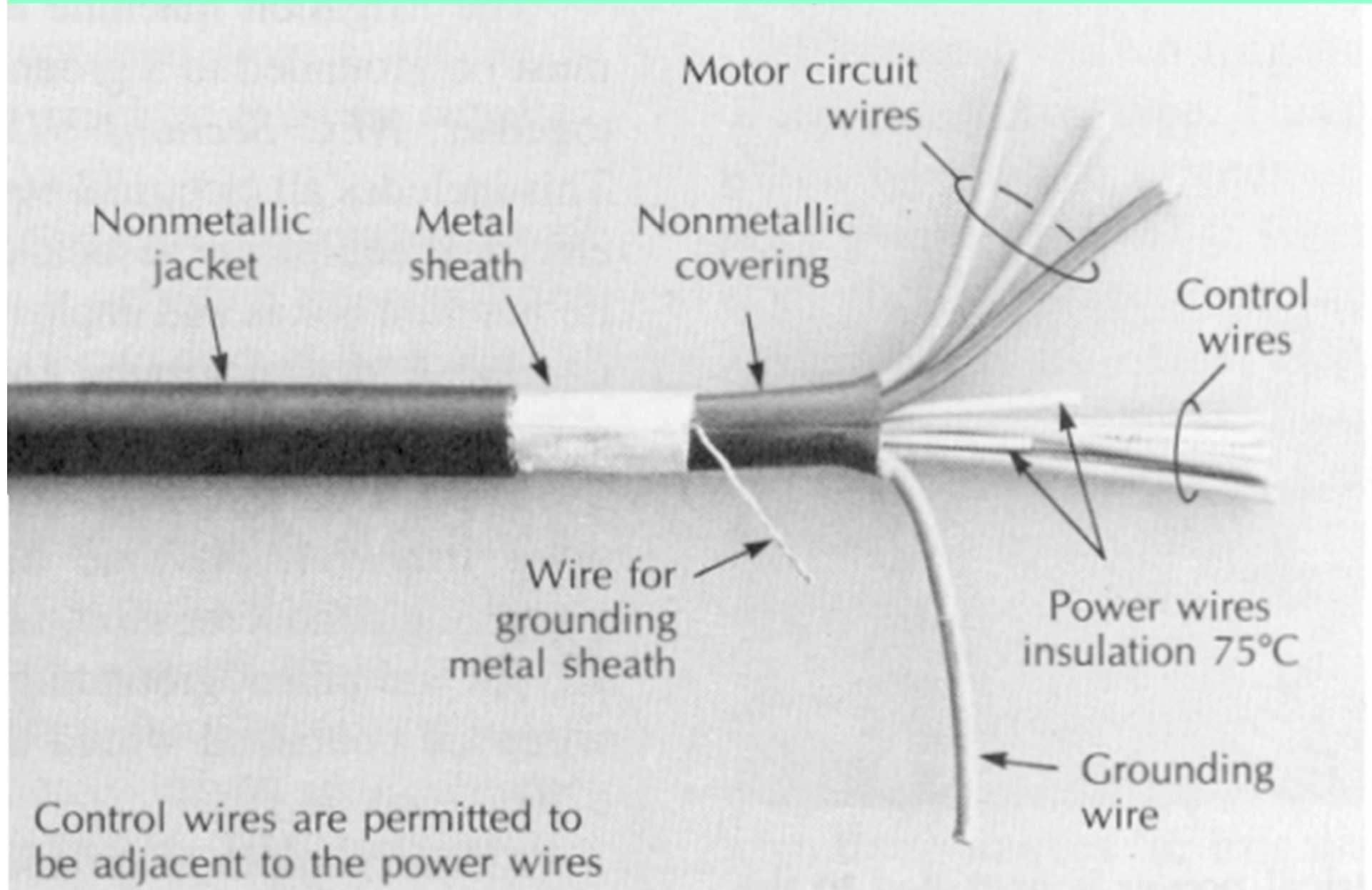
Irrigation Machines

- Conductors
 - All electrical conductors **SHALL** be within an enclosure, a raceway (conduit), or a jacketed cable.
 - Most systems use a heavy duty jacketed “irrigation cable” which has more protection than an “extension cord”

Jacketed “Irrigation Cable”



“Jacketed” Irrigation Cable



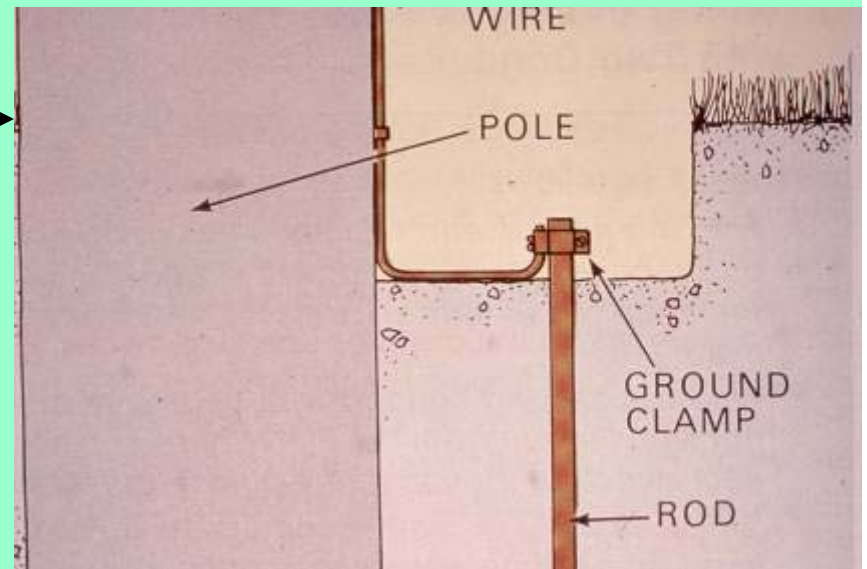
Electrical Grounding

- Grounding is a “secondary” measure of protecting employees and operators from electrical shock when insulation and guarding fail.
- Grounding is the process of connecting the electrical circuit and/or equipment to the earth (soil).
- There are two types of “Grounds” which is confusing.....Circuit/System Grounding and Equipment Grounding.

Electrical Grounding

- **Circuit/System Grounding** →

- Intentionally connecting a current carrying wire in the electrical system to earth (soil).
- Protects the electrical wire and equipment from lightning.



- **Equipment Grounding** →

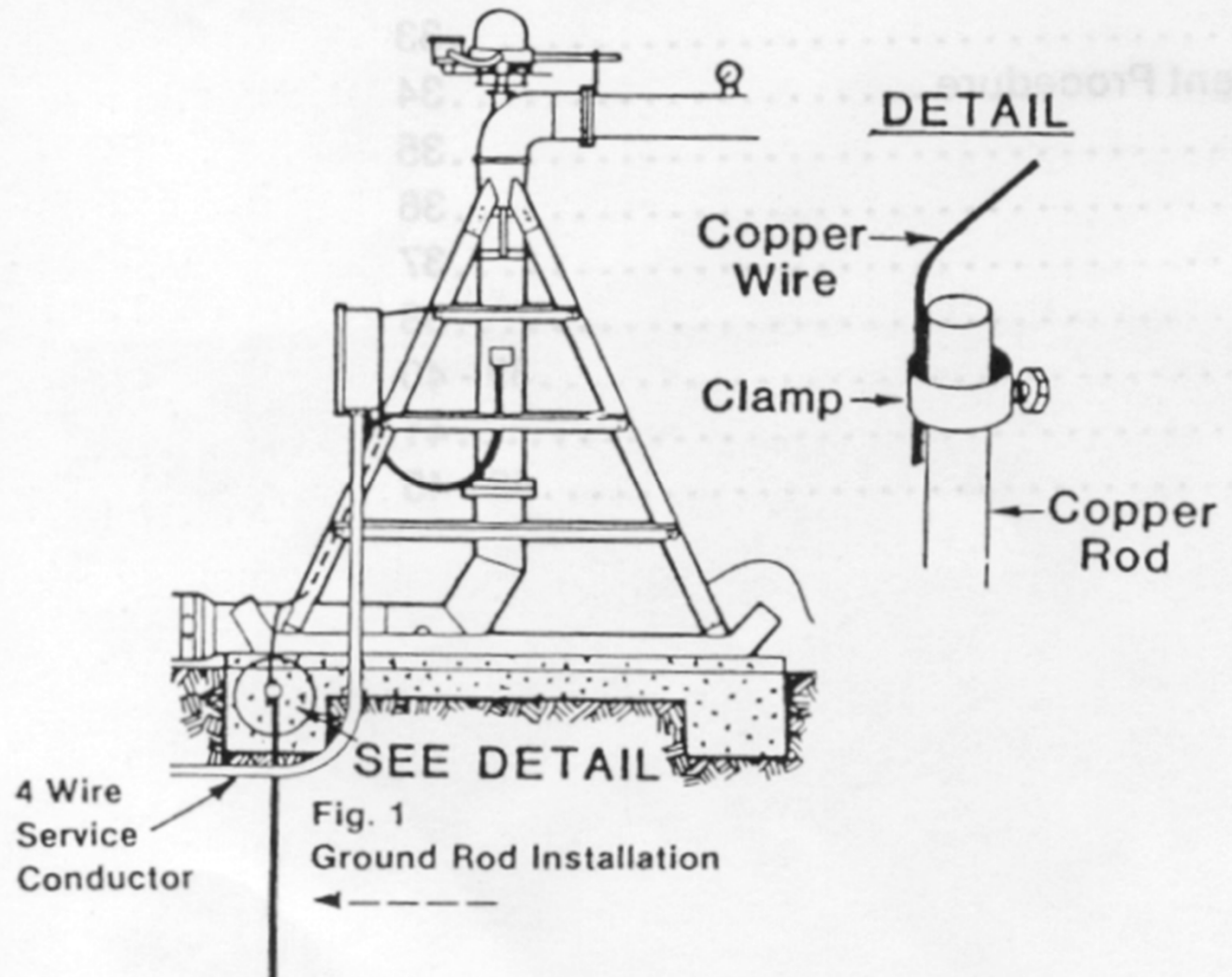
- Intentionally connecting the metal cases/enclosures of electrical equipment to earth (soil).
- Reduces hazards to persons from wiring or equipment short circuits.



Irrigation Machine Circuit/System Grounding

- Grounding
 - A grounding conductor and ground rod used for no other purpose than for machine grounding shall be used.
 - Provides lightning protection.

Irrigation Machine Ground Wire & Rod



Circuit/System Grounding

- All irrigation machines whether permanently installed or portable should have a copper ground wire run from the control panel to an 8 foot ground rod installed in the soil.
 - Primary purpose is lightning protection for the system.
 - It should run directly along the structure and not wrap as pictured.

Ground Wire

Ground Rod



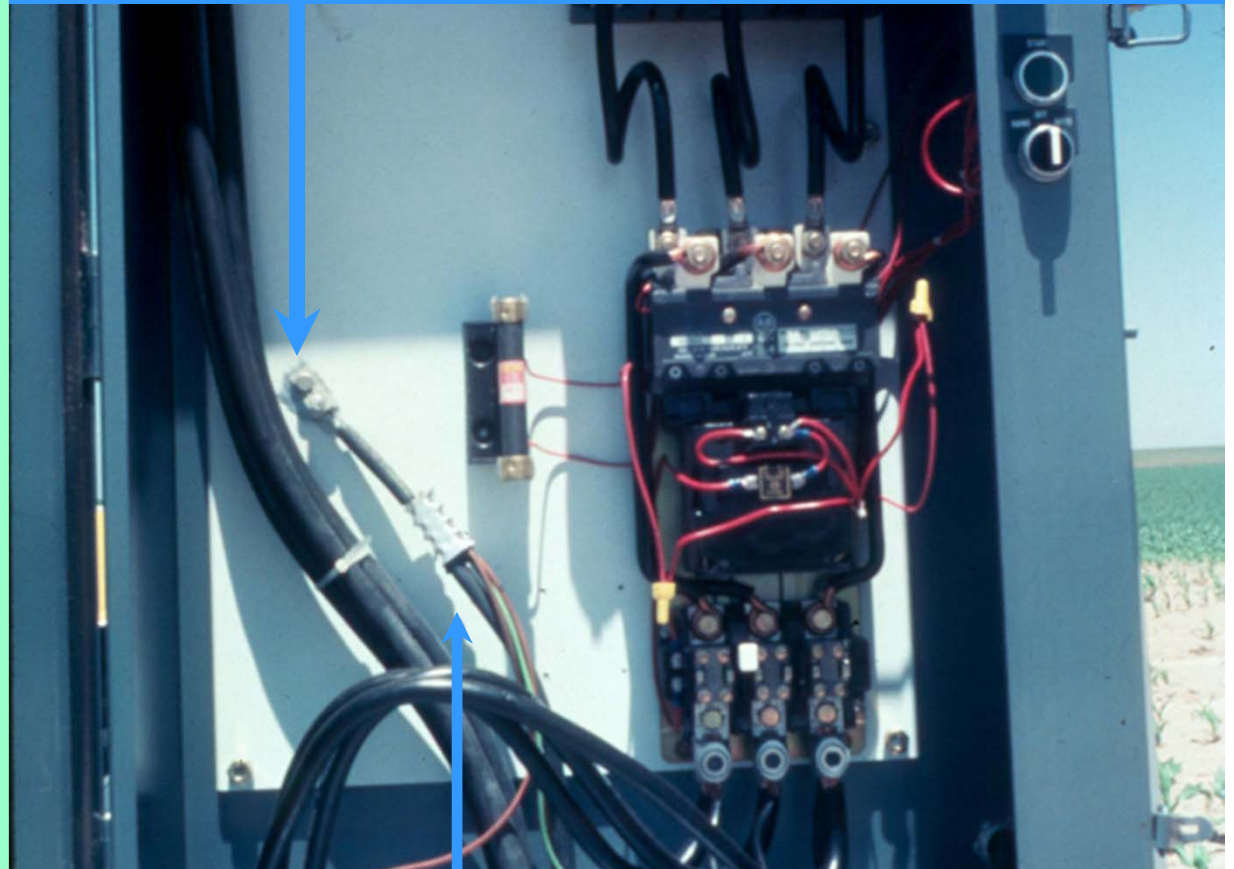
Pump & Irrigation Machine Equipment Grounding

- Both the pump and irrigation machine are also required to have appropriate “equipment grounding”.
 - Generally a bare copper or green insulated wire run from the electrical service to the metal frame of the pump motor and irrigation machine.
 - Similar function to the 3rd prong or “safety” wire on a standard 120 volt outlet.
- Difficult to determine without opening electrical enclosures and inspecting.

Equipment Grounding

- Equipment grounding allows the system to fail in a safe manner and blow the fuses to shut the power off if the pump or irrigation system has a short circuit.
- It is not necessary to make the system operate...only fail in a safe manner.

Equipment Grounding Conductor & Connection in Pump Panel

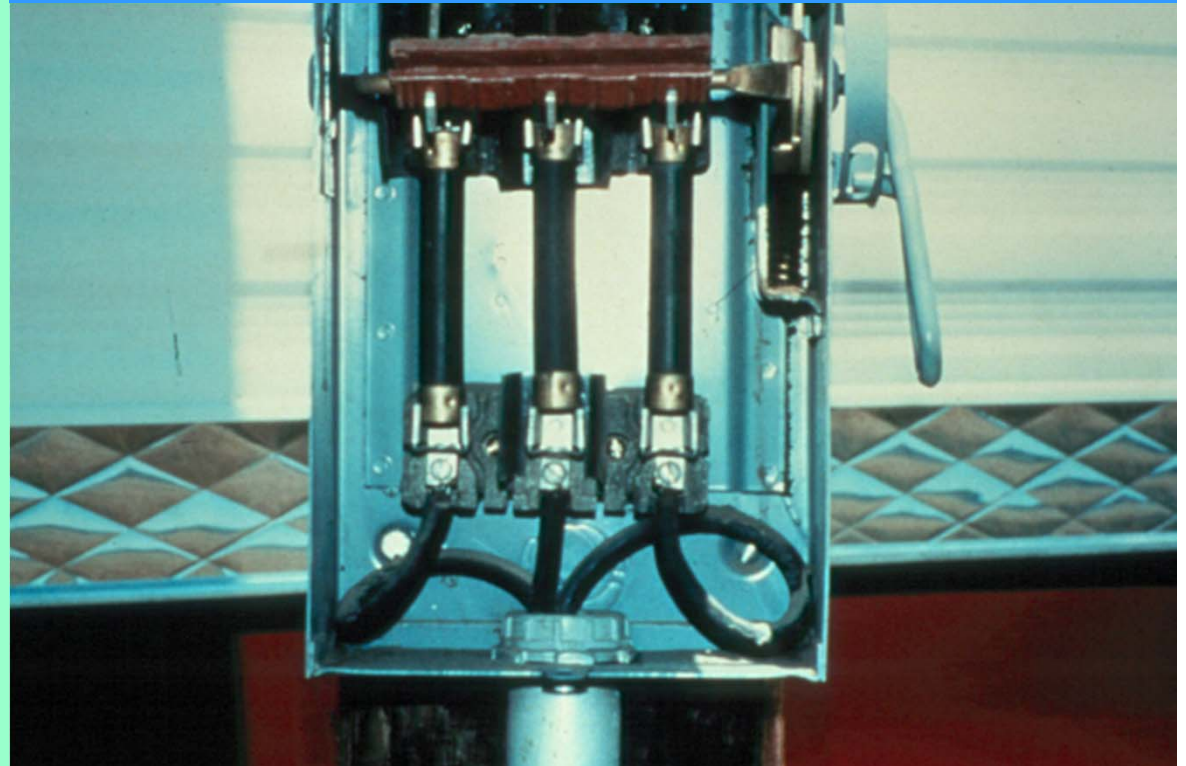


Equipment grounding conductor runs to metal frame of pump motor.

No Equipment Ground??

- Without equipment grounding wires, the circuit will probably not be de-energized due to a short circuit in the equipment.
- The metal frame of the irrigation pump or the irrigation machine will become energized.
- Anyone touching it and wet ground is subject to electrocution.

3 Phase circuit without equipment grounding conductor



3 Phase circuits should have 4 wires.

Improper Maintenance of Systems

- Common problems related to improper or poor maintenance of systems include:
 - Open Electrical Enclosures (boxes)
 - Broken or Damaged Electrical Conduit
 - Use of Damaged Electrical Power Cords
 - Improper Fuse Replacement

No Equipment Grounding Wire to Motor



Open Connections & Motor Enclosure

Open Enclosures/Boxes

- When electrical enclosures and boxes are left open after repair or maintenance or holes are left unsealed, moisture, dirt, and other debris will accumulate inside the enclosure.
 - Can cause voltage to leak from the wires to the metal enclosures/boxes and energize the metallic enclosure.

Enclosure on ground

Switch to low



Openings allowing moisture to enter

Broken/Separated/Corroded Electrical Conduit

- Sharp metal edges on broken or separated electrical conduit can cut conductor insulation and cause electrical shorts to the metal conduit energizing any metal equipment or structure connected to it.

Damaged Conductors with Tape



Broken Conduit Joint

Broken/Separated/Corroded Electrical Conduit

- Look for metallic conduit that has broken or pulled apart at joints exposing the electrical wires inside to the sharp metal edges and possibly cutting into them.



Old Corroded & Broken Conduit

Electrical Power Cords

- Power cords on irrigation systems are exposed and subjected to the elements and in some cases physical damage so their insulation is more prone to damage than that of cables inside conduit or buried underground.
- Be alert for damaged areas of power cords exposing the conductors.



Power Cord Insulation

- When power cord or conductor insulation is damaged, the result can be energization of equipment from the bare electrical conductors being contacted or coming in contact with humans, water puddles, or damp soil.



Unprotected individual power conductors subject to damage.

Damaged Electrical Power Cords

- Contrary to popular opinion.....Electrical tape is **NOT** meant to fix extension or power cords with gouges or cuts exposing bare wire.
- Electrical tape does have many useful purposes in concealed wiring....but it is not meant for exposed wiring, especially in wet areas.
 - It's not rated as an insulating material.
 - It's not watertight.

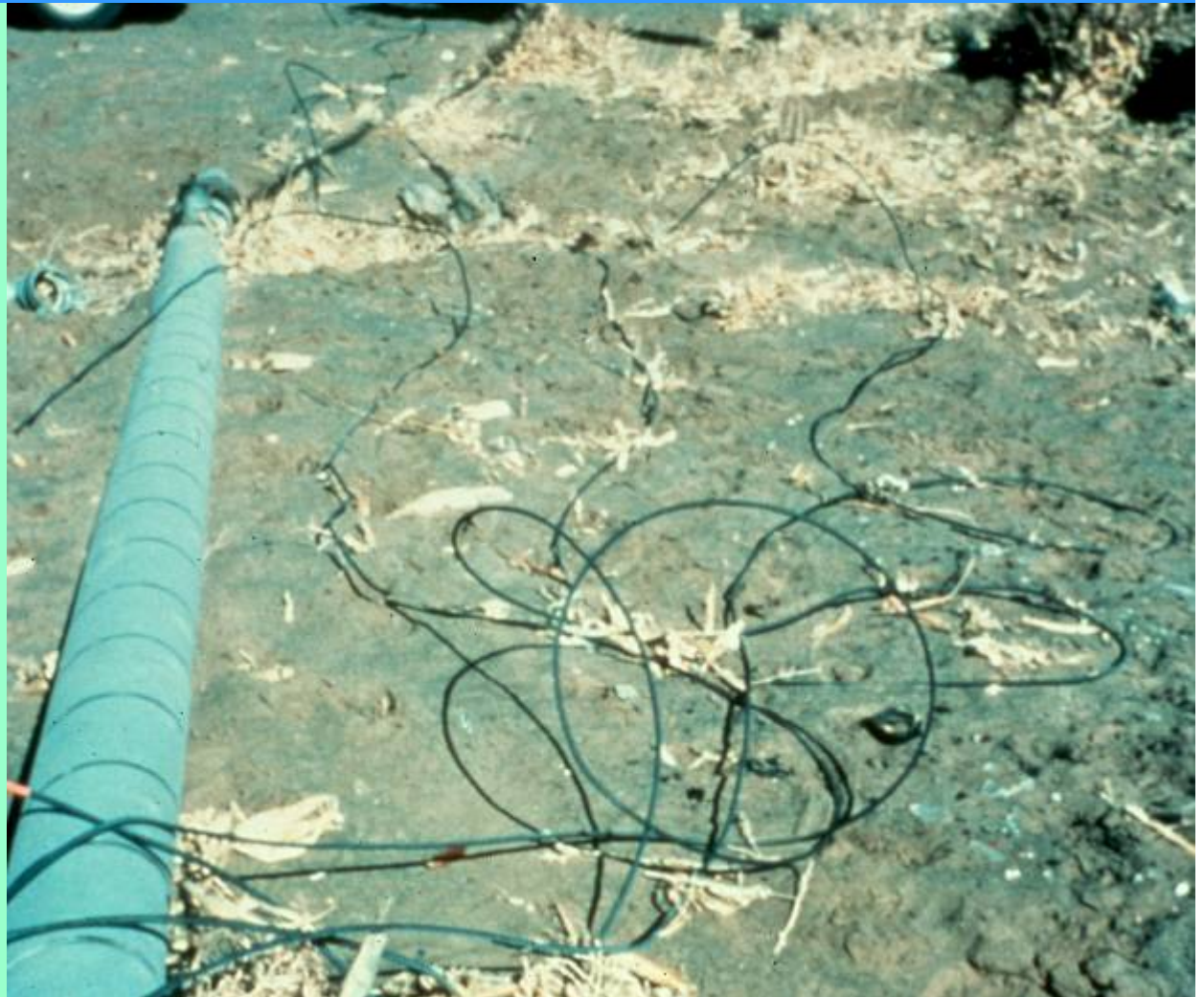


Taped Power Cord

Damaged Electrical Power Cords

- Areas to look for include:
 - Obvious physical damage to the outside of the cord.
 - Areas that have been covered with electrical tape.
 - Indoor extension cords with thin outer coverings that were not meant to be used outdoors and subjected to physical damage.

Unprotected Cords Exposed to Damage



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Safety Around Irrigation Systems

(PART – 3)

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Unsafe Work Practices

- Installation of the safest and best maintained electrical system can still result in electrical accidents if unsafe work practices are used by personnel performing repair, maintenance or testing of the system.



Irrigation Hazard - Electrical Contact

- Safety Signs are required on electrical enclosures containing live electrical parts and potentially hazardous voltages to alert personnel performing repair & maintenance to the potential hazard.
- The electrical voltage to most irrigation machines will be 240 or 480 volts three phase.



Irrigation Hazard - Lightning

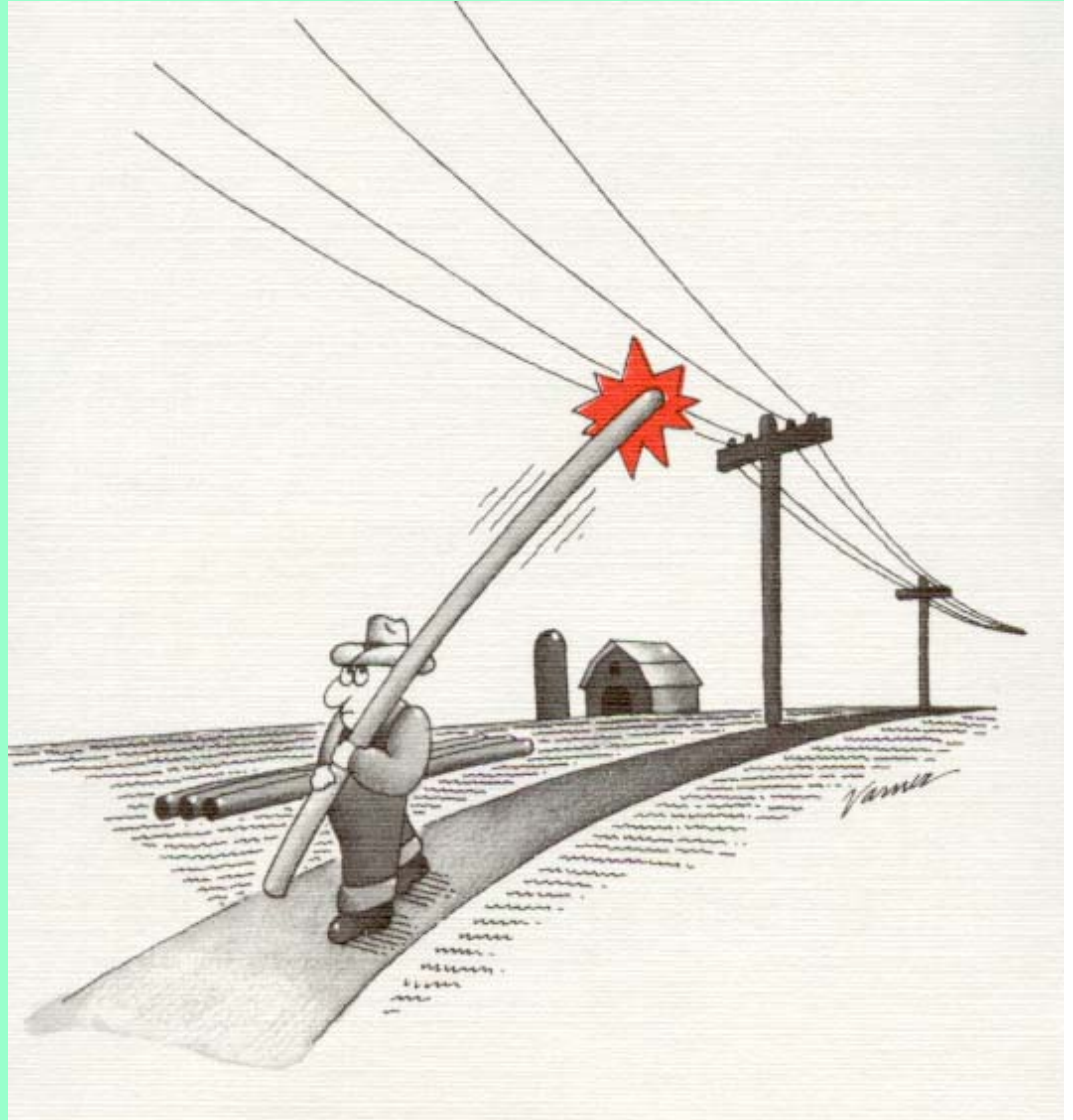
- Stay away from self-propelled irrigation machines during storms.
- The large metal structures make good paths to ground and they tend to be large lightning “receptors” due to their height in the field.



Irrigation Hazard

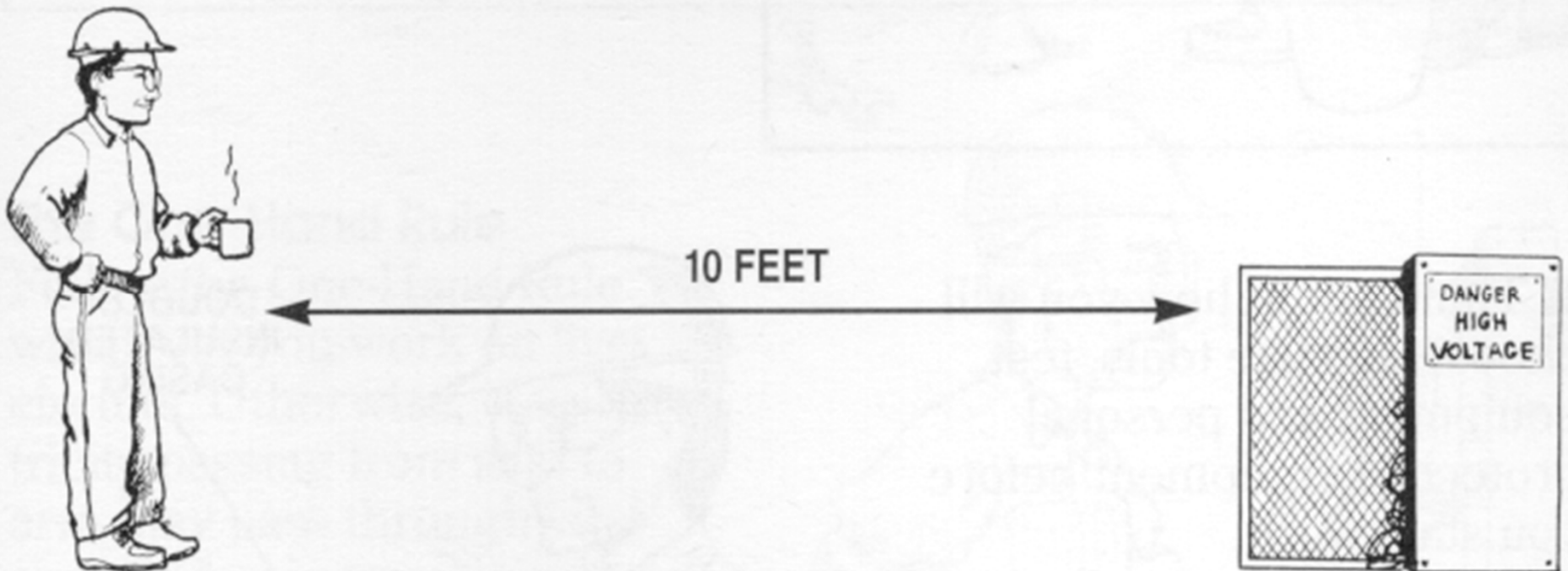
Overhead Power Lines

- Irrigation concerns with overhead power lines include:
 - Lifting aluminum irrigation pipe into overhead power lines.
 - Standing on irrigation systems while performing maintenance near overhead power lines.
 - Well drilling trucks/booms drilling wells close to overhead power lines.



High Voltage Circuits

- Un-qualified employees (not trained to work on the system) must stay a minimum distance of at least 10 feet in any direction from energized overhead power lines or open transformers.
- For high voltage transmission lines, the distance is even farther...10 feet + 4 inches for each additional 10,000 volts over 50,000 volts.



Irrigation Hazard

Spraying Water on Power Lines

- Don't touch irrigation systems while they are spraying water on power lines.
- Alert the power company.
- Distance, stream size, water conductivity, voltage, and wind ALL effect the amount of current carried when an irrigation system sprays a power line.



End gun spraying power lines & transformers

Irrigation System Safe Work Practices

- Wear appropriate clothing and use any necessary personal protective equipment.
- Visually inspecting the equipment prior to touching.
 - Look for unguarded drive-lines and other mechanical hazards.
 - Locate the equipment disconnect switches/devices.
 - Look for broken or damaged equipment and electrical insulation on cords and open or damaged electrical enclosures.
- Test the equipment (voltmeter and/or backhand)
- Disconnect energy sources prior to repair, maintenance and testing.
- Practice Lockout/Tagout

Personal Protective Equipment (PPE)

- Personal Protective Equipment (PPE) provides people protection from various hazards likely to arise in the workplace.
- The most common types of PPE include head, ear, eye, hand, and foot protection.



Clothing/Personal Protective Equipment

- Before leaving for the site consider:
 - What clothing & personal protective equipment do I need?
 - Clothing - What's the weather like? (hot or cold)
 - If it's hot, bring drinking water.....don't rely on drinking water from the irrigation system.
 - Footwear - Boots.....Rubber or Leather?
 - Hand Protection - Gloves....Rubber or Leather?
 - Head Protection - Class 1 Hard Hat.
 - Hearing Protection - Earplugs or Earmuffs.
 - Eye Protection - Safety Glasses.

Heat Stress

- Individuals performing maintenance or testing of irrigation systems can be exposed to very high temperatures and possible heat stress.
- Heat stress can cause various bodily distress including dizziness, elevated body temperature, nausea, and in severe cases can result in death.
- Dress appropriately for the field and conditions
- Ensure adequate drinking water or fluids are available (don't rely on drinking from the irrigation system).



Eliminate Problem Clothing & Jewelry/Accessories

- Secure Long Hair & Eliminate:
 - Jewelry (rings, watches, chains, large belt buckles etc.)
 - Loose clothing (ties, scarves, etc.)
- Metal jewelry is electrically conductive and long hair & loose clothing can easily become caught in rotating parts.



Foot Protection

- Typical foot hazards encountered when working around irrigation systems include rough, un-even ground and frequent muddy conditions.
- Comfortable foot wear appropriate for wet, muddy conditions and un-even terrain is required.



Hand Protection

- Irrigation systems generally consist of significant quantities of machined metal with sharp edges and lots of protruding bolts and other connectors.
- Appropriate hand protection in the form of gloves is generally warranted for technicians performing maintenance and testing on irrigation systems.



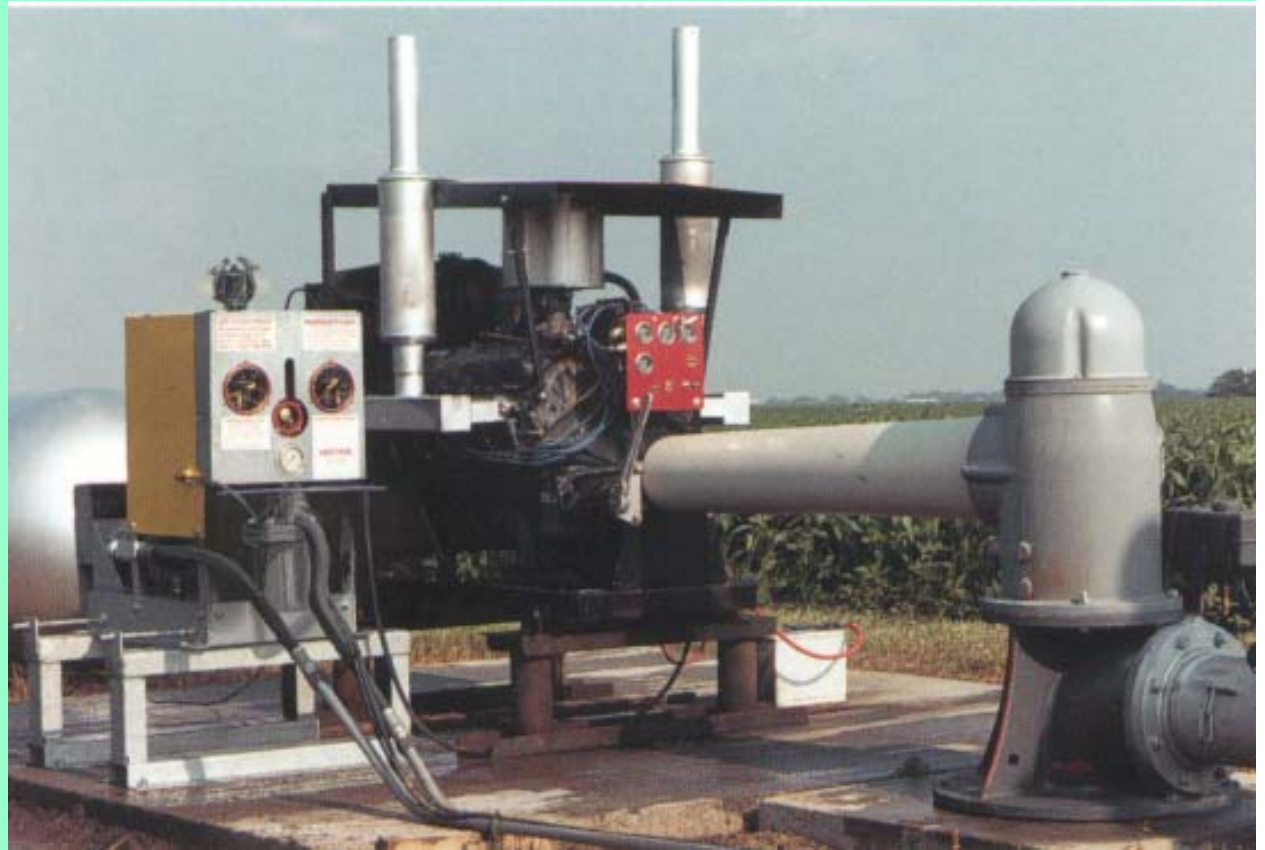
Head Protection

- Most owners and operators typically do not wear head protection when working on/around irrigation systems.
- Falling objects are rarely ever encountered however, bumping your head on the structure can be painful.
- A Class 1 head protective device (hard hat) is adequate for working around irrigation systems.



Noise - Hearing Damage

- Many fossil fuel power units will produce significant amounts of noise that will damage hearing slightly if exposure is sufficient.
- Wear appropriate hearing protection when working around this type of equipment.



How long do you want to stand next to this engine without hearing protection while it is running?

Noise - Hearing Protection

- Irrigation pumps powered by fossil fuel engines are extremely loud.
- Hearing Protection can be provided through PPE by wearing either approved earplugs or earmuffs.
- Cotton balls stuffed in your ears will not provide hearing protection.



Eye Protection

- Most owners and operators typically do not wear eye protection when working on/around irrigation systems.
- Technicians performing maintenance or testing of most any type should have and use appropriate eye protection when working on irrigation systems even if owners and operators do not.

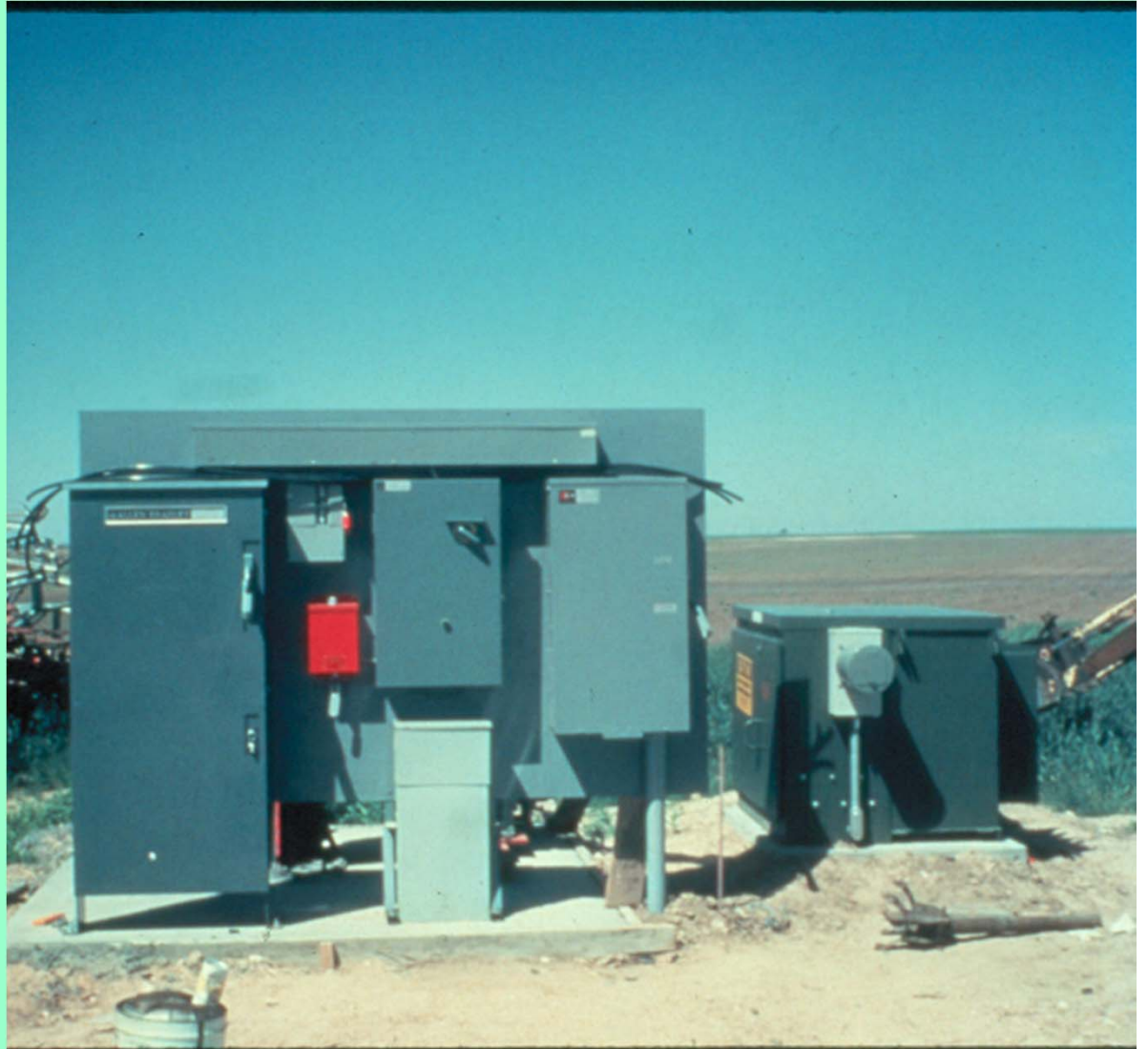


Visually Inspect the System/Area

- Locate the disconnect switches for the irrigation equipment
 - pump(s), irrigation machine(s), other equipment
- Look for missing lids & enclosure covers exposing live electrical parts.
- Look for damage from equipment or livestock on exposed electrical panels and cords.
- Look for missing guards on moving and rotating equipment.

Locate the Electrical Disconnects

- Always identify the electrical disconnects for the equipment you are going to work on.
 - Look for labeling/evaluate layout of system.
 - Ask Land-Owner/Manager



Look for Damaged Equipment & Other Hazards

Is there a good chance for this cord to be damaged due to its location?

- **Damaged Equipment**
 - Open enclosures
 - Damaged insulation
 - Water in enclosures
- **Missing Guards**
- **Chemical Spills**
- **Structural Instability**
- **Etc.**



It deserves a visual inspection to determine if there is any damage

Test the Metal Structure

- Check the system with a voltmeter.
- Measure from metal water pump/pipe to earth (soil).
- Measure from metal machine structure to earth (soil).
- Voltage reading should be 5 volts or less.

Voltmeter probe connected to metal structure

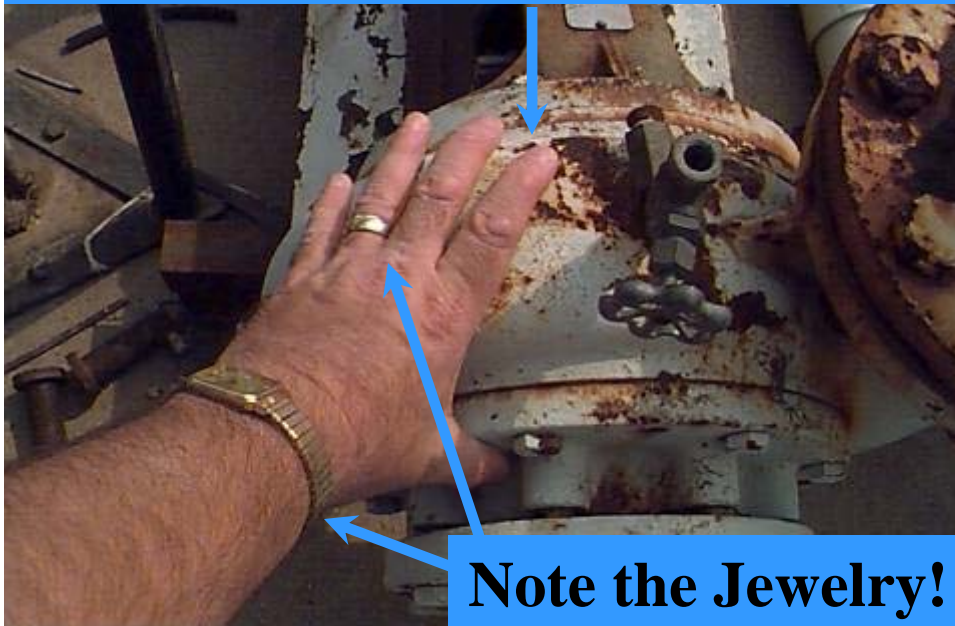


2nd voltmeter probe stuck in soil

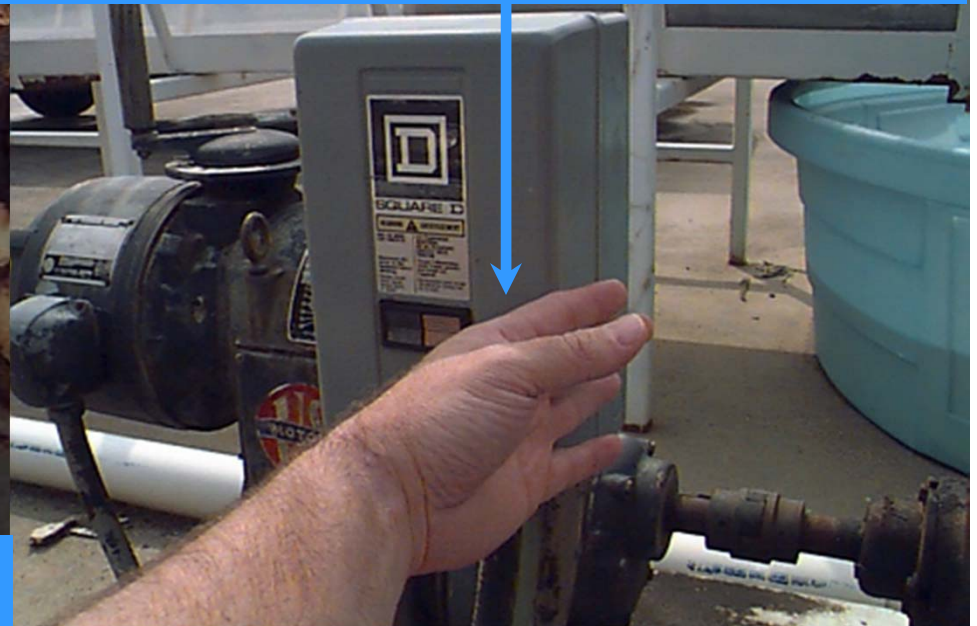
Back-Hand the System

- Make it a practice to always lightly brush the BACK of your hand against any irrigation system metal structure or enclosure before grasping with your palm.
- Grasping an energized metal structure member will cause your hand to clamp around it.

Don't test this way!

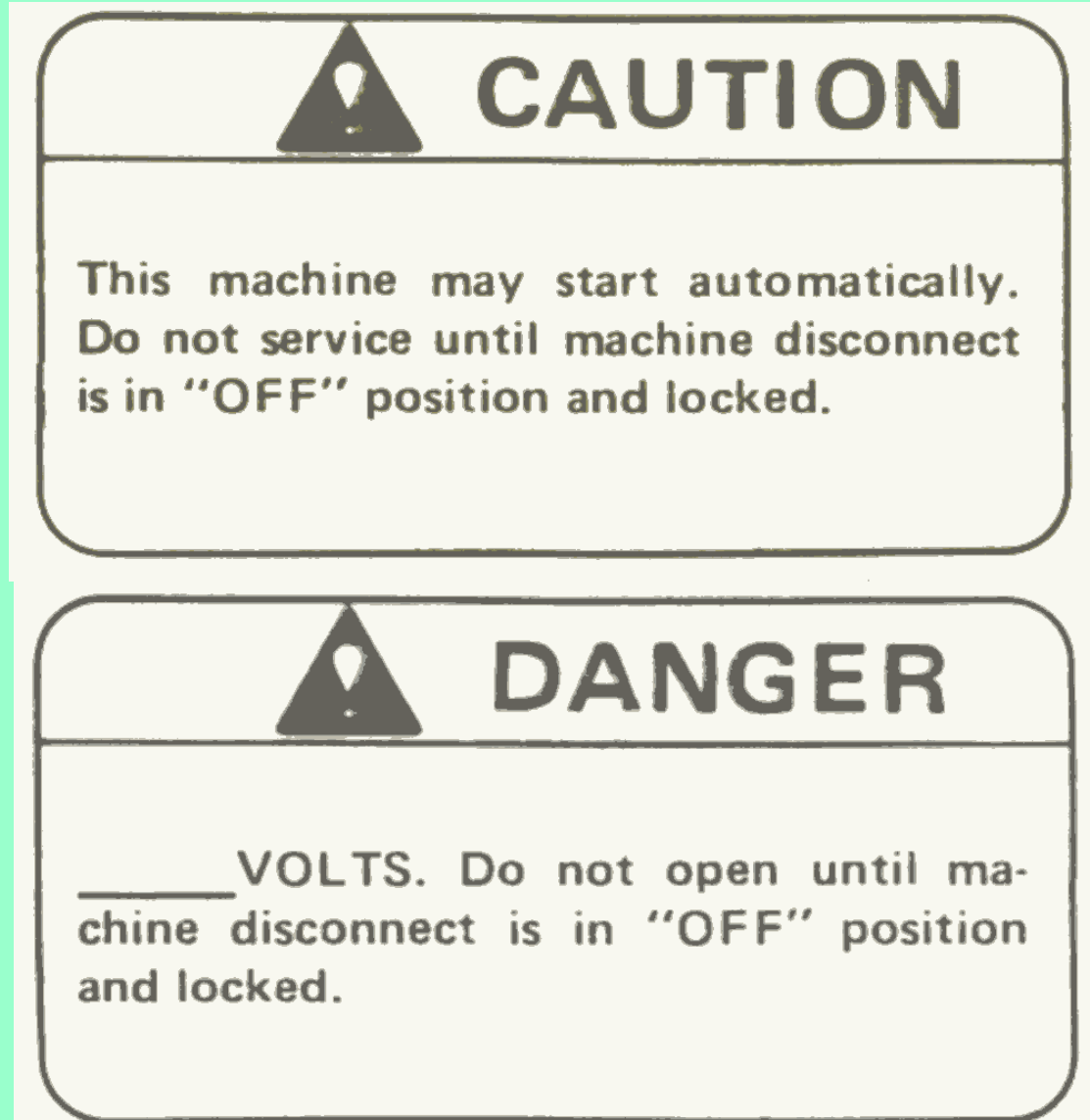


Do Test This Way.



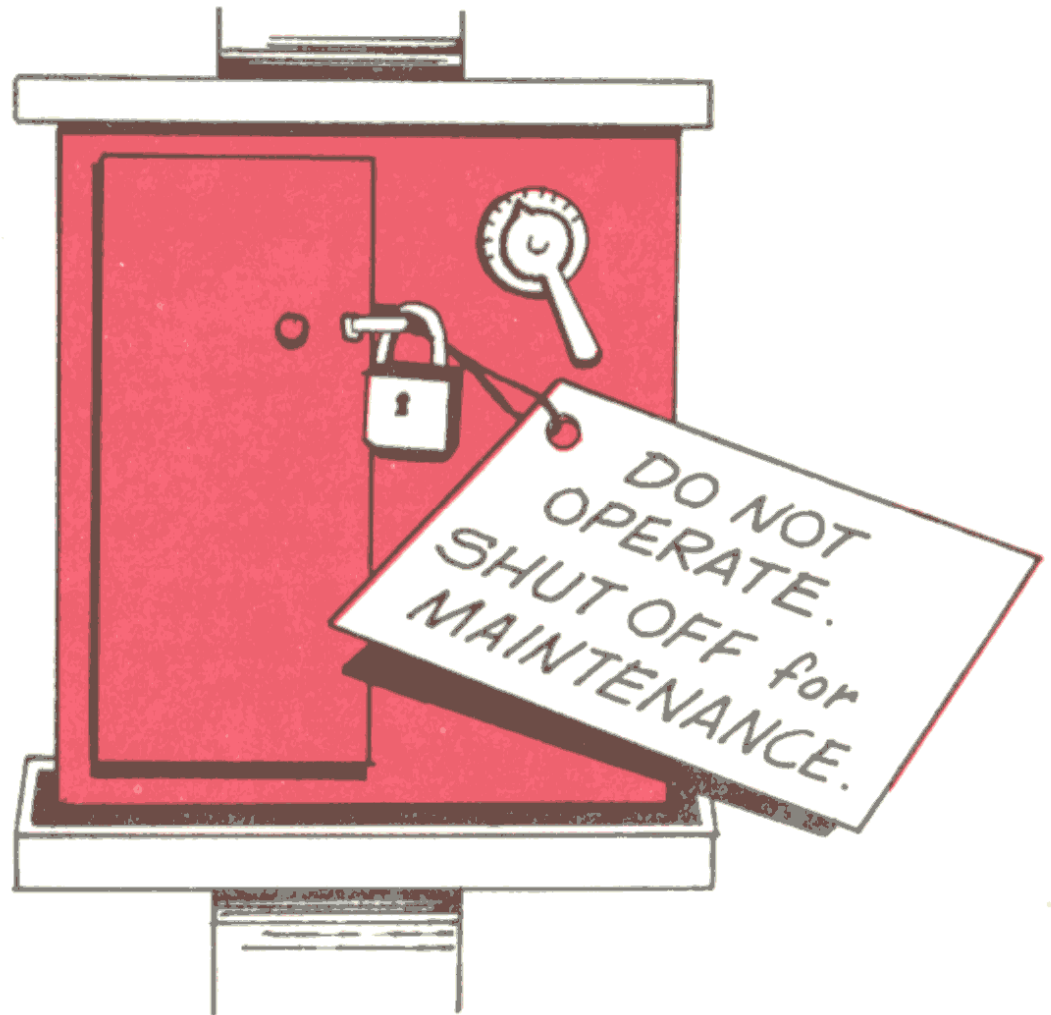
Always De-energize Equipment

- Accidental or un-expected sudden starting of irrigation related electrical equipment is a major contributor to irrigation accidents.
 - You **MUST** de-energize equipment prior to physical inspection or working on equipment in order to do it safely.
 - Lockout/Tagout procedures should be followed.



Lockout/Tagout

- Means of ensuring electrical and other energy is off and others cannot turn it back on accidentally.
- Most basic safety work practice.



How many of you have a lock and use it?

Lockout/Tagout

- Turn the power off and apply a padlock to the controls or switch to indicate someone is working on it and it cannot be turned back on.
- Tags can be used in some instances under certain conditions.
- Only the person applying the lock/tag may remove it under normal conditions.



Question?

- Which disconnects (pump or irrigation machine) should be shut off while performing maintenance & repair?
- Answer:
 - Both the pump & irrigation machine disconnects should be shut off.....the pump & irrigation machine may be electrically connected through metal piping, water in the pipes or on the ground.

Tingles

- If you suspect an electrical short or other problem due to a “tingle”.....
 - Do not touch the machine again.
 - Call the owner or manager and inform them of the incident and suggest they have a competent electrician check the system for any problems.



Good Judgment

- Perhaps the single most successful defense against irrigation accidents is an understanding of the potential hazards, following safe work practices, and **continuous** use of good judgement.

