



# STATE OF NEW YORK DEPARTMENT OF HEALTH

## FATALITY ASSESSMENT AND CONTROL EVALUATION

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### Dairy Farm Owner Dies during Manure Pump PTO Entanglement Case Report: 04NY010

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#### SUMMARY

On February 20<sup>th</sup>, 2004 a 53-year-old dairy farm owner was fatally injured while transferring manure from an underground storage pit to a manure lagoon. At the time of the incident, the farmer was utilizing a manure pump that was connected to a John Deere 4230 tractor via a power take-off (PTO) shaft. The farmer reached across the unshielded PTO shaft in order to operate a hand crank that would turn the manure pump chute. As he did this, his clothing became entangled in the PTO shaft, wrapping the farmer's body around the shaft. A co-worker who discovered the victim immediately called 911. Emergency rescuers responded promptly. The victim was subsequently pronounced dead at the scene.

New York State Fatality Assessment and Control Evaluation (NY FACE) investigators concluded that to help prevent similar incidents from occurring in the future:

- ***PTO-powered equipment should not be operated unless the PTO shield is in place and in good condition;***
- ***Power to equipment should be turned off prior to making mechanical adjustments and;***
- ***Entire manure handling systems should be designed to facilitate operator safety.***

#### INTRODUCTION

On February 20<sup>th</sup>, 2004, at approximately 1:30 p.m. a 53-year-old Caucasian male dairy farm owner was fatally injured while transferring manure from an underground storage pit to a manure lagoon. The farmer was utilizing a liquid manure pump, powered by a tractor with a power take-off (PTO) shaft, to agitate the underground storage pit in preparation for transferring the manure into the lagoon. The farm owner became entangled in the PTO shaft and subsequently died as a result of injuries sustained in the entanglement.

New York State FACE staff learned of the incident on February 23<sup>rd</sup>, 2004 through a newspaper article. A NY FACE investigator conducted a site investigation at the scene on March 18<sup>th</sup>, 2004 and visited with both the wife and brother of the victim. The sheriff's report and Medical Examiner's report were also reviewed.

The dairy farm was owned and operated by the victim and his brother, who had lived and worked their entire life on this farm. The farm milked approximately 160 cows, with an additional 140 young stock, and grew approximately 400 acres of field crops. The two farm owners worked full-time on this farm, with additional help coming from an occasional part-time employee. This was the farm's first serious injury event.

## INVESTIGATION

On February 20<sup>th</sup>, 2004, the farm owner was transferring liquid manure from an underground manure storage pit (Figure 1) in the end of the dairy barn to a manure lagoon that was located outside of the barn. On this particular farm, the freestall barn that housed the dairy cows was designed with two underground manure storage pits. The manure was scraped into the pits and held there until the level necessitated transfer of the manure to a larger outside storage lagoon. The freestall barn contained two separate manure storage pits that were 34 feet long by 10 feet deep and 10 feet wide. The manure from these pits needed to be transferred approximately once a month to

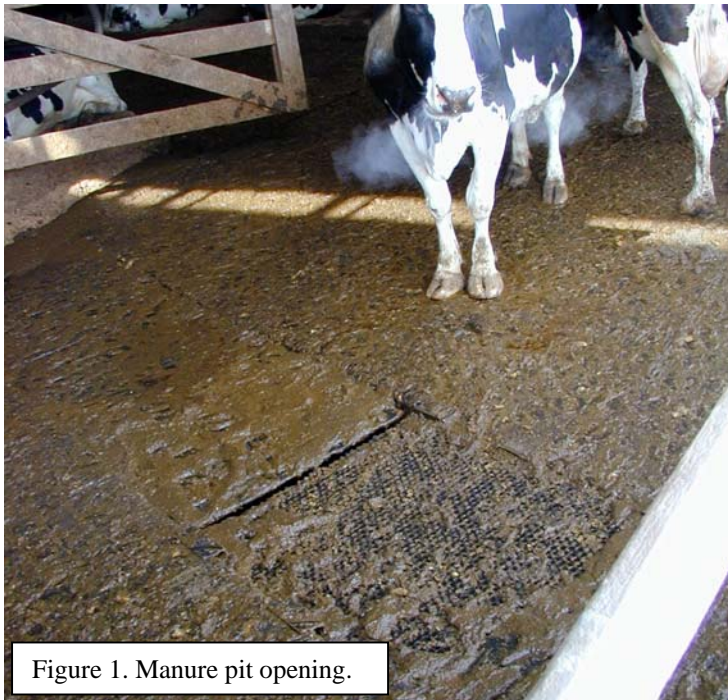
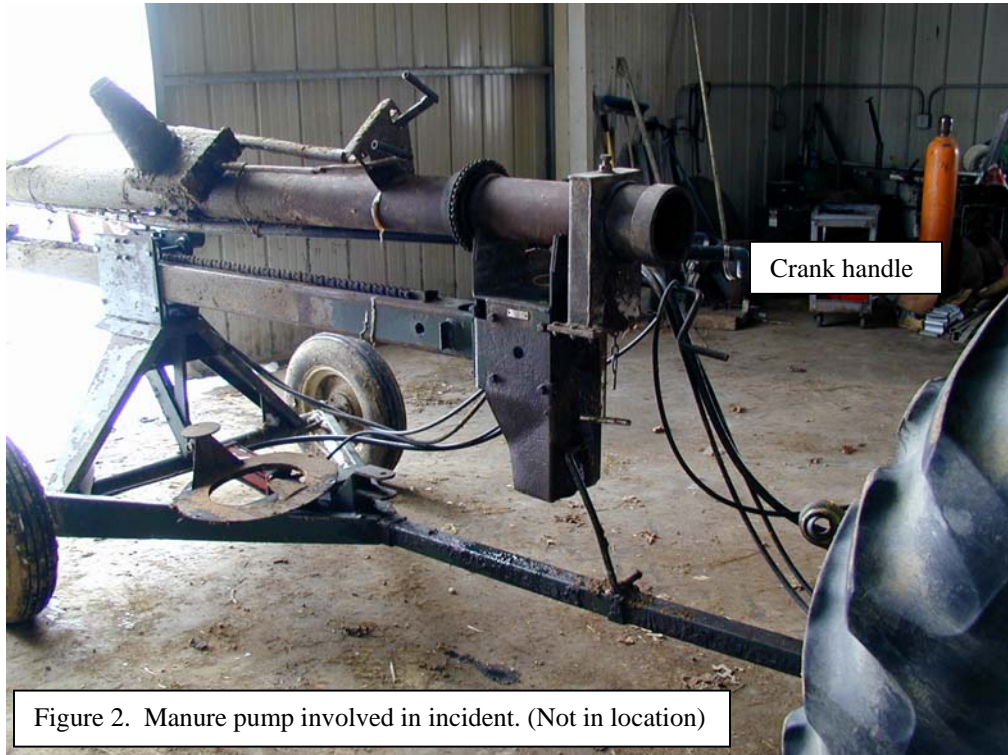


Figure 1. Manure pit opening.

the manure storage lagoon located outside. To perform the transfer, the farmer utilized a liquid manure agitation and transfer pump. The Husky brand manure pump (Figures 2 and 3) was connected via a 540rpm PTO to a John Deere 4230 tractor with approximately 120 horsepower. The manure pump was a 12-year-old model that had worked well prior to the incident.

Prior to transfer, the pump is lowered into the pit, and the pit is agitated whereby manure is pumped from the pit and circulated back into the pit. This suspends the solids more uniformly in the liquid manure and allows for better transfer of the material from the pit to the outside storage lagoon. During the agitation process, it is necessary to change the direction of the agitation spout on the manure pump. In order to do this the operator must turn a crank handle (Figure 2) to reposition the output spout to change the agitation flow. This crank handle is located on top of the manure pump



head near the rear connection to the PTO shaft. In standard practice, this crank is turned while the PTO is turned off so that the pump is not running.

On the day of the incident, the farm owner was performing this transfer procedure alone as his brother was away on vacation. The part-time worker was present that day and working around the farm doing various chores.



The victim had been ill the day before the incident and was still not feeling well. He had worked the night before until approximately 2:00 a.m. feeding calves and doing other chores on the farm.

He had then come home and slept approximately 3 hours before getting up and returning to the farm to do the morning chores and begin milking.

Shortly after lunch, he began agitating the manure pit in preparation for transfer of the manure to the lagoon. During the transfer of the manure, the tractor was operating at approximately half throttle. Since the PTO shaft was hooked to the 540 rpm PTO the liquid manure pump would have been operating at approximately 250-300 rpm.

As the farmer was agitating the manure in the pit, he dismounted from the tractor and began adjusting the crank handle, which altered the output chute direction of the pump. He did not shut off the power to the unit prior to the handle adjustment. In order to crank the handle, the farmer was standing next to the rotating PTO shaft, slightly leaning over it to reach the crank handle on the other side of the pump. As he was cranking the handle, his jacket became entangled in the rotating PTO shaft, entangling him and rotating him around the shaft. His head and body were impacted against the drawbar of the pump.

The part-time worker, who was nearby in the freestall barn, heard a noise. He immediately went to the scene where he shut off the PTO and the tractor engine. He could see that the victim had sustained a serious injury and immediately went to the shop to call 911. Both the local rescue squad and the county sheriff responded promptly. The victim was pronounced dead at the scene.

The sheriff noted during extrication of the victim that the victim's clothing was caught on the PTO shaft and had pulled the victim into the shaft. The PTO shaft was not guarded with a shaft shield and there were also two shear bolts protruding from the shaft, one at each end. These quarter-inch shear bolts were broken at the time of the extrication of the victim, but it is believed that these bolts caught on the clothing of the victim initially, entangling him in the shaft. These shear bolts are present so that if the manure pump becomes clogged or encounters an obstruction, they shear prior to serious damage to the pump. In this case, the PTO shaft had these shear bolts protruding since there was no shaft shield in place to guard against contact with them.

Both the wife of the victim and the victim's brother stated that they knew that this shaft presented a hazard without the shield, and that they had wanted to replace the shield but had not yet done so. The shaft had required some maintenance and the shaft shield was not put back on because it had been damaged and they were concerned about this shaft as a hazard. Following this incident, a new shaft and shield were put in place on this piece of equipment.

## **CAUSE OF DEATH**

The Medical Examiner listed the cause of death as multiple injuries.

## **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1:** *PTO-powered equipment should not be operated unless the PTO shield is in place and in good condition.*

**Discussion:** In this scenario the power take-off shield was not in place and therefore presented a possible hazard to people working around the PTO.

**Recommendation #2:** *Power to equipment should be turned off prior to making mechanical adjustments.*

**Discussion:** In this case, adjustments were made to the discharge chute of the manure pump while the unit was operating. The fact that the operator had to stand next to the turning PTO shaft to make the adjustment put the operator in a hazardous situation. Turning off equipment prior to making adjustments could help to reduce potential hazards to the operator.

Additionally, farms may consider tractor models that feature hydraulic powered adjustments that can be controlled from the operator's seat.

**Recommendation #3:** *Entire manure handling systems should be designed to facilitate operator safety.*

**Discussion:** In this scenario, manure was scraped from the barn, collected in the manure storage pits and then transferred monthly to the manure lagoon. Many manure handling system designs eliminate the intermediary collection stage and manure is immediately directed to the manure storage lagoon. A design that eliminates manure collection in storage pits would eliminate the need for subsequent transfer of manure with pumps.

**Keywords:** *manure pump, farm, agriculture, power take-off, PTO, entanglement*

The Fatality Assessment and Control (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), the NYS DOH FACE program collects information on occupational fatalities in New York State (excluding New York City) and targets specific types of fatalities for evaluation. NYS FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. The FACE program does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the New York State FACE program can be obtained from:

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[www.health.state.ny.us/nysdoh/face/face.htm](http://www.health.state.ny.us/nysdoh/face/face.htm)