# Safety On Electrified Leases

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Being associated with an electrical utility company where safety is as much a part of doing the job as the job itself, it is a privilege to have the opportunity to point out to you some things that might help in the safe operation of electrified leases.

As I go about the country on my job I have the chance to see the way many of you work, the kind of housekeeping that you maintain and the spic and span appearance of the properties of your companies. Such experiences are always an inspiration to cause us to want to do a better job in our own company.

In this highly technical and mechanized age of industry, whether it be oil producing — chemical — manufacturing — or utility; safety has come to to play a vital part. Most companies recognize this and spend considerable time in instructing their people in the safe operation of equipment and in safe practices generally. Many organizations conduct regular safety meetings where all personnel regularly attend. However, regardless of how much time is spent in safety meetings, if the individual workman is not convinced that safety is for him then little is gained. Safety should be considered as a matter directly affecting the individual, where the workman knows that the rules he follows are for his protection and the protection of the equipment he operates.

The biggest factor to be considered in all industries is the human factor. It has been said, out of all accidents that 10 - 12 percent are caused by mechanical failure; 88 - 90 percent are caused from human error. This condition has caused industry to recognize the individual's responsibility in the safety program. This requires getting the individual to accept personal responsibility for his own safety, for the safety of his fellow workers and for the safety of the public. Mr. Greenwalt, president of the Du Pont Company, pointed out in a paper entitled, "Have Faith in the Individual" and presented at the National Safety Congress last fall, that "the more we study the problem the more we see that success in safety is the product of an environment which emphasizes individual responsibility, exercised at all times and at all levels." Fairly good progress has been made in the mechanical or physical aspects of accident prevention; in designing safety into plants, lines and substations, and in providing safe tools with which to work. However, much more attention should be given to the human element.

In this paper we want to look at safety as it applies to the operation of electrified oil field leases.

Electricity eliminates many hazards encountered in other prime movers, but if it is improperly employed or suitable precautions are not taken in its operation, conditions can be introduced which are certain to result in bodily injury or property damage.

Electricity is used in ever increasing amounts in oil production and it is well that we, who are associated with that industry, know something about it. If electricity is handled with the "proper respect" and the right kind of tools and equipment are used in working with it, electricity is not nearly as hazardous as it might seem. A good practice to follow in working with electricity is that if we don't know what we are doing, we should call someone who does. Many oil companies have special electrical crews or qualified electricians, and the operators on the lease should call these people and not take the chance of being hurt or damaging the equipment through not knowing what is the proper thing to do.

The saying "A good place to work is a safe place" expresses a general thought which can be applied to electrified leases. Personal safety depends a great deal on the proper equipment, how it is designed, installed and operated. There is probably no other industry more advanced in safe equipment design than the oil producing industry.

Power or electricity is supplied to the electrical equipment on the lease through the distribution system consisting of primary, or high voltage lines, transforming and secondary, or low voltage lines. Primary systems range from roughly 7200 volt single phase to 15,000 volt three phase. Secondary voltage is 120/240 to 480 generally, however, some higher secondary voltages are used for specific operations.

Primary and secondary can usually be distinguished by the type of construction used. Primary voltages are generally mounted on cross-arms at the top of the pole and no cross-arm is used for secondaries.

Ground clearance, or the distance from the lowest conductor to the ground, and the location of primary and secondary lines on the lease should be given careful consideration, since so much high equipment, such as clean out rigs, high loaded trucks, winches, and guy wires are used every day in the oil field operations. In moving this equipment back and forth on the lease caution should be taken to see that none of it comes close to or into contact with these primary and secondary wires.

Several fatal accidents have occurred from high loads contacting primary and secondary. One, for example, occurred recently where a seismograph crew driller raised his rig up under a power line; two were fatally injured in this accident. Another hazardous condition that sometimes exists is where lines are pulled down by high load and left lying on ground unguarded. Fallen lines should be guarded until the power can be disconnected; to keep anyone from coming into contact with them.

In order to have the safest conditions possible, careful consideration should be given to proper ground clearance and line location. It is found, from talking to different oil company people, that the placing of primary and secondary lines a distance of 75' to 100' from wells and tank batteries is a must to allow work to be carried on without the danger of high equipment contacting these lines.

Other distribution equipment seen frequently on electrified leases are transformers, fused cutouts, capacitors, and lightning arresters. All this equipment plays a vital part in delivering power to the electric motors that operate the pump unit. To avoid extended shutdowns and possible personal injuries, when maintenance work is required on this equipment a qualified person should repair it. Fuse disconnects serve a two-fold purpose, one as a power disconnecting means and the other as a fuse protection for the transformers. Since usually these disconnects are associated with high voltage, caution should be taken in refusing them. Lightning arresters are used for lightning protection on most electrical equipment. The arrester is usually tied from "hot phase" to ground. These arresters sometimes fail and should be treated as "hot" equipment as the wires connected to them may be energized. Capacitors also deserve special consideration since they retain a charge after power is disconnected and will discharge when shorted. Severe shock can result from the capacitor when the discharge goes through the body. Transformers, as the name implies, transform primary voltage to a usable secondary voltage and should be treated as energized equipment unless known to be disconnected.

Secondary lines are generally brought into the well location from the rear in order to allow clearance for work over rig guys. Secondary is brought to the motor control both underground and overhead. The underground system is considered the safer method and is a part of the electrical specifications of a number of oil companies.

Most oil field controls, which are in use today, employ several general safety factors; the main ones being "Dead-front" and main line, interlock, off - on switches. The "Dead - front" feature has all of the control switches such as restart, automatic - manual, time clock and main line switch mounted on an inner panel with all wires, fuses and connections concealed. This inner panel cannot be opened unless the main line switch is on the "off" position. If the motor protection fuses in the control blows, a qualified electrician should be called so that the electrical short, or condition causing the fuses to blow, can be recognized and corrected.

Motor controls are usually located at the rear of the pumping unit so the operator will have access to the brake. In these cases a common ground from control, motor and pumping unit is essential. Some companies practice the use of a bonded ground between control, motor, pumping unit and well head. The grounding system is used to insure the same potential between all parts of the equipment involved; thus, helping to eliminate the possi-

bilities of electrical shock in contacting various parts of equipment. The old "rule of thumb" to test each control box by slapping it with the back of the finger, after it has been checked to see that the ground wire is connected to the control, is always a good practice. No work should be carried on around a pumping unit without first checking to see that the master switch in the pumping control is on the "Open" or "off" position to disable the automatic controls, as well as to render the electric motor inoperative.

Electrical equipment, such as that previously mentioned, to be safe in operation and to give the best of service must be installed properly and be given periodic inspection and maintenance. Qualified electricians should be used to do such work. Others, who are not electricians, may create hazards through ignorance in making installations or repairs.

There are many safety devices used by various oil companies, all of which have helped contribute to the fine safety record the oil industry now enjoys. Some of these devices are:

*Signs* — Signs play an important function particularly in defining some area or some conditions that may be hazardous. Signs such as "Automatic Control," "Time Clock Operated," "Danger" and "High Voltage" are only a few that emphasize to the operator that caution should be taken.

*Automatic Inter Locks* — Such devices as the automatic interlocks make it impossible for electrical equipment to be worked on while energized. They disconnect the power when the control front is open, eliminating any possibility of electrical shock.

*Fuse Puller*—A device for extracting fuses helps prevent an accidental contact with energized equipment in replacing a fuse.

*Rubber Goods*—Such equipment as rubber gloves, blankets, hose, etc., are used primarily by electricians for working on energized parts and equipment and are essential safety devices.

There are many other safety devices that play an important part in operating an electrified oil lease; they are for your protection. Such devices should be taken every advantage of.

A bit should be said about low voltages. Most people know the danger involved in high voltage but sometimes get careless when low voltages are concerned. The fact is high voltage circuits and equipment, well protected, are safer than poorly protected low voltage circuits and equipment. Many fatal accidents have resulted from voltages as low as 120 volts, depending on the condition of the body at time of contact, grounds, and other conditions. So it is a fact that low voltage can kill. Proper caution must be taken in working on low voltage equipment as well as high voltage equipment.

*First Aid*—All men working on or around electrical equipment should be thoroughly familiar with both the prone pressure and the back pressure —arm lift method of artificial respiration. As many persons who have been shocked and have lost their lives could have been saved if someone could have applied one of these proven methods of resuscitation.

The first step when a person has received an electric shock is to break the contact immediately. This may be done by using any dry non-conductor, such as ruber gloves, clothing, wood, rope, etc. Do not use the bare hand to touch the victim while he is on the live wire. If possible shut off the current by opening the nearest switch, as that is the quickest way to break the circuit.

As soon as the victim is freed from contact begin the back pressure arm lift or prone pressure method of artificial respiration at once and continue until natural breathing is restored. If necessary efforts should be continued four hours or longer or until a physician declares the patient dead.

*Technique of Giving Back Pressure—Arm Lift Method of Artificial Respiration*

Once the victim has been freed, artificial respiration should begin at once, as every second of delay decreases the chance of resuscitation. The victim should be placed face down on his stomach in a prone position. Elbows should be bent and one hand placed upon the other. Turn the face to one side, placing the cheek upon the hands. Check his mouth for any foreign objects, such as tobacco, false teeth, etc. In some cases the tongue has become paralyzed and drawn down the throat, obstructing air to the lungs. Where this has occurred the tongue should be pulled out and should be watched to see if it is swallowed again. The operator then kneels at the head of the victim on either or both knees, with knee or knees close to forearms; next place hands on the shoulder blades in such a manner that the heels of hands lie just below a line running between the victim's armpits. With the thumbs almost touching, spread the fingers downward and outward. Rocking forward until your arms are vertical with the victim, allowing the weight of your body to exert slow even pressure on your hands, keeping your elbows straight and rigid. The average man will require about 55 pounds pressure, females and children naturally require considerably less. Release the pressure and move slowly backward — place your hands upon victims arms just above his elbows, grasp and draw arms upward and toward you, just enough to lift and tension should be applied that resistance by victim's arms is felt by you. In doing this, keep elbows rigid and straight and rock backward drawing victim's arms toward you then lower the arms to ground again. This will complete the full cycle of the operation. The chest is expanded by lifting the victim's arms which causes air to be pulled into the lungs causing inhalation. Pressure on the back causes deflation of the lungs or exhalation. The cycle of resuscitation should be carried on 12 to 14 times per minute in a steady smooth rhythm without cessation.

A slight inclination of the body, with the head very slightly down, will permit drainage of fluid from throat or respiratory tracts. Extend the head forward and keep the chin up to avoid obstructing respiratory passage.

That, in brief, is the back-pressure arm-lift method of artificial respiration. In order that his own life might possibly be saved and that he may be able to save the life of a fellow workman, every member of any group working in areas where there is danger of asphyxiation or electric shock should know and regularly practice this method.

I honestly believe that if the utility companies and the oil companies continue to work together where the use of electric power is involved, a greater improvement can be made in safety, and operating jobs on electrified leases can be made easier.

I have attempted to touch on only a few high points affecting safety in the operation of electrified oil field leases. To go into this subject thoroughly would take a great deal more time than we have alloted and require much more study.

The main point I would like to make is that as we talk of safety it is *your safety* that we are talking about. Your own safety is ample reason for your giving unfailing attention to the matter. So make safety you own personal business.