



Engineering Sciences Section - 2014

C28 Pipe Joint Failure Analysis at an Oil Field Fracking Site

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After attending this presentation, attendees will understand the dangers of temporary pipes used in the fracking of oil and gas wells.

This presentation will impact the forensic science community by bringing to light the dangers of operating around temporary piping while servicing oil and gas wells.

Servicing a gas or oil well involves installing temporary piping. This piping is used to transport water, chemicals, sand, and other materials around the well site and into the well for many actions including fracking. The pressures can be on the high side, in fact up to 15,000psi. The pipe, therefore, is designed especially for this type of service. Normal pipe with threaded fittings, while rated up to 2,000psi, is not designed for the repeated application of high pressure. The type of pipe used most often in the oil and gas industry is called "1502" and each link and fitting is serial numbered. The pipe is joined with hammer fittings and the threaded joint does not come in contact with the pressure. Some service companies test this pipe as often as monthly to make sure it is in good shape. Using this pipe to transport abrasive and corrosive materials wears it out from the inside. Certified inspections are a must and include pressure testing. Sometimes the pipe still fails and the resulting accident can be devastating to personnel and equipment. The testing is done in bunker-style units to protect surrounding equipment and personnel. This pipe necessarily has a thick wall and therefore is very heavy. A failure of a joint or section of pipe releases the transported material at extreme pressure. The most dangerous situation involves an energized fluid. This term defines a material that has a large gas component that is pressurized. The expanding gas escaping from a failure will cause the pipe string to disrupt, fly apart, damage adjoining equipment, or harm personnel. A non-energized fluid is not as violent, but if pumps are running to maintain volume, up to 100 barrels of fluid per minute could exit the failure! Although there are restraint systems available, not all operators are required to use them.

A case study of a well service employee who straddled a pipe while turning a valve with a wrench will be presented. The torque from the wrench initiated a failure of the joint. Since the joint was under pressure, it violently separated, throwing the employee and his helper many feet. The employee suffered significant injuries to his leg. Lawsuits were filed and an expert was retained by the plaintiff's attorney. Nothing happened for many months, but the case became active when a blood clot, possibly from the injured leg, caused the man to die.

This presentation will illustrate the dangers of the temporary pipe, what went wrong in the case study, and what can be done to reduce the incidents of injury due to this necessary action.

Fracking, Oil, Piping