General Oil Field Safety Practices

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The Petroleum Industry, as in many industries, always has had its safety problems, but down through the years continuous effort has served to make it one of the safest occupations in American industry.

In going to work for most companies you will find that you are associated with a group of people who are interested in safety and are proud of a fine record of accident prevention. Good safety records do not just happen. They are made through the efforts of all employees in each operating unit.

In the time allotted today, it would not be possible to present in detail all the safe practices used in the field. This paper will deal with the four I feel would contribute most to a good safety record. These four safety procedures are as follows:

1. General on the Job Safety.
2. Safety on Electrified Leases.
3. Handling Mercury.
4. Hydraulic Fracturing.

One important practice for safety on the job is proper clothing. Well-fitting work clothes, whether they are coveralls, overalls, or khaki trousers and shirts, are important to comfort as well as safety. Other items of protective apparel which are worn on the job today are: Safety hats—in place of the old felt hat, safety toe shoes, and a good pair of gloves suited for the job to be done, i. e., canvas, leather, rubber. Almost 90 percent of all eye injuries could have been prevented if the injured person had taken advantage of the protection equipment available.

Most people do not realize the danger of exposing themselves to large quantities of petroleum vapors. A good safety practice is to prevent dangerous accumulation of gases or vapors in explosive quantities. Each worker should strive to prevent ignition of such vapors or gases in case an accumulation does occur. "No Smoking" signs and smoking only in certain designated areas is a practice which should be followed to the letter. New men must be watched closely until they are acquainted with the location of the designated smoking areas.

By the use of safe transportation practices a great many accidents could be prevented. When it is necessary to use an open type truck as means of transportation, it is advisable for each person to take precaution while riding on the back of the truck. Workmen should be cautioned not to stand on the running board or the back of the truck. They should keep their feet and legs on the truck bed, not hanging over the sides.

The basic cause of several accidents and injuries is horse-play. Several years ago horse-play was engaged in on almost every job. Having fun is all right, but to do it at someone elses' expense is a practice not to be encouraged. Also several years ago the new man or "weevil" on the job was made the butt of all the jokes. Many serious injuries resulted from this practice. Today the companies go to great expense to train the new man for the job he is expected to do.

Our company has prepared a program of job instruction and the proper way these instructions should be given to the new worker. This is a very important part of our safety program. In brief the program is as follows:

1. Make up a Training - Planning Table.
   a. Plan training in advance.
   b. Anticipate future needs.
   c. Be ready for emergencies.

Plan training as you plan your work.

2. Break down the Job.
   a. Think the job through.
   b. Overlook no important step.
   c. Know each Key Point.

Safety is always a key point.

3. Have everything ready.
   a. The tools, equipment, materials, and/or supplies needed.

Arrange your time to avoid interruptions.

4. Have the work place properly arranged.
   a. Have things the way you want the new man to keep them.
   b. Lead the way by practicing good housekeeping habits.

Here are a few of the practices you should use every time you instruct a new man in safety on the job or correct his work if it is unsafe. Put the new man at ease. Remember he can't think straight if you make him embarrassed or scared before the other men. Find out what he already knows about the job. Don't confuse him with things he already knows. Start the instruction where his knowledge ends. Try to get him interested in the job. Relate his job or operation through to the final product, so he will know his part in the work is important to complete the job.

Position is important too. Put him in the right position. He should never see the job backwards, or from any other angle than that from which he will work. After he is in position, tell him how to do the job safely, show him how to do the job safely, and then ask him if he understands what is to be done. Put it over to him in small doses. Explain and show him one important step and/or hazard at a time. Make sure he understands each step and why he should do it in that order. Always stress the key safety points. These will make him a safe worker and prevent serious injury. Your instructions should be clear, complete and have patience with the worker. Try for accuracy and safety now, and wait for speed until later.

Now is the time to have him do the job, but watch closely and correct his errors as he makes them. DO NOT LET HIM DO THE JOB UNSAFE. Now have him do the job again, but have him explain what he is doing and why. All of us find it easy to observe motions and not really understand what we are doing. The new man must understand what he is doing and why. Have him explain the key safety points as he does the job once more. Again correct his error, but don't reprimand him or indicate that he is "thick" or "dumb." Some men may have to do the job half a dozen times before he knows what he is doing. When you are sure he can do the job put him on his own, and give him confidence. He has to get the feel of the job by doing it himself. Designate to whom he should go for help. Make this definite. By going to the wrong person with a problem he can become more confused than ever. After he is doing the job, check with him frequently As often as every few minutes at the start, every few hours or few days later on. Be careful about your taking over the job too soon or too often, but be on the lookout for any unsafe or unnecessary move. Never take the job over if you can point out the help he needs.

If he does a good job, compliment him on his efforts and encourage him to ask questions. Always treat the new man as you would like to be treated.

I hope you can use this plan. I feel that you will find it amazing that such greatly improved results in having a safe worker can come from such a simple plan.

In our company, as with most companies in the oil industry, making use of electricity is ever increasing. Use of electricity in the production of oil is a great step forward. A worker not using safe practices in electricity not only may become a fatality himself, he also can jeopardize lives of others working in the area.

There are many safe practices used by oil companies in the operation of automatic tank batteries, should repairs have to be made or any work performed.

For maximum effectiveness, any safety program should include thorough training of all employees who work with electrical installations. In addition to instructions on the hazards of electricity, employees should be trained in first aid, the use of warning sign, guards, and other protective devices in safe operational procedures.

Supervisors should be given such instructions as shall be necessary to acquaint them with the electrical hazards in the field and they should be required to maintain close supervision over all operations which involve the use of electrical equipment. Supervisors also should encourage employees to report immediately any electrical defect they find. Defective equipment should be repaired or replaced at once. Electrical equipment must be installed properly and given periodic inspection and maintenance for safe operations.

I honestly believe that one of the most insidious hazards found in the field, even with all the safety devices we have today, arises from the use of mercury. Mercury is a poisonous, silvery, liquid metal that gives off dead-

ly vapors at room temperature. Any one who works with orifice meters or handles mercury in any form is subject to mercurial poisoning by any or all of the following three methods.

1. Inhalation of fumes and dust.
2. Absorption through the skin.
3. Swallowing with food or substances taken into the mouth.

Mercury is a cumulative poison and small amounts which find their way into the body by any of three methods, build up a poisonous condition over a period of time. The absorption of as little as .001 gram of mercury per day, will in a relatively short time, cause mercury poisoning.

Safe practices used to prevent mercurial poisoning are simple. The worker should always work in a well ventilated place when holding mercury. Floors and repair benches should be free of cracks or places where spilled mercury may accumulate. (A solution of ammonia water will neutralize mercury vapors for a short time.) Mercury should be stored in tightly stoppered metal or unbreakable containers. Mercury should not be allowed to stand exposed to the air. Workmen should wash their hand carefully after each exposure to mercury and avoid eating, smoking, or handling anything that might be placed in the mouth during exposure to mercury liquids or vapor. The custom of coating money with mercury to make it shine is an excellent way to contact mercury poisoning. The mercury will wear off the coin into the lining of the pocket and from there will come in contact with the leg. The continuous rubbing of the pocket on the leg will allow the mercury to absorb through the skin into the system.

Death from mercurial poisoning comes from liver condition.

The signs of this poisoning are very obvious, but seldom attributed to the proper cause. At first, there may be a skin rash and loss of appetite. Later there is intestinal trouble such as diarrhea or constipation, followed by loss of weight and pains in the bones and joints. A bluish line may appear on the gums with an inflammation of the mouth. Eventually headaches and numbness of the limb, the mental condition changes, body tremors, and finally death.

Therefore, the hazards encountered in unsafe handling of mercury are evident. However, when handled with the proper caution working with mercury can be a safe occupation.

In the past several years a new operation has been very successful in treating wells for better production. This operation is called Hydraulic Fracturing. A highly specialized operation, the process uses thousands of dollars worth of equipment and a crew of men trained in the use of this complicated apparatus.

While many safety rules in this operation are fundamental, the changes in equipment and treating practices have created many differences of opinion on detaails of safe operating procedures.

Not only do safety requirements vary from one state to the next, but the rules of an oil company may vary one division to the next.

I have tried to incorporate a few of the general safety practices used in Hydraulic Fracturing of oil bearing formations. An "On the Job" safety meeting should be conducted before beginning the job and periodic checks should be maintained throughout the performance of the job. All persons not involved in the job should remain in a predetermined area away from the operation. This area should be up wind from the job location and should be the only place where smoking is allowed. Location of pump trucks is determined largely by necessity for efficient suction hook-up but in any event, trucks should be arranged as to provide ready accessibility to all units, and where possible, parked heading away from the well so they may be moved should fire occur.

After the well is hooked up and before starting to pump, the service company supervisor and the person representing the well owner shall have an understanding as to the maximum permissible treating pressure. A pre-treatment test should be made of the discharge lines and wellhead equipment, down to the last valve, at a pressure not less than the estimated fracturing pressure plus 1500 psi. However, in no event, will the line testing pressure be permitted to exceed the manufacturer's test pressure on any of the fittings or equipment involved. Pressure recording apparatus should be located as far as possible from wellhead and discharge lines. A relief valve, set for the maximum safe pressure for the well equipment. should be on each pump. Discharge lines from the relief valves should discharge into a tank or some other non-hazardous location and be tied down to prevent whipping. A safety chain or cable to clamp behind the union on the side pipe of the discharge line at the pump and a similar anchoring device for the last long nipple or pipe at the wellhead. A discharge line or a pressurized suction must never pass under a truck. A suction hose should never be used for a discharge line. The pressurized equipment presents hazards for which there is no ideal or adequate remedy as yet. Until this is remedied, such equipment must be considered a calculated risk and extreme vigilance and constant inspection the compensating factors.

Minimum fire protection device for each piece of service equipment should be one 30 lb. dry chemical extinguisher or the equivalent. Portable fire protection equipment should be removed from the trucks and placed in strategic locations during servicing operations. The location of the extinguishers shall be designated by the supervisors of the well servicing company. In the event a fire truck or large wheel mounted extinguisher are furnished, these should be placed far enough from the wellhead as to be in no danger of fire enveloping them. Each man on the job must know the location of these extinguishers. They should be set in approximately the same relative position on each job. In case of panic, the men will, through habit, rally at these extinguishers and the chances of having complete control of the situation in a very short time is greatly increased.

The real danger develops when fluid in the lines is broken and the space is filled with air. This creates a dangerous "surge" in the lines. The danger of an explosion is remote but the results from surge can be serious. When crude oil is used for the Hydra-Frac job, weathered crude should be employed. This should apply to the sand-carrying medium as well as to the load and flush phases of the operation. Special precaution must be taken on those occasions when the particular job involved must involve pumping live crude, distillate or other highly volatile liquids. All oil spilled on location must be covered with dirt as soon as possible. If a leak occurs in treating, bleed the pressure down before making repairs or tightening a union. Hammering or tightening of a union or connection on lines under pressure must be strictly prohibited. In no event should anyone stand on a straddle of any lines or hoses under pressure. Hydraulic fracturing is strictly a day-light operation and no attempt should be made to rig up lights and do any portion of this work before or after day-light hours.

In summary, I have tried to show that safe practices will fit well in your over-all operational picture. The need for safe operating procedures cannot be overemphasized. I hope you have had recalled to your attention something you not only can apply, but can pass on to your associates.