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APPENDIX A
REVIEW OF ACCIDENT CASE HISTORIES

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REVIEW OF ACCIDENT CASE HISTORIES

Accident statistics from national and state surveys that demonstrate the high injury incidence and severity rates of the oil and gas well drilling industry (SIC 1381) were presented in Chapter III. A tabulation of 738 accident reports compiled from Federal and State OSHA investigations, workers' compensation reports, published accident case histories [10, 46-49], and company records of incidents that occurred during drilling operations is divided according to whether the employees were injured performing tasks that are unique to drilling operations or are typical of accidents associated with numerous other occupations; e.g., construction, manufacturing, or mining.

A. Accidents Unique to Drilling Operations

Injuries that result from hazards unique to oil and gas well drilling operations can be broadly classified into two major categories: those injuries incurred from task-specific accidents and those injuries incurred during more catastrophic events. Of the 33 accident case histories that follow, 27 are representative of injuries sustained by workers performing tasks unique to well drilling operations and 6 are representative of accidents common to many industries.

1. Task-Specific Accidents

The first category of accident case histories is representative of incidents that occurred during task-specific operations. This major category has been further subdivided into accidents that occurred during drilling operations, derrick tasks, and materials handling activities.

In many instances, the cited case histories depict accidents classifiable into more than one subcategory.

a. Drilling Operations

Drilling operations have been further categorized by the tools or equipment used in performing the task such as:

(1) Slips

Case No. 0355, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught between	Drilling	Crushed toe	Slips and rotary table	4 days

The rig crew was in the process of adding a length of drill pipe to the string. An employee was setting the slips into the master bushing-rotary table to suspend the drill string. As the slips were inserted, the employee's foot slipped into the opening and was caught between the slip and the rotary table; one of his toes was crushed.

Comments:

Surfaces wet with water and/or circulating fluids can be expected to be slippery. Handling heavy items on slippery surfaces can result in slips and falls. Where this hazard is compounded by the presence of moving equipment (rotary tables, kelly bushings), the potential for injury is increased.

Case No. 0654, 1977

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught in or between	Drilling	Amputation of leg	Slips, drill pipe, and tongs	N/A[1]

The rig crew was "breaking out" the drill pipe. The initial step involves using the pipe tongs to "break out" the torqued drill pipe coupling. The tongs were positioned as close to the rotary table as possible to avoid bending the drill pipe. Mechanical forces were applied to the tongs by the cathead-chain system typical of drilling rigs. Once the coupling was "broken," the joint had to be raised a few feet prior to "spinning out" the threaded portion. The tongs were left in place with the jaws unclamped.

An employee placed a foot on the slips to hold them in place while a driller hoisted the drill string. The pipe joint was apparently spun out before the slips were set, and the employee's foot became caught by a slip handle. His leg was severed below the knee when it was squeezed between the drill pipe and a breakout tong line.

Comments:

This accident was directly attributable to the premature spinning of the pipe by the driller. The accident potential was further increased by the presence of machinery and equipment (tongs) not required for the task being performed (spinning). The pressure on the crew to perform all tasks as rapidly as possible further compounds accident probabilities. The time pressure to "make hole" could be responsible for the lack of sufficient communication between crew members rushing to complete individual tasks.

[1]Not available.

(2) Tongs

Case No. 0552, 1975

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Drilling	Fatal	Tongs	N/A

The rig crew was "breaking out" a connection in the drill string. A pipe tong was attached to the drill pipe and connected to a backup post with 5/8-inch wire rope. The rotary table was engaged in reverse to supply the torque necessary to "break" the connection. The employee was holding the jaws of the tongs when the safety line snapped, causing the backup tong handle to strike him. The employee's chest was crushed by the impact from the tong handle.

Comments:

Two factors contributed to this fatal accident. Tongs are routinely powered by the catheads on the drawworks. A safety line's breaking strength is selected to be compatible with the maximum forces that can be generated by the cathead. Rotary tables deliver the force necessary to turn the drill string. When the rotary table is used to torque the coupling, there is no method used to determine if the safety factor and/or breaking strength of the snub line is being exceeded. NOTE: The breaking strength of new 5/8-inch wire rope is approximately 30,000 pounds.

The second contributing factor of this accident was the position of the deceased when the force was applied to the tongs. If the employee had not been in the path of travel of the pipe tong, he would not have been killed; the accident would have been a "near miss."

Case No. 0633, 1976

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by and caught between	Drilling	Fatal	Tongs	2 days

The rig crew was "breaking out" a connection in the drill string. The worker had clamped the break out tong to the drill pipe. The driller engaged the rotary table in reverse to supply the force necessary to disengage the coupling. The 5/8-inch wire rope safety line for the tong was connected to the derrick structure with one cable clamp. This connection failed, allowing the tong handle to first strike the employee (with great force) and then pin him against the brake handle.

Comments:

This fatal accident could have been prevented if the proper number of cable clamps had been used. Additionally, tongs are normally powered by the catheads on the drawworks. Rotary tables deliver an undetermined amount of force to the tong system. This situation lends itself to equipment failure.

Of equal importance in the prevention of accidents involving safety line failure is allowing the positioning of employees in the tong handle's direction of travel. This positional hazard could be improved by employee training.

Case No. 0045, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught between	Drilling	Fractured finger	Tongs and drill pipe	1 week

The rig crew was pulling the drill pipe out of the hole. A worker placed his hand in the wrong position on the tongs and caught his finger between the drill pipe and the tong head as he positioned the tongs on the pipe. The employee sustained a fractured finger as well as multiple lacerations to other fingers.

Comments:

Tongs are equipped with handles and hand guides. Proper training and guidance in their operation could effectively lower the frequency of incidents involving tong latchings.

(3) Elevators

Case No. 0488, 1978

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Drilling	Fatal	Elevator and casing	N/A

Two workers were in the process of wrapping rope around a steel casing that was in the well bore. Another casing was being hoisted to make a connection. One of the two workers had just walked under the elevated load when the elevator latch came open, dropping the 30-foot section of steel casing on his head and fatally injuring him.

Comments:

Examination of the elevator, which dropped the drill pipe, revealed that a safety chain had never been installed. The elevator did not

have the double safety latch system or a safety chain and pin. Redundant safety mechanisms should be used to prevent accidents of this type.

Case No. 0637, 1976

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Drilling	Fatal head injury	Elevators and drill pipe	4 months

Drilling of the well had been completed and the drilling pipe was being removed. The procedure for withdrawing the drilling pipe was being followed. The elevators were attached to the belled portion of the drill pipe to bring each section of pipe (500 pounds) about 4 feet above the top of the drilling floor. The section was then clamped to hold the drill string in the well while the elevated connection was broken loose and the pipe spun-out from the pipe remaining in the well hole. To facilitate movement, the bottom of the pipe was placed on a hook suspended from a pulley that rides on a cable stretched from the mast to a point beyond the pipe rack. As the pipe was lowered, the small end of the pipe moved out toward the pipe rack along the cable.

When the accident occurred, a section of pipe had been broken loose and was being rigged for lowering to the pipe racks. The cables above the hoisting block became twisted, turning the elevators 180 degrees, as well as reversing their position, so that they were upside down when the top of the pipe reached the drilling floor. The floorhands unlatched the elevators but were unable to remove the elevators. When they attempted to relatch the elevators, the driller, believing the elevators had been latched, rehoisted the pipe, which was raised about 20 feet above the drilling floor. At this point the elevators opened and the section of drill pipe fell to the rig floor, striking an employee on the head.

Comments:

The driller was unable to see the operation (latching the elevator) from his control station. He hoisted the drill pipe without receiving a signal other than a noise he interpreted as the latching of the elevators. Clear hoisting signal methods, similar to those used in crane operations, could have prevented this accident--crane operators do not raise or move a load until signaled by a person designated as a signalman.

Case No. 0365, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught between	Drilling	Crushed hand	Elevator or drill pipe	5 weeks

The crew was removing the drill pipe from the well bore and laying it down in the Vee-door. The pipe was suspended by the elevators. The bottom of the drill pipe was pushed/pulled by floorhands until it was suspended over the Vee-door. The driller then lowered the hoist along with the drill pipe and elevators. An employee unlatched the elevators (suspended out of plumb by the hoist), which then swung back and crushed his hand against the stand of pipe in the rotary.

Case No. 0048, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by and caught between	Drilling	Mashed fingers	Elevator	4 months

A derrickman was unlatching the elevators from the drill pipe when the elevator swung out, mashing his hand between the pipe and the elevator.

Comments:

Better supervision was needed in coordinating the drilling activity; i.e., employees on the derrick cannot be allowed to rush through tasks to keep up with floorhand operations.

(4) Catlines

Case No. 0658, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	Positioning stabbing board	Fractured leg	Catline	N/A

A catline was being used to position a stabbing board on the derrick. The injured employee was guiding (hands on) the stabbing board into position. He was not wearing a safety belt or lanyard. The stabbing board jammed on the derrick, the catline broke, and the stabbing board and the employee fell.

The injured employee was saved from probable death by the driller who broke his fall by catching him. The driller sustained multiple fractured ribs from this accident.

Comments:

This injury could have been prevented had the injured employee been wearing a safety belt.

Case No. 0662, 1981

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught between and fall to below	Drilling	Amputated hand; ruptured spleen	Cathead or wire line	N/A

An employee was to run a 1/8-inch wire rope through a pulley sheave located at the derrick runaround platform. The wire was to attach a geolograph, used to record drilling rates. The employee wrapped the wire rope around his hand and proceeded to climb the derrick.

The wire line became snagged in a space between the bottom plate and the clutch mechanism of the cathead. The line wound around the cathead and yanked the employee off the derrick; as he fell he struck a beam and ruptured his spleen. The wire line continued to wrap around the cathead until it became taut enough to amputate the employee's hand.

Comments:

The employee committed an unsafe act when he wrapped the wire around his hand to carry it up the derrick. Failure to instruct the employee in the safe procedures necessary to complete a task is the responsibility of management. (This was the first time the injured employee had performed this task. Furthermore, no one was stationed at the rig controls to stop the catheads in the event of an emergency.)

(5) Working surfaces

Case No. 0575, 1975

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to working surface and caught between	Tripping	Fatal	Drill pipe	15 months

This crew had removed approximately 6,300 feet of drill pipe from the hole during the tripping operation. There were approximately 6,000 feet of "thribble" stands of drill pipe in the derrick pipe rack. Each "thribble" stand of pipe was approximately 94 feet in length. The crew had placed one stand of pipe from the offside rack in the hole. The derrickman was on the monkey board about 90 feet above the floor, the driller was at his control panel, and one floorhand had his back to the rotary table pulling the spinning chain from the cathead. The second floorhand was positioned near the rotary table, waiting to stab the next stand of pipe, while the motorman (the employee to be fatally

injured) was in back of the offside pipe rack ready to tail the pipe in the hole. The driller raised the elevators to the monkey board level and stopped their travel while the derrickman loaded one of the two remaining stands of pipe from the offside rack. The driller then raised the stand of pipe approximately 18 inches above the floor. As the motorman attempted to tail the pipe, he slipped and wrapped both arms around the pipe. The pipe swung back in the direction of the stand of pipe, still in the offside rack, crushing his head between the two stands of pipe and fatally injuring him.

Case No. 0388, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	Drilling	Bruised chest and rib cage	Cellar	19 days

An employee had been working as a floorman for 19 days. He fell into an unguarded cellar under the rig substructure and bruised his chest and rib cage.

Comments:

Since the cellar was full of water and contained blowout prevention equipment, the potential existed for the employee to strike his head and drown while unconscious.

"Near-miss" accidents should serve as a warning. Open cellars should be guarded as a matter of standard operating procedure.

Case No. 0371, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	N/A	Fractured rib	Cellar ladder	1 month

A floorhand attempted to climb down a ladder into the cellar. His hand slipped and he fell into the cellar. He bruised his back and fractured a rib.

Comments:

Ladders entering cellar openings from above should be designed with adequate handrails above the openings.

Case No. 0195, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to working surface	Drilling	Fractured foot	Mousehole	14 years

The driller had pulled a joint of drill pipe out of the mousehole to add to the string when he stepped back into the mousehole. He fractured his foot.

Comments:

All holes in the floor of a drilling rig are potential hazards. They should be covered when not in use to prevent employees from stepping into them.

Case No. 0342, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to working surface	Drilling	Bruised hip and strained back	Mousehole	1 month

A floorhand was helping another employee move a well head from the rig floor. He inadvertently stepped into the unguarded mousehole and fell. He sustained a bruised hip and pulled muscles in the lower back.

Comments:

When unoccupied, mouseholes and ratholes should be covered to prevent employees from accidentally stepping into them.

Case No. 0661, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below fluid	Circulating inspection	Fatal drowning	Reserve pits	N/A

A fatal drowning occurred at a well drilling site when an employee slipped from a reserve pit embankment into the slurry. This incident occurred at night in an unlighted area. Employees were operationally required to be in the reserve pit area three or more times each shift.

Comments:

Guardrails around the dike embankment were not in evidence, personal flotation lifejackets were not provided, and no water rescue devices were onsite.

b. Derrick Tasks

The derrickman on a well drilling operation performs his tasks from various elevated work platforms in the mast. He is exposed to falls while climbing the derrick ladder, working with the pipe stands, and moving from the ladder to his platform station. The derrickman is also exposed to crushing injuries from shifting stands of pipe and elevator latching tasks.

Adequate and continuous fall protection is a prerequisite for the safety of employees working on a derrick. Conditions beyond the control of the derrickman (wind, vibration, pipe movement) make even momentary unprotected exposures hazardous.

Case No. 0656, 1977

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	Tripping	Fatal	Derrick platform	8 months

The drilling crew was completing the final phase of a tripping operation. Forty-seven hundred feet of drill pipe, in 60-foot increments, had been returned to the hole. The final stand of pipe would not go into the hole, so the driller replaced it in the derrick rack. When the kelly was reattached to the hoist, the driller raised the block. For unknown reasons, the block struck the derrick structure, causing the derrickman to fall 50 feet from the derrick platform to his death.

Further investigation revealed that the derrickman was observed earlier in the tripping operation wearing a safety belt. It was determined that the derrickman had removed his safety belt to leave the derrick platform. He either did not put it back on to assemble the single pipe stand or he had again removed it prior to descending the derrick ladder.

Comments:

In either instance, the wearing of a safety belt could have prevented this fatal accident. The transfer point from climbing the ladder (with a fall arresting device) to the donning of the safety belt and lanyard worn during the tripping operation leaves the employee at risk during this transfer period. The use of retractable lifelines would provide fall protection during tripping operations, as well as provide

protected freedom of movement during transfer from the derrick ladder to the work station.

Case No. 0641, 1972

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	Tripping	Multiple fractures of legs and arms; head and internal injuries	Derrick ladder	N/A

The drilling crew was preparing to begin a tripping operation. The derrickman was climbing the derrick ladder when he lost his grip and fell about 70 feet to the derrick floor. He suffered multiple injuries.

Comments:

This accident could have been prevented by the wearing of a derrick climber or other fall arresting climbing device.

c. Materials Handling Activities

The most common type of accident that occurs in materials handling operations is the "caught between" situation; e.g., when a load is being handled and a finger or toe gets caught between two objects. Rolling stock (drill pipe and collars) can shift and/or fall from a pipe rack or truckbed. Employees must be alert to the hazards attendant to pipe handling and racking.

Vertical storage of drill pipe on the inclined ramp requires adequate slippage protection and employee procedural training in order to handle them safely.

Improper rigging of loads can easily result in load shifts and objects falling on those below. Materials handling procedures are frequently not given the necessary emphasis in safety training; i.e., materials handling is a support activity to the task of "making hole" and as such may be slighted.

Case No. 0508, 1973

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by pipes	Pipe handling	Fatal	Drill pipe	N/A

The rig was actively drilling. Two crew members were hoisting (by catline) 30-foot drill pipe sections from the pipe rack/catwalk to the

derrick incline. One man was working the catline, and one man was rigging the pipe at ground level. The incline, located below the Vee-door, was serving as a temporary storage point for the drill pipe; i.e., drill pipe that was expected to be added to the drill string during the shift was stored in a location conducive to its rapid addition to the drill string. The drill pipe was blocked at the bottom, but no precautions were taken at the top to prevent the pipe from slipping; e.g., 30-foot-long pipe joints stored almost vertically may tend to topple sideways. The five pipes stored in the incline toppled and fatally crushed the man working below.

A retaining safety device at the top of the incline could prevent similar accidents of this type.

Case No. 0576, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Drilling	Fractured foot; contusions	Drill pipe	N/A

Two men were handling drill pipe on the inclined pipe ramp below the Vee-door of a drilling rig. Two joints of drill pipe got away and slid down the ramp, striking and injuring both employees. A pipe joint weighs about 500 pounds and is about 30 feet long.

This accident happened after the two men had pulled five joints of drill pipe onto the pipe ramp with an air tugger. Two joints ended up crossed over three joints already on the ramp. All joints were positioned against a pipe stop near the bottom of the ramp. When one joint was moved from the bottom end of the ramp, it went over the pipe stop. The other crossed joint followed. One joint slid on top of the pipe racks, and the other joint slid to the ground under the pipe racks, striking both employees and causing a fractured foot in one and contusions in both.

Comments:

This accident reflects a lack of procedural instruction to employees. A pipe should never be handled from below. Retainers located at the upper level of the pipe ramp may have prevented the pipe from slipping.

Case No. 0513, 1975

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by kelly bushing	Drilling	Fatal	Kelly bushing assembly	N/A

The employees were in the process of making up joints of pipe, a normal task in a drilling operation. The kelly bushing separated, falling approximately 30 feet to the rig floor and fatally striking one of the employees.

Investigation revealed that there was no positive locking device used to secure the kelly bushing assembly to the hoist. It was also found that the bolt holding the split ring on the kelly bushing, to prevent disengagement of the assembly, had worked loose and had not been tightened.

Case No. 0130, 1975

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by kelly bushing	Drilling	Broken collar bone	Kelly bushing assembly	N/A

The employee was setting the slips into the rotary table on the rig floor. The kelly bushing fell approximately 10 feet from the hoisted kelly, striking the employee on the neck. His collar bone was broken by the impact.

Comments:

Employees should be protected from falling objects by proper rigging techniques and equipment inspections. Safety chains or other redundant safety equipment could have prevented this accident.

Case No. 0655

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by mud hose	Drilling	Fatal	Rotary hose	N/A

The night crew had just commenced drilling activities. They had made a connection to the drill stem. The slips, which hold the drill stem while connections are being made, were pulled up. The mud pump had just been activated by the driller, when the rotary hose, which was attached to the swivel, came loose at the point of the connection and fell approximately 45 feet to the derrick floor. The mud hose struck the employee on the side of the head and shoulder, fatally injuring him.

Investigation disclosed a new mud hose had recently been installed. The safety chain, provided for the purpose of restraining the end of the hose in the event of an accidental separation of the hose from its point of connection at the swivel, had not been reconnected.

Case No. 0497, 1981

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Caught between	Install-ing Hydril	Fatal	Hoist and blowout preventer	N/A

The well drilling operation had progressed through the installation and cementing of the surface casing. The drilling crew was installing the upper portion of a blowout preventer. They were using the main hoist to "pick" the equipment from the ground to its position below the drill floor (in the substructure area). The rig was equipped with only two slings long enough to perform the task. Tag lines were not used to position and stabilize the load. During the positioning operation, the equipment tipped and fatally crushed one of the employees.

A number of events contributed to this incident. The drilling crew is frequently assigned tasks that are not part of the everyday drilling routine. In this instance, the rigging, picking, and placement of a heavy load (12,000 pounds) in a constricted space was beyond the expertise of the crew. A four-point pick made from two points should never be performed. Hands-on positioning of heavy loads, instead of using tag lines, is not an acceptable practice.

Comments:

Proper training, appropriate equipment, and operational supervision could have prevented this death.

2. Catastrophic Events

Catastrophic accidents involve the destruction of the drilling rig and/or injuries to multiple employees. Blowouts, derrick collapse, and hydrogen sulfide accidents are included in this category. These accidents may frequently involve loss of life as well as the major destruction of equipment. Insurance companies and corporate decisionmakers become involved in accident investigations and prevention policies. Although these incidents frequently make for media headline material, the actual loss of employee life and limb represents a small percentage of the total well drilling occupational worker incidence and severity rates [2].

a. Derrick or Mast Collapse

Derrick or mast collapse is most common during rigging-up and rigging-down procedures. The greatest strains are exerted on the mast components during these operations. Inspection of the derrick structure is important for the detection of sulfide embrittlement, weld weakness, oxidation, and bent members [6, 7]. Weight indicators and recorders allow the driller to stay with mast load tolerances;

consequently, they must be maintained and inspected. Manufacturer rig capacities and guying requirements should always be followed.

Case No. 0567, 1976

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall to below	Drilling	Fractured pelvis	Rig mast	N/A

This accident happened just after the crew had pulled the last drill collar out of the well. After removing the bit, a gust of wind turned the drill rig over into an adjacent canyon. The derrickman on the finger board rode it down and sustained a fractured pelvis.

Water from breaking drill pipe at the rotary table drains under the rig floor to the ground near the mast footings. This condition may have softened the ground and contributed to the turnover.

Although the manufacturer of the derrick recommended that the mast be guyed, it was not. Outriggers improve stability but are not designed to substitute for a guying system. Additionally, the outriggers on the driller's side were not installed because the mud box and stairs precluded the placement of an outrigger.

Case No. 0493

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fall	Rigging	Fatal	Rig mast	10 days

The sequence of events leading to the collapse of the rig was as follows: The crew had just completed a drilling job on an approximately 12,000-foot hole and the mast was being prepared for letdown. Two members on each side of the rig climbed up to unlock the mast leg locking lugs. Before the lugs could be pulled, the driller had to take tension on the bridle hookup to loosen the lugs. The two men on each side pulled the lugs while the driller took tension on the bridle. Three men then got down while the derrickman climbed the approximately 143-foot mast to hook the "angel flight" line at a higher elevation to permit the counterweight to go down to near ground level where it could be disconnected for the mast letdown. The derrickman was above the mast pipe racking platform, near the 120-foot level. The driller at his stand on the floor reported that he took a tension of 60,000 to 70,000 pounds, so he picked it back up to 60,000; it then bled down to about 40,000. The third time he picked it up to 60,000 pounds, the left rear leg of the mast collapsed and the mast fell to the front left quarter. The derrickman fell with the mast.

Although this accident occurred when the crew was preparing to lay the mast down, the events leading up to this accident could occur during any phase of a drilling operation. The driller, who supervises activities during the drilling operation, is responsible for checking the weight indicator for load forces on the mast throughout the drilling operation.

In this incident, the driller had taken a weight reading of the mast load. He was trying to maintain a weight of 60,000 pounds as indicated on the meter when in actuality he had exceeded the safe load of the mast. When the meter bled down, rather than stopping to determine where the fault was, the driller continued with the operation.

B. Accidents Not Unique to Drilling Operations

Employees of drilling contractors may be injured in accidents due to:

- o Working with saws, hammers, grinders, drills, chain hoists, or pipes
- o Working with electricity, pressurized air, or other energized systems
- o Falling from or slipping on ladders, floors, scaffolds, or walkways.

The six accident case histories that follow are representative of injuries sustained by workers performing tasks not unique to well drilling operations.

Case No. 0671, 1977

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Electro-cution	Checking oil level	Fatal	Jumper cables	N/A

The deceased, who had been checking oil levels for a start-of-shift operation, was found on the rig floor between the motor for the drawworks and the diesel tank (which supplies fuel for the rig motor and the powerplant). The night shift had "jumped" the powerplant battery with the motor battery. The jumper cables were removed from the motor battery but not from the powerplant battery, and were left lying across a large diesel storage tank located between the powerplant and the motor floor.

The deceased was found lying on his back, his head resting on a mud pipe with the grounded side of a jumper cable clip across his chest. The cable was clasped in his right hand; his chest appeared burned. Another employee grabbed the cable clamp and could feel a "pulsation" through the clamp. When he could not remove the cable from the hand of the deceased, another employee jerked the cable off the ground side of the powerplant battery. The autopsy stated that the shock caused ventricular fibrillation, which made him fall to the floor and strike

his head on a pipe. The ground cable was conducting current from an undetermined source.

Case No. 0659, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by drill pipe	Unloading	Fatal	Drill pipe	N/A

A load of drill pipe was positioned to be unloaded from a highway tractor-trailer. The boomer load binder chain, which held the drill pipe in place enroute, had been released.

An employee was fatally injured when a drill pipe rolled off the bed of the truck and struck him. The employee was standing in the path the rolling stock would travel in when offloaded.

Case No. 0148, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Hammering	No lost time	Hammer	3 months

An employee was hammering a drilling head when he pulled the hammer back too far, hitting himself in the mouth.

Case No. 0001, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Foreign body in eye	Clearing pump	No lost time	Mud pump	4.5 months

A derrickman was cleaning the mud pump when a piece of dirt got into his eye. He did not report the incident right away. Two days later he needed to go to the doctor and have his eye cleaned.

Case No. 0144, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Struck by	Hoisting	No lost time	Jack handle	3 days

An employee was jacking up a catwalk with a jack, when the jack handle slipped and hit him in the jaw.

Case No. 0272, 1979

Accident Type	Activity	Nature of Injury	Equipment or Tool	Length of Employment
Fire	Lighting heater	Burns to face and hands	Heater	1 year

A floorhand was relighting a gas heater in the "doghouse." He neglected to turn the butane off prior to striking a match. The gas flashed and burned his hands and face.