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**HEALTH AND SAFETY ANALYSIS CENTER
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**VERTICAL
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ANALYSIS OF FAILURE TO BLOCK OR SECURE
MINING EQUIPMENT IN A RAISED POSITION,
COAL MINING 1973-1980

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ANALYSIS OF FAILURE TO BLOCK OR SECURE MINING EQUIPMENT
IN A RAISED POSITION, COAL MINING 1973-1980

by

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Introduction

Repairing or working under, over, or between raised mining equipment occurs frequently at coal mines. This activity has become routine and common type of work for most miners. The continued occurrence of accidents involving a failure to block or secure elevated equipment indicates a need to emphasize proper work practices.

Analysis

Unsecured mining equipment has accounted for twenty-two coal mine industry fatalities from 1973 through 1980. Fatalities have increased the last two years. Fourteen fatalities were the result of employees positioning themselves under, or between raised, unblocked mining equipment that moved or shifted. Seven other fatalities were caused by faulty, improper blocking methods or inadequate blocking material. Two of these fatalities occurred when the employees securely blocked the loading machine conveyor boom then positioned themselves between the bumper and boom. When the pressure to the boomjacks was removed, the bumper raised, crushing the victims against the boom. The remaining fatality occurred when a shuttle car was raised onto blocking material. The car rolled off the material, crushing the employee performing repairs underneath. The equipment involved in these accidents is shown in table 1.

Recommendations

Raised, elevated, and unsecured equipment must be securely blocked to prevent movement before employees position themselves under or between movable components of the equipment. Occasionally more than one component location on a machine must be blocked. Blocking material must be capable of supporting the weight of the equipment or component. Wood used for blocking material must be solid and should be flat sided. Most equipment can be safely blocked with a solid wooden crib. The crib should be installed on a solid footing and wedged tightly to the machine to prevent any initial movement that could dislodge the blocking.

The inclusion of mechanical locking or blocking devices in the basic machine design may help address the problem of suitable blocking not being readily available at the work site. The use of built-in check valves in hydraulic cylinders could help to prevent accidental movement caused by the loss of hydraulic pressure.

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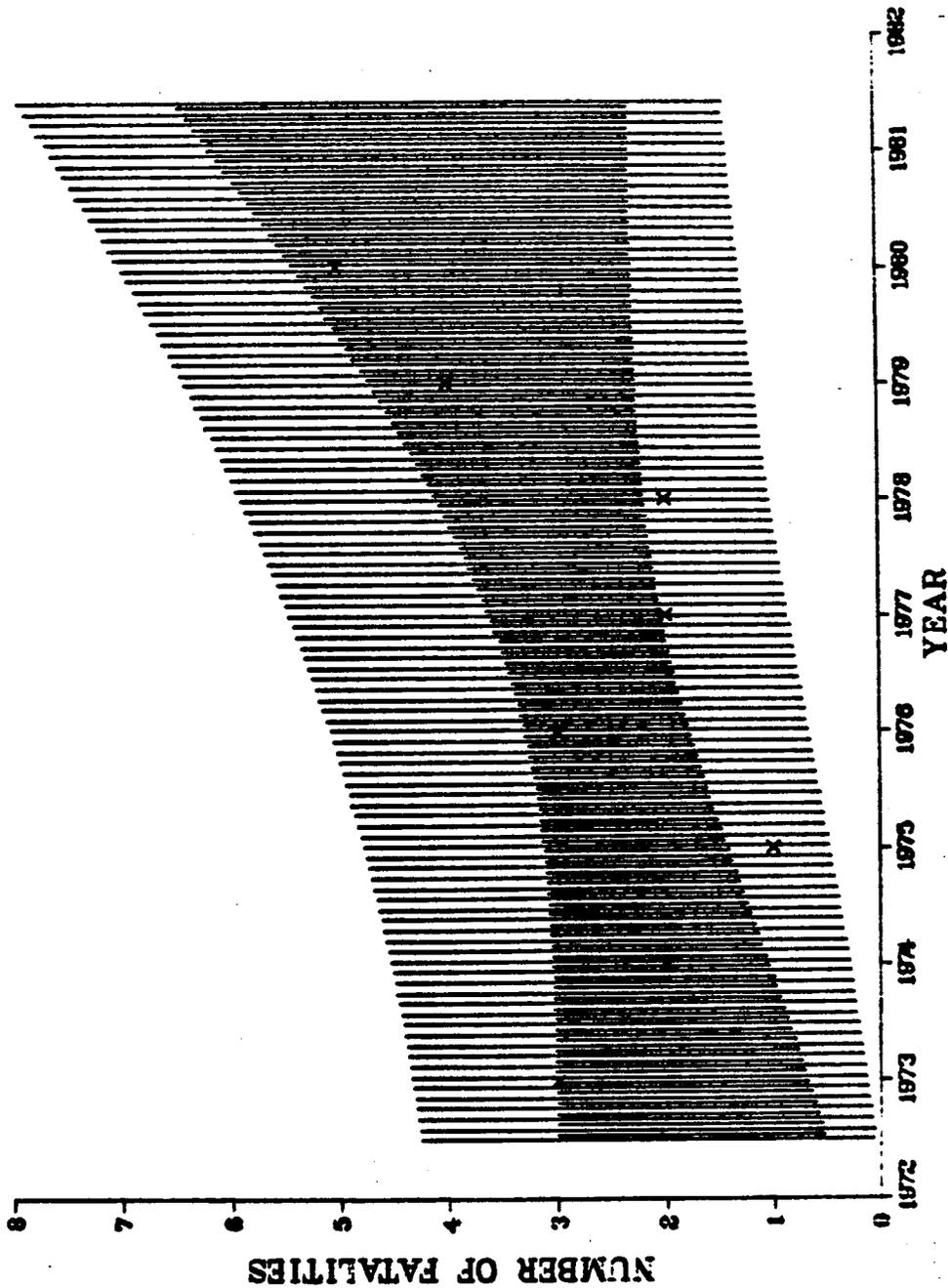
Table 1. - Fatals caused by failure to block equipment

Equipment type

Year	Cont. min- ing machine	Load- ing machine	Bull- dozer	Truck	Drag- line	Short- wall chock	Long- wall chock	Crane	Auto	Shuttle car	Total
1973	1	1	0	0	1	0	0	0	0	0	3
1974	0	1	1	0	0	0	0	0	0	0	2
1975	0	1	0	0	0	0	0	0	0	0	1
1976	0	0	0	1	1	1	0	0	0	0	3
1977	0	2	0	0	0	0	0	0	0	0	2
1978	1	0	1	0	0	0	0	0	0	0	2
1979	2	1	0	0	0	0	0	0	0	1	4
1980	2	0	0	0	0	0	1	1	1	0	5
Total	6	6	2	1	2	1	1	1	1	1	22

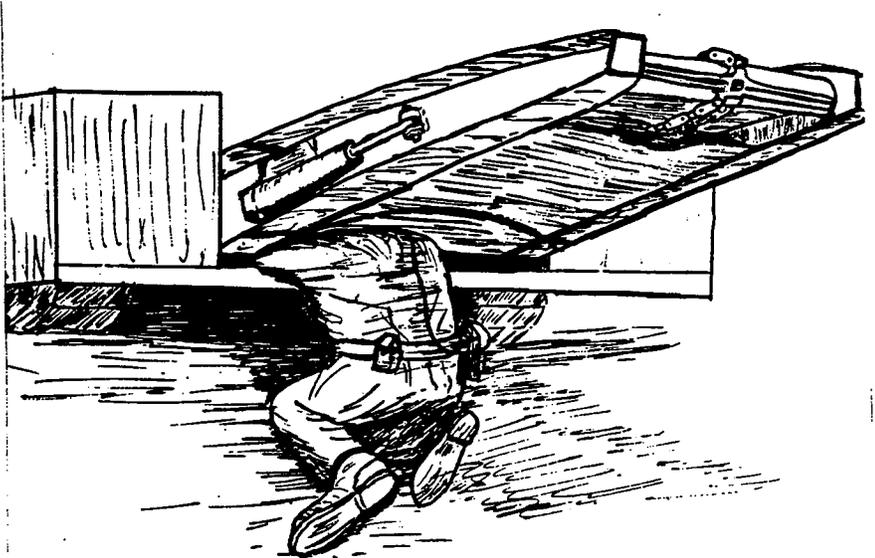
FATALITIES CAUSED BY FAILURE TO BLOCK EQUIPMENT

$F(1.5) = 2.82$ $\lambda = 0.65$



January 29, 1973

While repairing a hydraulic leak on a continuous mining machine, a mechanic positioned himself between the raised unblocked conveyor tail boom and the bumper. The hose ruptured, permitting the boom to fall, crushing the victim.
(underground)

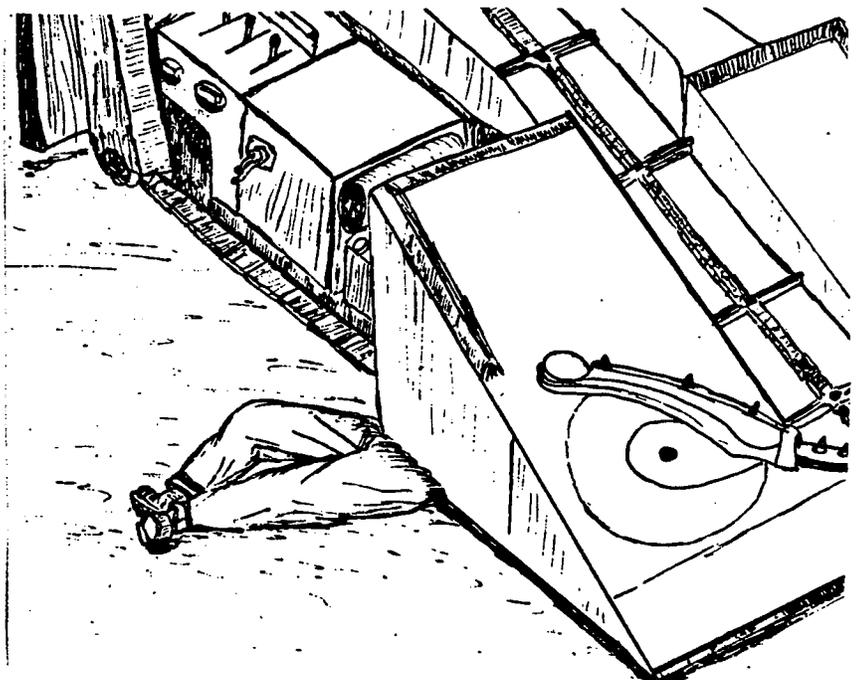


September 21, 1973

While removing the bolts supporting a swing pinion gear in a drag-line, an employee positioned himself under the unblocked gear. When the last bolt was removed, the gear fell crushing the victim.
(surface)

November 30, 1973

An employee positioned himself under a raised unblocked head of a loading machine to remove the drain plug in a loading arm pot. Another employee accidentally hit the loader head control lever causing the head to fall, crushing the victim.
(underground)

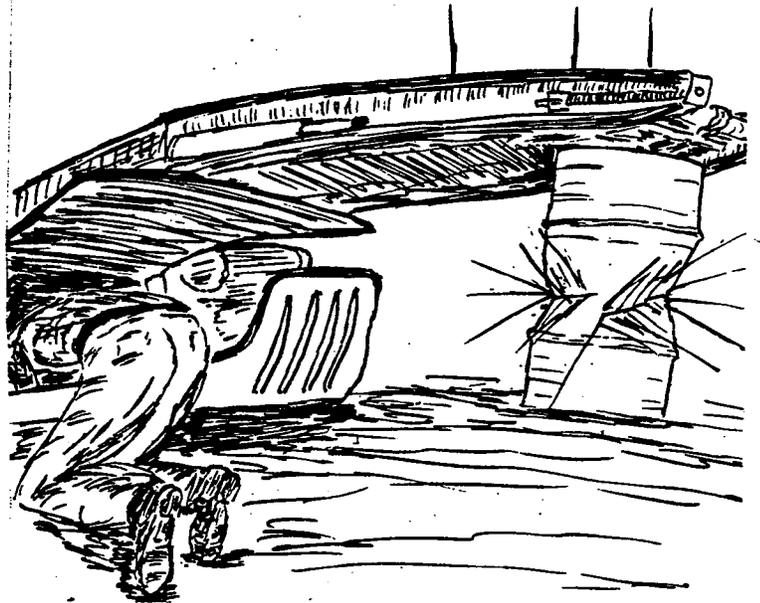


April 8, 1974

While servicing a crawler tractor (bulldozer) in the surface maintenance yard, an employee positioned himself between the hydraulic cylinders used to control the ripper on the tractor. Another employee entered the cab and accidentally hit the ripper control lever, permitting the ripper to fall. The cylinders squeezed the victim, causing fatal injuries. (surface)

September 24, 1974

An employee positioned himself between a raised conveyor boom and the bumper of a loading machine to repair the hydraulic system. The boom was improperly blocked with a 55-gallon drum. The boom fell, crushing the drum and the victim. (underground)



January 10, 1975

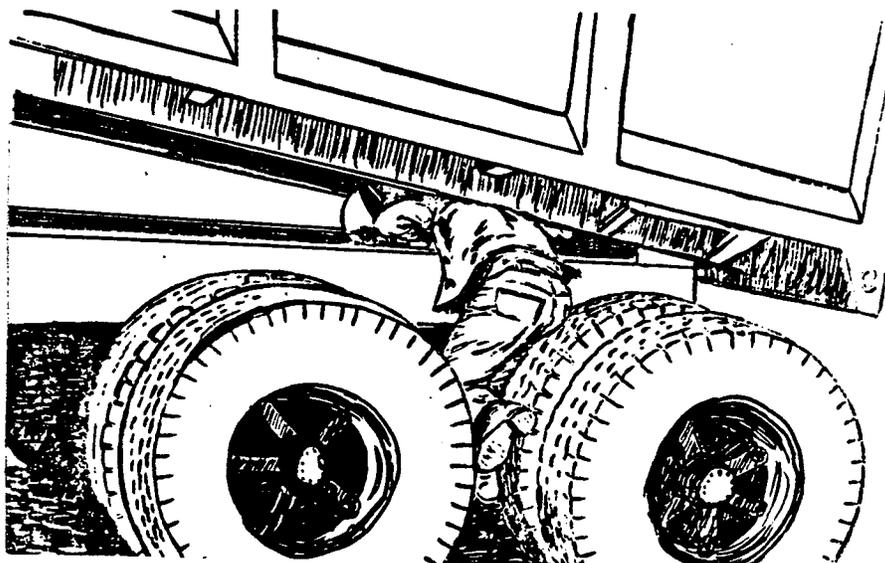
A mechanic positioned himself under a raised, unblocked loading machine conveyor boom to tighten a hydraulic fitting. The boom fell, crushing the victim. (underground)

January 4, 1976

During the installation of a new shaft for the drag drum and gear on a drag line, a welder positioned his head between the unblocked drum and gear. The drum moved, crushing the victim's head. (surface)

April 20, 1976

A truckdriver positioned himself between the raised unblocked truck bed and the frame to repair the universal joint between the tandem axles. The bed fell, crushing the victim. (surface)



September 3, 1976

A jacksetter was fatally crushed under the forward portion of a longwall chock canopy. The victim was removing loose material under the raised chock base when the single block supporting the canopy dislodged. (underground)

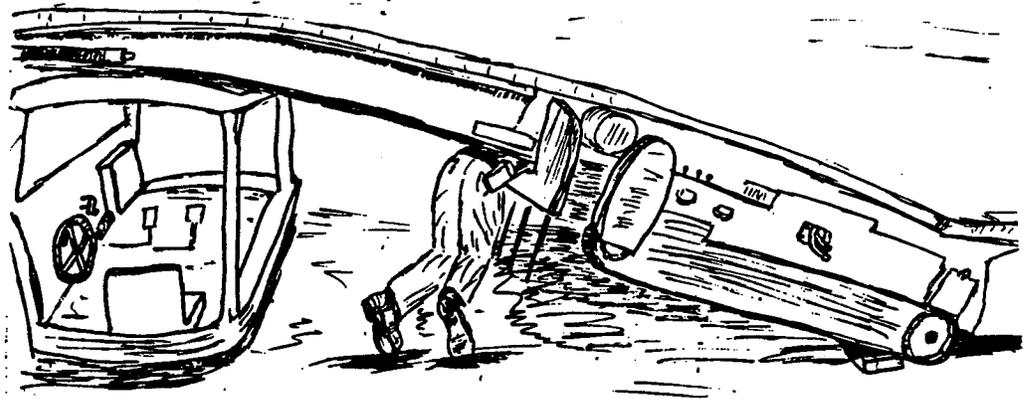
April 8, 1977

After blocking the loading machine conveyor boom on the side of a shuttle car, a repairman positioned himself between the boom and the bumper to repair a hydraulic fitting. The fitting broke, releasing the boom pressure; causing the bumper to come up, crushing the victim into the boom. (underground)



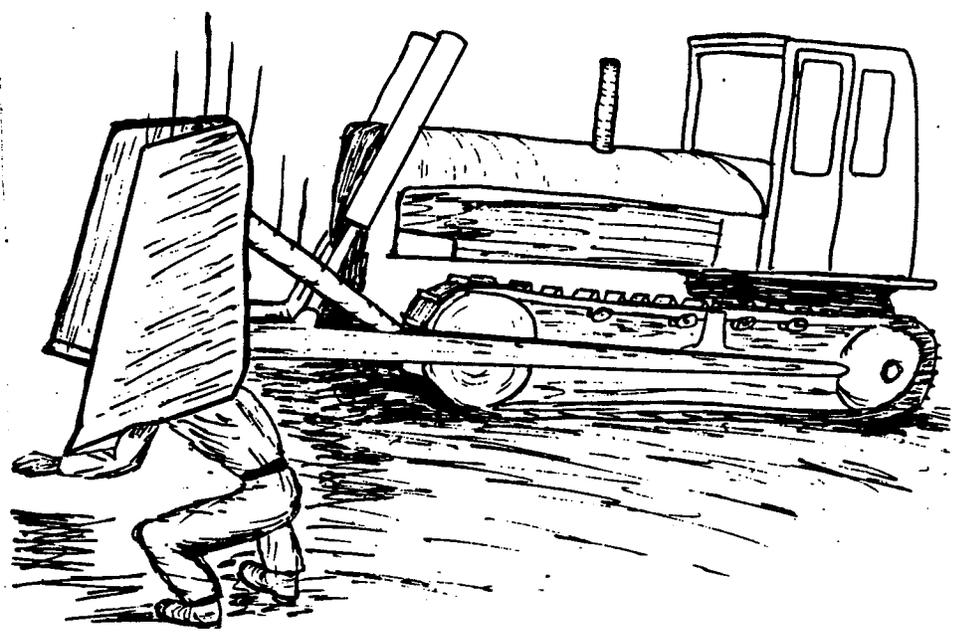
August 30, 1977

A loading machine was elevated on wooden blocks with the conveyor boom resting on another machine. A repairman was working between the boom and the bumper when the hydraulic pressure to the boom jacks was released. The rear frame moved upwards, crushing the victim. (underground)



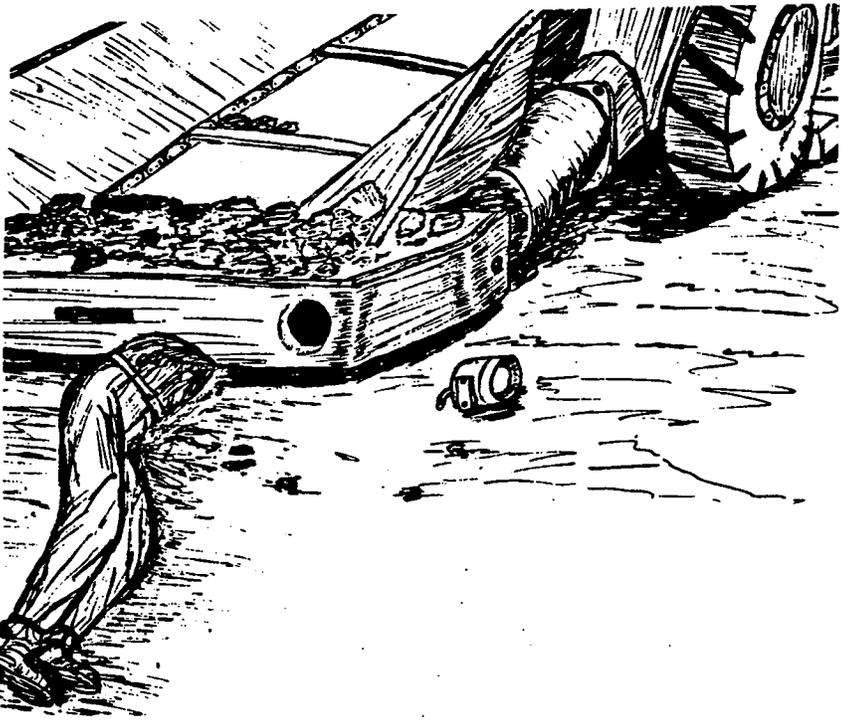
May 22, 1978

A mechanic positioned himself under a raised unblocked dozer blade to tighten the corner bit bolts on the blade. The dozer operator inadvertently hit the dozer blade control, causing the blade to fall, crushing the victim. (surface)



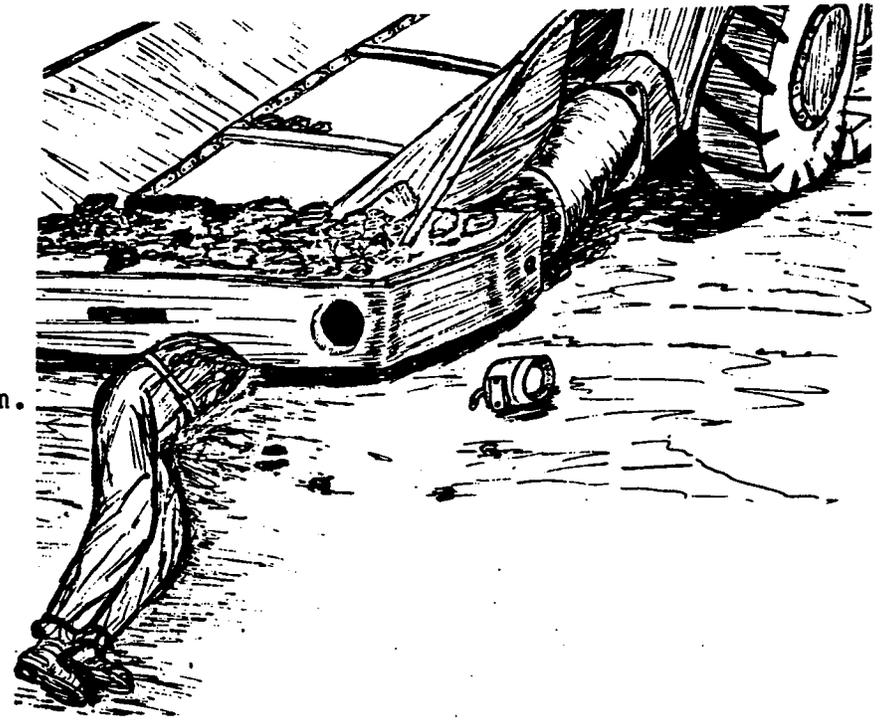
August 16, 1978

While under a raised continuous miner cutting head, a mechanic trainee was attempting to insert a cutting jack hinge pin when the material used to block the head dislodged. The cutting head fell, crushing the victim. (underground)



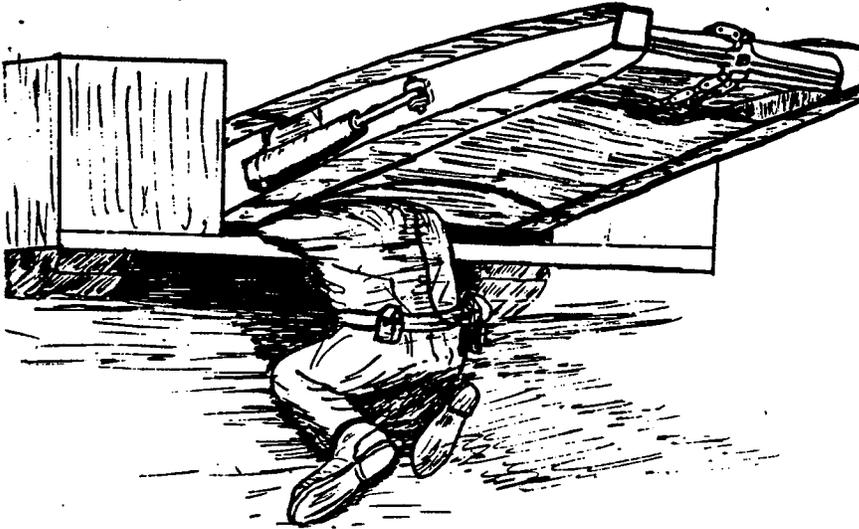
January 20, 1979

An electrician was welding under a shuttle car that was on wooden blocks. The shuttle car rolled off the blocks, crushing the victim. (underground)



July 23, 1979

A repairman positioned himself under a raised continuous mining machine cutting head that was blocked with two vertical posts. The blocking material dislodged, causing the head to fall, crushing the victim. (underground)



July 30, 1979

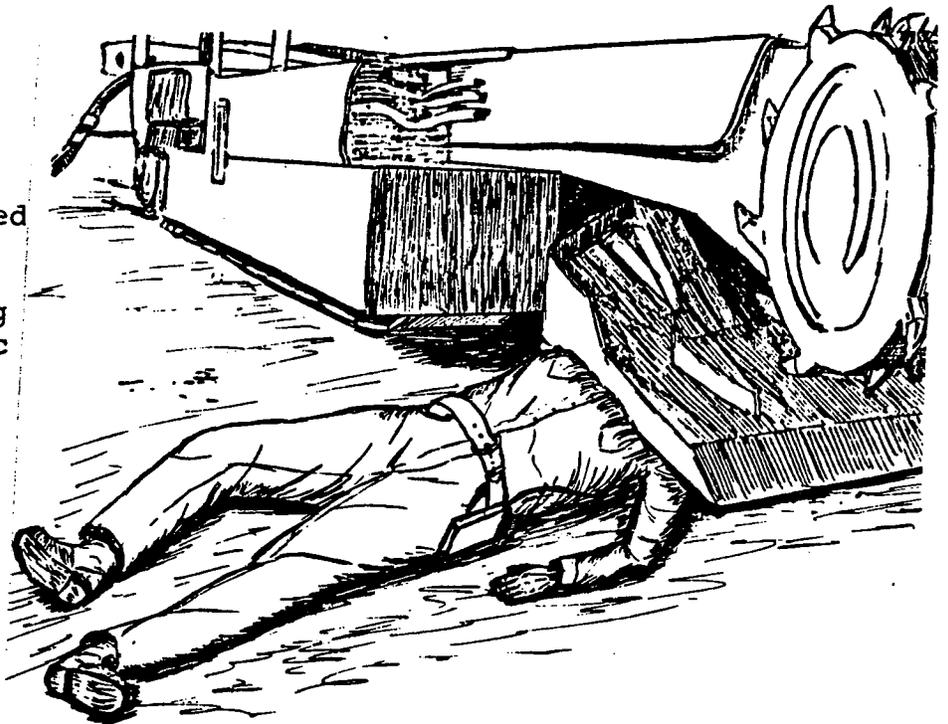
While attempting to locate a hydraulic oil leak, a mechanic positioned himself between a raised unblocked continuous miner conveyor boom and bumper. The boom fell, crushing the victim. (underground)

October 19, 1979

A repairman was working under a raised loading machine head that was blocked with cinder blocks. The head fell, crushing the blocks and the victim. (underground)

February 7, 1980

An electrician positioned himself under a raised unblocked continuous mining machine gathering head while the hydraulic system was being operated to keep the head elevated. A relief valve in the system opened, permitting the gathering head to fall, crushing the victim. (underground)



March 17, 1980

A maintenance foreman, looking for a hydraulic oil leak, positioned himself under a raised, unblocked continuous mining machine cutting head. Another employee uncoupled a hydraulic hose to the head, causing the head to fall, crushing the victim. (underground)

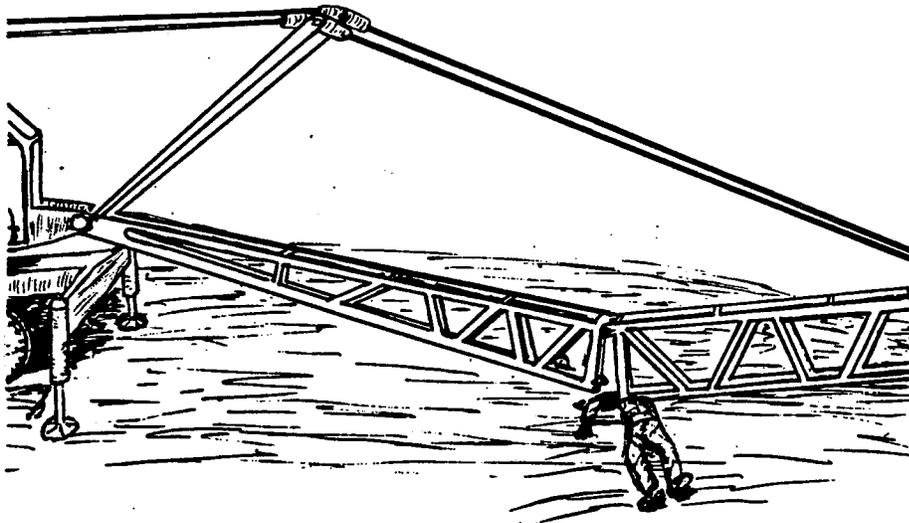


June 6, 1980

A master mechanic was under a raised automobile in a surface shop when the device suspending the automobile broke. The car fell and fatally injured the victim. (surface)

September 19, 1980

A welder crawled under a suspended, unblocked crane boom to remove the second lower hinge pin so the boom could be lengthened. The pin came out, permitting the sections to part, crushing the victim under the boom. (surface)



October 13, 1980

While repairing a longwall chock on the surface, an employee positioned himself between the raised, unblocked caving shield and the chock base. Another employee removed a hydraulic hose to the control valve bank causing the shield to fall, pinning the victim between the shield and the chock base. (surface)